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CONTENT

ASPECTS REGARDING THE SEED COLLECTION OF THE BOTANICAL GARDEN OF IASI

ASPECTE PRIVIND COLECȚIA DE SEMINȚE DIN CADRUL GRĂDINII BOTANICE IAŞI

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Abstract*: In the "Seed change laboratory" belonging to the Botanical Garden of Iasi a seed collection has been initiated. This seed collection consists in more than 500 samples of ligneous and herbaceous plant species. The samples belong both to spontaneous and cultivated species, including strains and varieties. The collection is useful in clarifying different aspects regarding the determination of some species. It can be used by comparison when determining the purity of a seedage lot, when identifying vegetal rests found in various archaeological sits.*

Rezumat*: În cadrul "Laboratorului de schimb de semințe" al Grădinii Botanice Iaşi a fost inițiată o colecție de semințe. Colecția de semințe numără peste 500 eşantioane de la specii de plante lemnoase şi ierboase. Eşantioanele provin atât de la specii spontane, cât şi cultivate, inclusiv soiuri şi varietăți. Colecția este utilă în clarificarea diferitelor aspecte legate de determinarea unor specii. Poate fi utilizată prin comparare la stabilirea purității unui lot semincer, la identificarea resturilor vegetale găsite în diferite situri arheologice etc.*

The study of seeds is an area as interesting as is difficult. Specific bibliography is scarce and most of it is published abroad [2]. In Romania there is research in this area focusing both on morphology and internal structure of the seeds.

Generally, taxonomical papers [1] contain brief information on the morphology of fruits and seeds but, in some cases, they also have general traits characteristic of a larger taxonomical group (genus, subgenus, etc.). Properties of fruits and seeds are frequently used as keys in species identification, aspect that highlights the importance of studying such properties. This is especially valuable in agriculture, when discussing weeds damaging the crops.

RESULTS AND DISSCUSIONS

In the international seed exchange Lab of the Iasi Botanical Garden, starting in the 1990s a seed collection was set up. Today this has 782 different taxa, both wild and tilled. Of these, 76 samples are of infrataxa (species, forms, varieties, types). Most of them are Romanian wild taxa.

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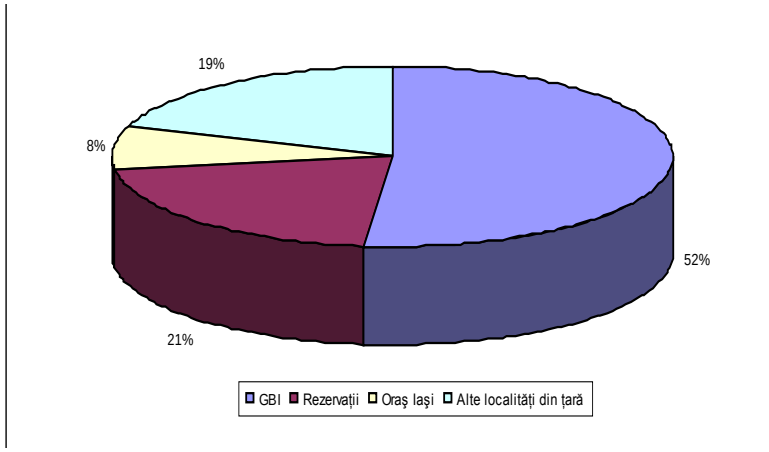
The first samples have been collected in 1979 while the most recent are from 2004.

22 samples belong to the gymnosperms which represents 3% of the total. As expected, most samples belong to infrataxa of the *Asteraceae* family: 116 taxa representing 16% of the total.

Samples were collected throughout the country but most of them originate in the Iasi Botanical Garden - 376 taxa representing 51,6% of the total. Especially valuable are samples from 154 taxa collected in 17 Romanian national parks, representing 21.1% of the total number of taxa.

Fig 1 Graphical representation of sample percentage for each collecting place



The table below shows a detailed representation of samples originating in national parks [3, 6].

Table 1

Seed samples collected in national parks

Nr.	Place	Number of colected taxa
1	Județul Iaşi, comuna Lețcani, rezervația naturală "Fânețele seculare Valea lui David"	62
2	Județul Constanța, municipiul Constanța, rezervația naturală "Dunele marine de la Agigea"	24
3	Județul Constanța, comuna Albeşti, rezervația naturală "Pădurea Hagieni"	20
4	Județul Galați, comuna Fundeni, sat Hanu Conachi, rezervația naturală "Dunele de nisip de la Hanu Conachi"	13
5	Județul Suceava, comuna Pojorâta, rezervația naturală "Codrul Secular Giumalău"	9
6	Județul Cluj, comuna Suatu, rezervația naturală "Fânațele Suatu"	9
7	Județul Cluj, comuna Mihai Viteazu, rezervația naturală "Cheile Turzii"	5

8	Județul Neamț, comuna Bicaz-Chei, rezervația naturală "Cheile Şugăului"	3
9	Județul Iaşi, comuna Miroslava, sat Uricani, rezervația naturală "Pădurea Uricani"	2
10	Județul Braşov, oraşul Rupea, rezervația naturală "Stânca bazaltică de la Rupea"	2
11	Județul Iaşi, comuna Dumeşti, rezervația naturală "Sărăturile din Valea Ilenei"	1
12	Județul Harghita, comuna Sânmartin, sat Lăzăreşti, rezervația "Lacul Sfânta Ana"	1
13	Județul Suceava, comuna Poiana Stampei, rezervația naturală "Tinovul Poiana Stampei"	1
14	Județul Harghita, comuna Sânmartin, sat Lăzăreşti, rezervația naturală "Tinovul Mohoş"	1

Five taxa collected in the wild are endangered taxa; they are mentioned in national and international conventions (see the table below):

Table 2

Seed samples of the endangered taxa

Species	National or international conventions
Arnica montana L.	HD AnVb
Crambe tataria Sebeók	HD An IIb
Echium rossicum J. F. Gmel.	HD An IIb
Paeonia tenuifolia L.	BC
Syringa josikaea Jacq. F.	HD An IIb

HD – habitats Directive 92/43/EEC – Annexes IIb and Vb
BC – Bern Convention – AppI

Sample information has been stored in electronic format using Excel. The following elements have been saved: family, genus, species, author, subspecies (when necessary), form/variety/ type (when necessary), alternative name (when necessary), place of collection, year when collected.

Fig. 3 Sample of our seed

All taxa are listed in issues of „Catalogul de seminte si spori" („Catalogue of seeds and spores") of the Iasi Botanical Garden which has been published between 1979 and 2005 [4, 5].

The samples of seeds was split in 5 transparent bags so that they can be studied with the naked eye or using a magnifying glass.

By comparative analysis of the vegetal material in this collection some problems in species identification can be solved, especially when the fluorishing phase has been overlooked, impurities in seed lots can be found. A different usage is the macroscopic and microscopic comparison with seed lots found on different archeological sites, in vegetal or animal remains.

CONCLUSIONS

The seed collection represents an important vegetal material for taxonomical studies.

Analysis of samples from the collection can help solving species identification problems.

Comparative analysis enables identification of impurities in seed lots.

Along with macroscopic analysis, microscopic analysis can help with identification of seed fragments found in archaeological sites, of seeds found in the bodies of animals or in their dejections, etc.

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INVASIVE PLANTS FROM THE CERNA OF OLTET BASIN

PLANTE INVAZIVE DIN BAZINUL CERNEI DE OLTEȚ

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Abstract: *In this paper we are presenting the main invasive species from the Cerna of Oltet Basin. The invasive species from the Cerna of Oltet Basin are species with luxuriant development on a certain area, on the prejudice of other species, due to a dominant and favourising ecological factor, natural and anthropic. From this category are also the adventive plants which usually grow in anthropogenic habitats (cultivated fields and/or ruderal area). Among these we mention: Amorpha fruticosa, Ambrosia artemisiifolia, Calamagrostis epigeios, Cardaria draba, Centaurea solstitialis, Cirsium arvense, Conyza canadensis, Hordeum murinum, Pteridium aquilinum, Sambucus ebulus, Xanthium italicum and other.*

Rezumat: *În această lucrare se prezintă principalele specii invazive din Bazinul Cernei de Olteț. Plantele invazive sunt acele specii care au o dezvoltare luxuriantă pe o anumită suprafață, în detrimentul celorlalte, datorită unui factor ecologic dominant şi favorizant, natural sau antropic. Din această categorie fac parte şi plantele adventive care cresc obişnuit în habitate antropogene (câmpuri cultivate şi/sau arii ruderale). Dintre acestea amintim: Amorpha fruticosa, Ambrosia artemisiifolia, Calamagrostis epigeios, Cardaria draba, Centaurea solstitialis, Cirsium arvense, Conyza canadensis, Hordeum murinum, Pteridium aquilinum, Sambucus ebulus, Xanthium italicum ş.a.*

***Key words*:** invasive plants, Cerna of Oltet Basin.

INTRODUCTION

In order to be invasive a plant should have certain qualities: to be endowed with fast spreading means, to produce many embryos annually , to have at disposal vegetative reproduction means, to grow fast, to be large in size and have strong underground organs and not be preferred by phytophagous animals. Some of the plants identified in the examined territory become invasive.

MATERIAL AND METHOD

The first stage while studying the Basin of the Cerna of Oltet was the reading of the bibliographical material. That is why many publications mentioned in the bibliography represented a reference material through the similarity of the geographical zone and the studied one. Starting from this information we repeatedly studied the area conform to the method of itinerary as the surface was very large, but when necessary we used the method of stationary and detailed our analyses collecting and preserving the floristic material.

The identification of the taxons was performed on preserved dry material or on live material, using the latest taxonomic informative sources (Beldie Al., 1977, 1979, Săvulescu T., 1952-1976, Tutin T.G., et al. 1964-1980, Ciocârlan V., 2000).

RESULTS AND DISSCUSIONS

1. *Amórpha fruticósa* L. – Fabáceae Fam.

This species of North- American origin can be found in the lower side of the examined territory in the meadow land of the river Cerna. It flowers and it fructifies abundantly and in addition to this it becomes thicker through sucking**.** Even though, at the beginning it was cultivated now it is difficult to be controlled. Its only advantage is that it consolidates the soil in which it grows.

2. *Ambrósia artemisiifólia* L. – Asteráceae Fam.

It is of North- American origin. It forms dense local masses in ruderal territories along the main road in the basin and has the tendency to expand. In many European countries it is considered "quarantine weed". It will not be impossible for this species to acquire this status, even in our case, unless measures to control its spreading are taken.

3. *Calamagróstis epigéjos* Roth – Poáceae Fam.

It is a strong plant, with a rhizome which can be found from the level of the locality called Oteteli (at the confluence of the rivers Cerna and Olteț) up to the region of the sub-Carpathian hills (at the level of the locality called Slătioara). Along with the rhizomes the flying fruits are an advantage for this species when it spreads on new territories. This species does not demand a certain substratum and it can be found on various soils.

4. *Cardária drába* (L.) Desv. – Brassicáceae Fam.

It is a species frequently found in the places along the communication means from the basin to which it lends a white look. It has a great spreading ability by means of its offshoots from its roots and by its great number of seeds which become mature at the beginning of the summer. It flowers in abundantly in spring and spreads a pleasant smell.

5. *Centauréa solstitiális* L. – Asteráceae Fam. (Fig. 1)

It is an annual species frequently met in the ruderal places, fallow fields, and antropophile grass plods from the Cerna of Olteț Basin. It usually establishes itself on dense soils, poor in humus. Its presence in grass plots contributes to their degradation. In the places where it establishes it self it grows rapidly because the fact that it is not used as fodder and because of its thorns at the level of the inflorescence.

Fig. 1. General aspect with *Centauréa solstitiális* L.

6. *Círsium arvénse* (L.) Scop. – Asteráceae Fam.

Indigenous Eurasian plant, it is also ruderal and segetal**.** In the searched territory it can be found in various cultures, especially stalky ones where it develops high colonies. The calix of the fruit and the development of the offshoots on the roots makes it successful in creating widespread clusters and makes it capable of eliminating other cultures.

7. *Conium maculátum* L. – Apiáceae Fam.

It is a strong plant, growing up to 2 meters in height, biannual, nitrophile**,** and also toxic. It forms pure, thick clusters true fortresses growing in ruderal places especially in highly humid ones such as the meadow land of the Cerna river. It spreads a fetid smell like that of a mouse. It is a toxic pland and therefore it is not eaten by animals. People do not seem eager to destroy these fortresses that bring only trouble. It can be recognized by the purple spots on its stem.

8. *Conýza canadénsis* (L.) Cronquist (*Erígeron canadénsis* L.) – Asteráceae Fam.

It is of North American origin. It is an annual species present in almost any border of a cultivated land, any ruderal field and even on the street of the basin. We observed that a single well developped plant can produces over a milion fruit, a fact which gives this plant the status of a first degre nitrophil invasive plant.

9. *Daúcus caróta* L. subsp. *caróta* – Apiáceae Fam.

It is an euroasien taxon frequently met in the basin. It does not seem to be demanding in terms of temperature and it is found on the lower side of the territory up to the level of the sub-Carpathian hills. It grows on various soils, of we take into consideration their acidity. In ruderal places and in *Festuca pratensis* grass plots it is invasive and it gives them a white look when these plants flower. The presence of this plant in such grass plots leads to their depreciation and the plant is also avoided by farm animals.

10. *Erigeron annuus* (L.) Pers. (*Stenáctis ánnua (*L.) Less. – Asteráceae Fam.

It is an annual plant of medium size, which during the last decades produces dense populations and dominates the surfaces by its white-blue color. During 1970-1980 this species was considered new say that the status of invasive plant describes it best.

11. *Galinsóga parviflóra* Cav. – Fam. Asteráceae

It is South-American origin (Peru). It seems to have imigrated to the Roumanian flora during the 1-st world war. It multiplies rapidly as commensal plant in hoed lands, both on the hills and in the mountains especially in cornfields. In Copăceni, Slătioara, Stroieşti and Cerna it is present in all gardens. Its massive developement it impoverishes the substratum but it can be used as fresh fodder for pigs and birds. The only way to control it is to hoe regularly. Its success is ensured by the great number of embryos it produces and by its rapid growth.

12. *Hórdeum murínum* L. – Fam. Poáceae

This is an annual species, of eurasian origin, which is indigenuous and also nirophil. It lives for a short time on ruderal lands from the lower and middle side

of Cerna-Olteț Basin. They are often exclusivistic. The plant has a frail rachis and each group of three ears detaches itself and fixes easily on people's clothes and on animals. Obviously a significant part in its chorology is played by rodents who store the fruit as food. The phitocoenosis where it can be faund alternate with those of *Cardária drába*.

13. *Matricária perforáta* Mérat *(M. inodóra* L.) – Asteráceae Fam.

Annual plant, frequently met in ruderal places and in fallow lands it often becomes the only one dominanting. Where it is not controlled it spreads easily in the nearly cultures (especially in stalky ones). Due to the great number of the fruit created by a single individual we can give this plant the status of invasive species.

14. *Nárdus stricta* L. – Poáceae Fam.

It is a species present at the level of the sub-Carpathian depression up to the sub-alpine region of the searched territory. There it forms lawns by itself.

The spreading of the lawns that it creates is due to its great ability to adapt. It does not survive excesive drought or massive floods. Its poor value as fodder makes animals which graze on those surfaces ewoid it.

To increase its value as fodder urgent measures are demanded in order to control this species.

15. *Onopordúm acánthium* L. – Asteráceae Fam.

It is a strong nitrophile plant, up to 2 metres high, frequently met in ruderal places on the lower side of the examined territory. Very few individuals may also be present in fallow fields. When it settles in one places it sometimes becomes the only dominating plant.

16. *Polýgonum áviculare* L. s.l. – Polygonáceae Fam.

Pioneer species, extremely widespread in the Romanian Flora with a weak resistance to competition but remarkably tough when stepped on it. As soon as an empty space appears it is the first one to occupy it. It has a great ability to from parcels where it is the only one to dominate. However we are still unable to understand how its friut spread so fast, possibily with the help of the factors which tread down the land and also duet o the water. The plant can be found along the paths or the country roads which are not frequently used as well as on the border of the main roads.

17. *Pterídium aquilínum* (L.) Kuhn – Hypolepidáceae Fam. (Fig. 2.)

Fig. 2. General aspect with *Pterídium aquilínum*

Native species, with a well developped rhizome system which is also efficient when it spreads through the lawns in the mountains and on the hills, in the *Bétula péndula* forest, on parquets and acid soils. It produces on these very persistent and exclusivist clusters. This phenomenon can be noticed especially on the Plaiul Cernei Hill where hundreds of hectare are occupied by this species. It is not eaten by animals as it is highly toxic. It spreading is also favoured by grazing which weakens the other plants.

18. *Rúmex alpínus* L. – Polygonáceae Fam.

It develops luxuriantly along the mountain streams from the basin and its development becomes eplosive beside or on the place of the sheepfolds where great amounts of dung accumulate. It is an ultranitrophile plant. When growing on the place of sheepfolds it is co-inhabits with *Urtíca diòica* and sometimes with *Rúmex obtusifólius*, with which it may be mistaken unless we know that *Rúmex alpínus* has the branches of the adpres inflorescence. It is hard to be controlled because of its rhizome system which is very well developped and because of its large leaves which cast a shade on the soil and allow only the growth of certain species such as: *Stellária némorum, S. média*.

To control the growth of such species people have tried to boil the rhizomes in order to feed the pigs but this method had no result. Therefore it continues to be a problem which needs to be solved. After the dug disappears the plant withdraws gradually.

19. *Sambúcus ébulus* L. – Caprifoliáceae Fam.

Strong plant with an extremely strong rhizome system. It can be recognized by its very fetid smell even when young, by anyone. It is a nitrophile species which produces great colonies by the road boarders in alder plantations and also in dirty places. The colnies are difficult to be desfroyed. Local people ignore its presence as it is not useful. More than this they consider its presence in places with a lot of garbage to be beneficial as it reduces the dull atmosphere of these places.

20. *Verátrum álbum* L. subsp. *lobeliánum* (Bernh.) Arcang. L. – Liliáceae Fam.

It is a perennual plant, toxic, with great leaves on the stem which are pubescent at least on the inferior side. The weed bushes dominated by this species are found in mountainous lawns of the studied territory and it does not from a separate asociation. The plants represent invasions in the lawns of *Violo declinatae – Nardetum strictae* sau *Festuco rubrae – Agrostietum capillaris*.At the border of the forest on Stânişoara peak the groups of Veratrum extend them selves on notable surfaces, invading the lawns nearby in 2-3 years time.

The toxicity of this plant is given by the presence of some alcaloids such as: proveratrină, ermine, less jervină in its vegtative organs.

The plants of *Verátrum* can be eaten by sheep without causing them illnesses only after the frost.

To conclude, we notice that these weed bushes have a double economic aspect: on the one hand they hold remarkable surfaces of unremarkable lands and on the other hand it reresent a permanent danger to the animal production.

21. *Xanthium italicum* Moretti – Fam. Asteráceae

It is probably of American origin. Despite the fact that it is an annual plant it spreads in a remarkable way. It is large in size, it fructifies abundantly, whatever the climatic conditions may be. In each pseudofruit which has 2 layers there are 2 fruit and seeds. Of these 2 at least one insures an offspring. In the examined territory it is frequently met fallow fields on the lower side of the land.

When passing through such a field any animal or person can notice the embryos of the plants hanging on them. It is also difficult to get rid of them. The embryos are capable of surviving for a long time in the soi land they germinate successively, therefore it is difficult to clean up the invaded lands. It also destroys the wool of the sheep.

CONCLUSIONS

In this paper we have presented 21 invasive species identified in the Cerna of Olteț Basin. They belong to 9 botanic families.

The families with the greatest number of representatives are: Asteraceae – 9, and, for behind, Poaceae – 3. The rest of the families (Liliaceae, Caprifoliaceae, Polygonaceae, Hypolepidaceae, Apiaceae, Brassicaceae and Fabaceae) have less than 2 species.

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THE EFFECT OF FE AND NI ON THE RESISTANCE AND PRODUCTIVITY OF VINE

EFECTUL MICROELEMENTELOR ASUPRA REZISTENȚEI ŞI PRODUCTIVITĂȚII VIȚEI DE VIE

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Abstract: *The efficacy of foliar treatment with trace element containing compounds - $FeSO_4$, Dissolvin, $NiSO_4$ and a complex of trace elements Microcom, that has been elaborated and tested for applicability in Moldova, on the vine resistance to low temperature and productivity, was studied in greenhouse and under the field condition. Foliar treatment of vine during the vegetation led to the accumulation of newly acquired solutes (prolin, glutamic acid, glutamin, monosaccharides), that might protect the plants as osmotic – balancing solutes or against free radicals generated in response to stress. Modifications that were revealed led to the intensification of processes of growth and development of plants, formation and fuller manifestation of genetically based potential of frost and winter resistance.*

Rezumat: *Rezistenta plantelor multianuale asupra conditilor nefavorabile este strins legata de statusul mineral al plantelor. Deseori factorul limitativ este continutul de microelemente, care joc un rol important in procesele metabolice al plantelor. De regula solurile si plantele sunt slab asigurate cu forme accesibile de Fe, Mn, Zn, B. Eficacitatea tratamentului foliar a vitei de vie cu complex de microelemente Microcom, care a fost elaborat in Moldova, s-a studiat in conditii de producere si in casa de vegetatie. Tratarea plantelor in perioada de vegetatie a adus la acumularea solutiilor,care pot proteja plantele ca solutii usor compatibile (prolina, acidul glutamic, glutamina, monosaharide). Modificarile relevate tin de intensificarea proceselor de cresterea si maturizarea plantelor, manifestarea mai deplina a potentialului genetic de pezistenta la iernare.*

INTRODUCTION

The resistance of perennial plants to the unfavorable conditions of growth is closely connected to mineral status of plants. More over the basic limitative factor is content of trace elements, which play a very important role in many metabolic processes of plants. Horticultural crops need to receive more micronutrients than field crops owing to their greater susceptibilities to deficiencies and the relatively high value of their produce (1). As a rule, the soil under the vine is insufficiently ensuring with mobile form of Fe, Mn, Zn, B (2). Healthy plants with no trace elements deficiency stresses are better able to resist unfavorable conditions of grows (drought, low temperature, diseases and infections). Most effective way to ensure the plants with micronutrients is foliar treatment.

Taking into account the insufficient supply of soils in mobile forms of microelements in our region, and also their high necessity for perennial plants, a

special complex of microelements *Microcom-V* was created in the Institute of Genetics and Plant Physiology Academy of Sciences of Moldova. It was studied in greenhouse and under the field condition parallel with $FeSO_4$, Dissolvin, $NiSO_4$.

It's well known, that one of the plant resistance mechanism to the unfavorable conditions of growth is the accumulation of compatible osmolits in the cells of organic compounds with little molecular weight. Glucides and free amino-acids with stress – protective action refers to those components. Earlier we emphasized that Fe had a positive effect in the decrease of manifestation grade of edafic chlorosis of vine by modification of some metabolic processes inclusively quantitative and qualitative component of free amino-acids and glucides in vine leafs (3, 4). In 2005-2006, we established that Fe in Dissolvin - form had a passive role in glucide metabolism to vine adaptation to low temperatures.

The main objective of this article is elucidation of the influence of Fe in different compounds and Ni as $NiSO_4$ on the accumulation of carbohydrates and free amino acids, resistance to low temperature and productivity of vine.

MATERIAL AND METHODS

The experiments were carried out during the period 2006-2007 in the greenhouse and in the conditions of production in different parts of Moldova. Next cultivars of grape were used: Aligote, Alb de Surucheni and Codrinski. The foliar treatment with solution of trace elements was conducted twice – three times: a week before flowering, and a week after flowering then 10 days later. The optimal concentration of compounds was established on the base of previous experiments in green house. The samples of the plants were gathered in 3 and 6 days after treatment. The following laboratory methods were used: content of free amino acids – with the aim of the amino acid analyzer; photosynthetic pigments - after extraction from leaf discs with acetone 80 %; sugar content – according to Bertrane; content of phosphoric compounds – according to Ocanenco A.S. et al. (1969) and Levit T.E. (1981); content of trace element – by atomic absorption spectrometer after dry ashing at the t=480°C; grown and ripening of shoots - according to Lazarevskii M.A. (1963), Iova Gh, DobreiA. (1996); frost-resistance - according to Cernomoreț M.V. (1985), Cernomoreț M.V. etal. (2000).

RESULTS AND DISCUSSIONS

The free amino-acids and carbohydrates (mono- and disaccharides) supply to apoplast from the photosynthetic cells as a rule depends on the intensity of photosynthesis process in the plant, so we determined the content of photosynthetic pigments in dynamic in vine leafs during vegetation.

After the first treatment all components, which contains Fe, increased the *a* chlorophyll content, but most effectively influenced Ni. The chlorophyll sum in this phase increased more significantly with Ni. It was not remarked considerable changes of carotinoid content (tab.1). In a month, after the 3rd treatment, the chlorophyll and carotinoid content decreased related to the control plants. Fe in Dissolvin form and Ni maintain the pigment content at a higher level. It is necessary to be mentioned that in 2007 in conditions of long drought, it was

noticed for the first time, that Ni effect on the content of photosynthetic pigments is stronger than Fe effect.

Table. 1

The content of photosynthetic pigments in vine leafs after treatment with Fe - containing compounds, s. Codrinschi, % f. w.(5.06.2007).

Variant	Chlor."a" M±m	Chlor."b" M±m	Sum a+b M±m	Carotinoid M±m
Control	0,516 ± 0,009	0,202 ± 0,005	0,718±0,009	0,302±0,004
$FeSO_4$	0,530 ±0,008	0,202 ±0,005	0,736±0,008	0,317±0,004
Dissolvin	0,583 ±0,005	0,213 ±0,005	0,796 ±0,011	0,346±0,005
Microcom	0,568 ±0,033	0,209 ±0,005	0,777 ±0,035	0,335±0,010
$NiSO_4$	0,614±0,016	0,301±0,006	0,916±0,021	0,339±0,005

The carbohydrates content in vine leafs increased for 3-4 fold in summer period (June – July). The most stable and strong positive effect on the sum of soluble saccharides was in variant with microelements complex (Microcom). It was enhanced the content on monosaccharides. The insignificantly increase of starch confesses indirectly about the increase of processes of synthesis.

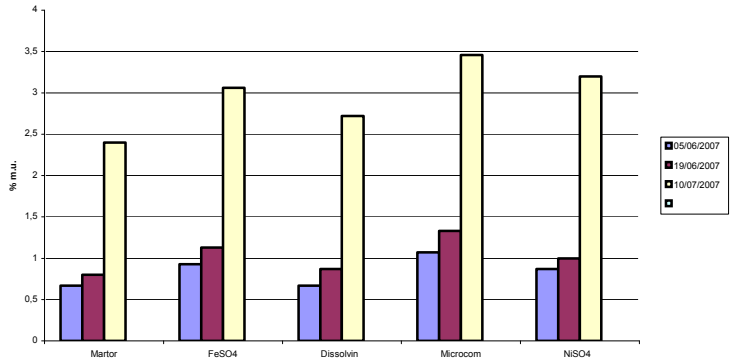

Fig.1. The carbohydrates content in vine leafs after the treatment with microelements, s. Codrinschi

The free amino-acids (AA) content in vine leafs has been determined for three times. To be mentioned, that treatment with microelements during vegetation maintains the summary of AA at significantly higher level. The quantitative and qualitative changes are stronger after the 3rd treatment. The sum of AA in this period obviously increased after treatment with Fe-containing compounds, special – with Microcom and Dissolvin. Qualitative content analysis of AA shows, that in the variants with microelements increases the content of praline, valine, tyrosine, phenylalanine. After the 3rd treatment the content of glutaminic acid + glutamine increased. The content of γ – aminobuteric acid also was more than in control plants. In variant with Ni the sum of AA after the first two treatments is enhanced related to the control plants, but at the beginning of ripening - decreases. The Fe-effect depends on the compound used as a source of

elements and on the supply of nutritive elements. It's better to use Fe in chelat-form (Dissolvin) and in complex with other elements (Microcom).

We suppose, it's taking place a stimulation of AA synthesis process after the treatment with Fe and Ni, special after three treatments, at the beginning of ripening. The difference between variants is better seen at the 3rd determination. This could be bound up with the accumulation of microelements effect or with worsening of drought, which took place in 2007.

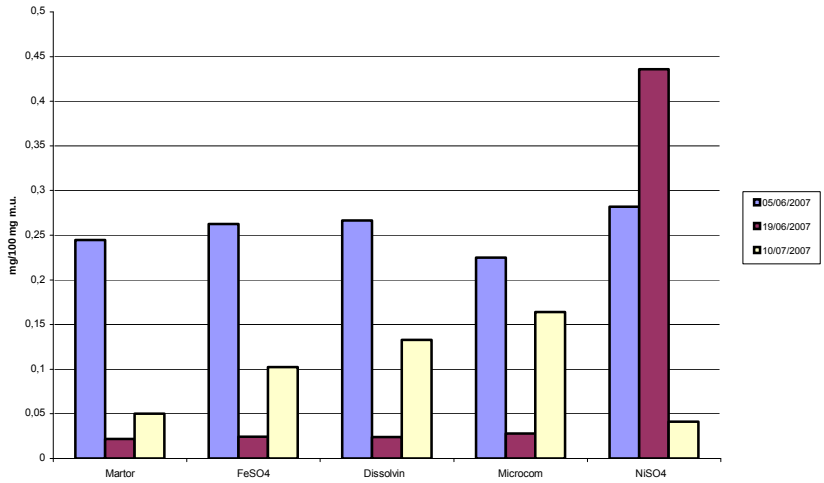

Fig.2. The content of AA in vine leafs after the treatment with microelements s. Codrinschi

Foliar treatment by complex of trace elements Microcom influenced growth of annual shoots of grape. Average length of shoots v. Chardonnay increased to 6-8 cm and v. Alb de Suruceni – to 12-21 cm comparatively to control plants. Degree of maturation of annual shoots enlarged correspondingly by 5,9% and 10,9%. It is likely that effect of Microcom is more expressed on the technical cultivars that on the table ones. The same results were obtained in 2006 in other climatic conditions, v. Aligote. Three times repeated foliar treatment of grape by complex of trace elements influenced the processes of growth and development of plants, shoots maturation increased to 6,9-7,3% relatively to control plants.

It is known the importance of phosphorus for the synthesis processes activation, transport in plants, role of this element for the formation and manifestation of the level of frost resistance and wintering of perennial plants. The study of the influence of foliar treatment by Microcom on the content of phosphoric compounds in grape leafs show significant modifications in the content of acid-soluble phosphorus and its components: phosphorus inorganic and organic. The quantitative increase of those components depends on the quantity of treatments. More significant values take place after 3 treatments.

The foliar treatment led to the crop increase in comparison with control plants. The positive influence of foliar treatment on the weight and quantity of bunches was marked. Some increase of bunches number took place as foliar treatment before flowering influenced the additional development of buds because of better mineral status of plants and improvement of leaf photosynthetic activity (table 2).

Table 2

The influence of foliar treatment with microelements on the productivity of vine s.Codrinschi

Variant	Grapes/bunch		Medium weight for 1 grape		Crop /bunch		% to control
	x	Sx	x	Sx	x	Sx	
Control	48,86	3,22	144,44	7,50	7,05	0,46	100
$FeSO_4$	42,33	2,38	181,61	11,44	7,68	0,43	108,9
Disolvin	41,80	2,57	164,76	9,74	6,88	0,42	97,6
Microcom	56,40	3,63	156,33	7,64	8,81	0,59	125,0
$NiSO_4$	59,80	2,75	190,65	8,99	11,39	0,23	161,6

It's meaningful that the content of AA, especially those indispensable ones, increased in grapes, in variants with Dissolvin and with the complex of microelements. It means, that quality of grapes became better. The content of sugar in grapes increased related to control only in variants with the complex of microelements Microcom and with Ni (table 3).

Table 3.

The influence of the treatment of vine with microelements on sugar content, %

Variant	x	Sx	% to control
Control	18,77	0,16	100
$FeSO_4$	17,77	0,12	94,7
Disolvin	18,23	0,22	97,2
Microcom	19,67	0,17	104,8
$NiSO_4$	19,71	0,16	105,0

CONCLUSIONS

The foliar treatment of the vine during the period of vegetation influences positive the content of carbohydrates, photosynthetic pigments and free amino-acids in leafs, especially in conditions of drought which took place in 2007.

The effect of Fe on the accumulation of compatible osmolits (glucides and free amino-acids), that have stress – protective action, was stronger than in previous years. We presume it is taking place a stimulation of AA synthesis process after the treatment with Fe and Ni, special after three treatments at the

beginning of ripening. The difference between variants is better seen at the 3rd determination. This could be bound up with the accumulation of microelements effect or with worsening of drought. The better effect was after the treatment with Fe in chelat-form and Microcom.

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THE EFFECT OF CHEMICAL MUTAGEN AGENTS ON SOME MORPHOLOGICAL CHARACTERS AT *SILYBUM MARIANUM*

EFECTUL AGENȚILOR MUTAGENI CHIMICI ASUPRA CARACTERELOR MORFOLOGICE LA ARMURARIU (*SILYBUM MARIANUM*)

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Abstract: *Silybum marianum is an annual, herbaceous medicinal herb of Mediterranean origine, belongs to the Compositae family,and has genom 2n= 34 chromosomies. Our study emphasises the modification upon the germination capacity, length of the root, rhythm of growing of the stem at Silybum marianum, our purpose being to determine the effects of some chemical mutagen agents with different concentrations (colchicines, methylic ester of sulphonic methane acid and hydroxylamine) upon the morphological characters. These mutagen agents determine a certain variability to the initial biological material, which leads by repeated selections to the identification of valuable mutant genotypes.*

Rezumat: *Silybum marianum este o plantă medicinală erbacee, anuală, din familia Compositae, originară din zona mediteraneană (2n=34). Scopul cercetarilor a fost determinarea efectelor unor agenti mutageni chimici (colchicina, esterul metilic al acidului metan sulfonic si hidroxilamina), asupra caracterelor morfologice la Silybum marianum. Tratamentele cu diferite concentratii ale agentilor mutageni s-au facut la seminte. Aceste caractere vor fi urmarite in continuare si in generatia M2 cand preconizam identificarea unor genotipuri mutante valoroase.*

MATERIAL AND METHODS

The biological material used in our experiments was *Silybum marianum* seeds treated with chemical mutagen substances. The treatments were made with mutagen agents: colchicines(C), methyilic ester of sulphonic methane acid (EMAM) and hydroxylamine (HA). Colchicines were used in five concentrations: 0,01%, 0,05%, 0,10%, 0,15% şi 0,20%, methyilic ester of sulphonic methane acid(EMAM) : 0,0125%, 0,025%, 0,050% hydroxylamine(HA) : 0,005%, 0,010% şi 0,10%. The treatments with different concentrations of mutagen agents were made to *Silybum marianum* seeds, for 6, 12 and 24 hours.

All the analyses were made in the laboratory the germination of seeds was made in Petri vases at room temperature (20ºC-24ºC).

The data/results obtained were processed by the statistical method that is the analysis of the variables and the determination of the limit differences.

RESULTS AND DISCUSSIONS

The analysis of the germination capacity at control variant shows values between 86,4% and 91,3%. Treatments with colchicines at low concentration, 0,01%, on seeds for 6 and 12 hours influenced positively the germination capacity of seeds with values between 89,3% and respectively 87,4%, but the diferences at control variants were insignificant.

Germination capacity diminished with the bigger colchicines concentration and for a longer duration ,0,20% and exposure time, 24 hours, recording 43,8% germinated seeds (fig. 1). The treatments made with EMAM diminished the germination capacity of seeds much more compared to the colchicines treatments.

The analysis of the milk thistle germination capacity after HA treatments (fig. 1) in all used concentrations, differences at the control variants were very significant.

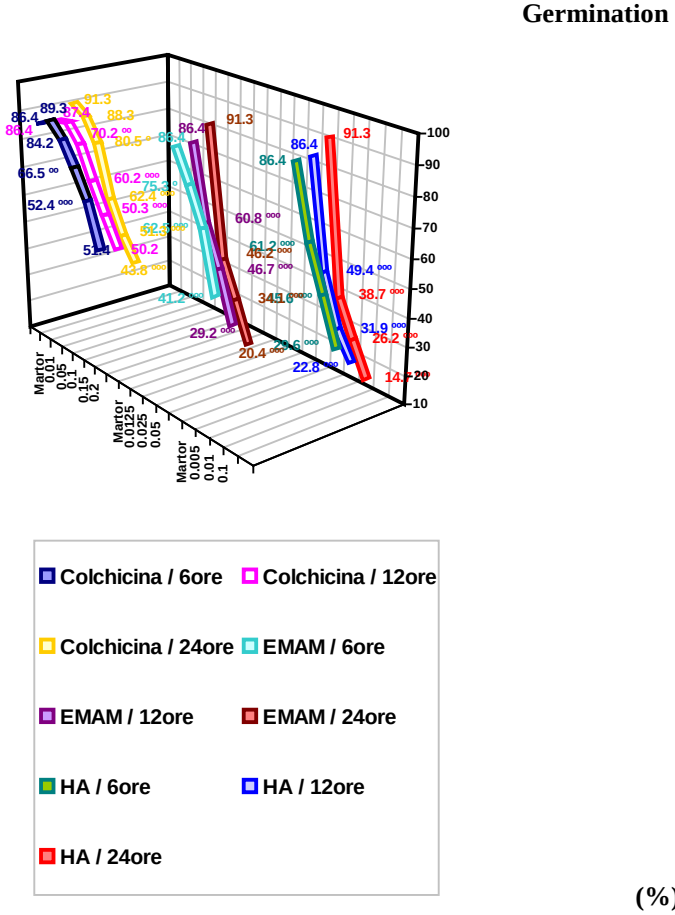

Fig. 1. The effect of chemical mutagen agents upon germination capacity (%)

Another analyzed character was the length of the root which had at control variants values between 42,61 mm and 44,62 mm.

The colchines treatments, at low concentrations,0,01% and 0,05%, had stimulatory effects upon the rhythm of growing of the roots at S. marianum meristem(fig. 2). Thus, the colchines treatments in concentration 0,01% had 41,34 mm for 6 hours and 42,66 mm for 12 hours; but the colchines treatments in concentration 0,05% had 42,11 mm for 24 hours and 43,60 mm for 12 hours.

Length of the root

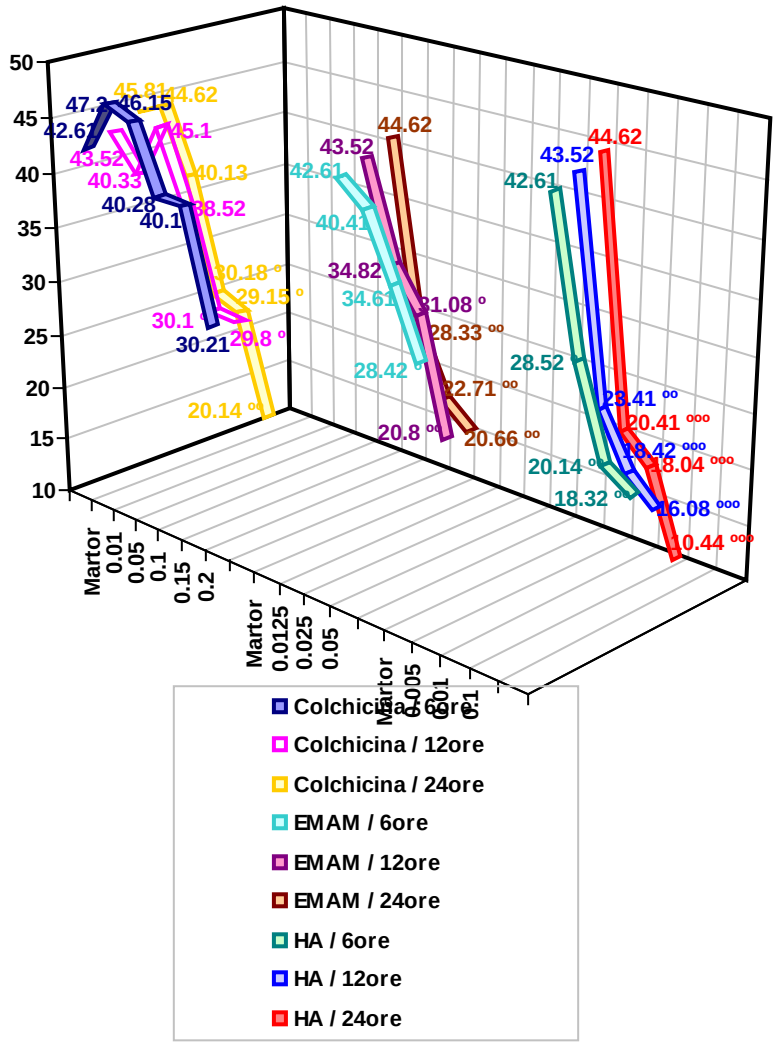

Fig. 2. The effect of chemical mutagen agents upon length of the root

The methylic ester of sulphonic methane acid treatments had an inhibitory effect on the rhythm of growing the root in all three concentrations and especially for maximum time exposures of 24 hours.

Hydroxylamine had the greatest effect upon the rhythm of growing of the root, even at 0,005% concentration, recording 20,41 mm for 24 hours exposure and 28,5 mm for 6 hours exposure. At the maximum concentration of 0,10%, this character had 10,44 mm for 24 hours exposure and 18,32 mm for 6 hours exposure at mutagen agents. In all variants the differences at the control variants were very significant. In control variants, the average length of the stem had 28,42 mm for 6 hours exposure and 40,11 mm for longer time exposure in distilled water, but the differences were not significant (fig. 3).

The colchines treatments, at low concentrations,0,01% and 0,05%, had stimulatory effects upon rhythm of growing of the stem with values between 41,34 mm and 43,60 mm, but differences at the control variants were insignificant.

The methylic ester of the sulphonic methane acid treatments determined inhibitory effects upon rhythm of growing of the stem, for all variants concentrations and for the three times of exposure.

The rhythm of growing stem was more influenced by the hydroxylamine treatments in 0,010% and 0,10%.

The differences at control variants had different degrees of significance in all variants of treatment.

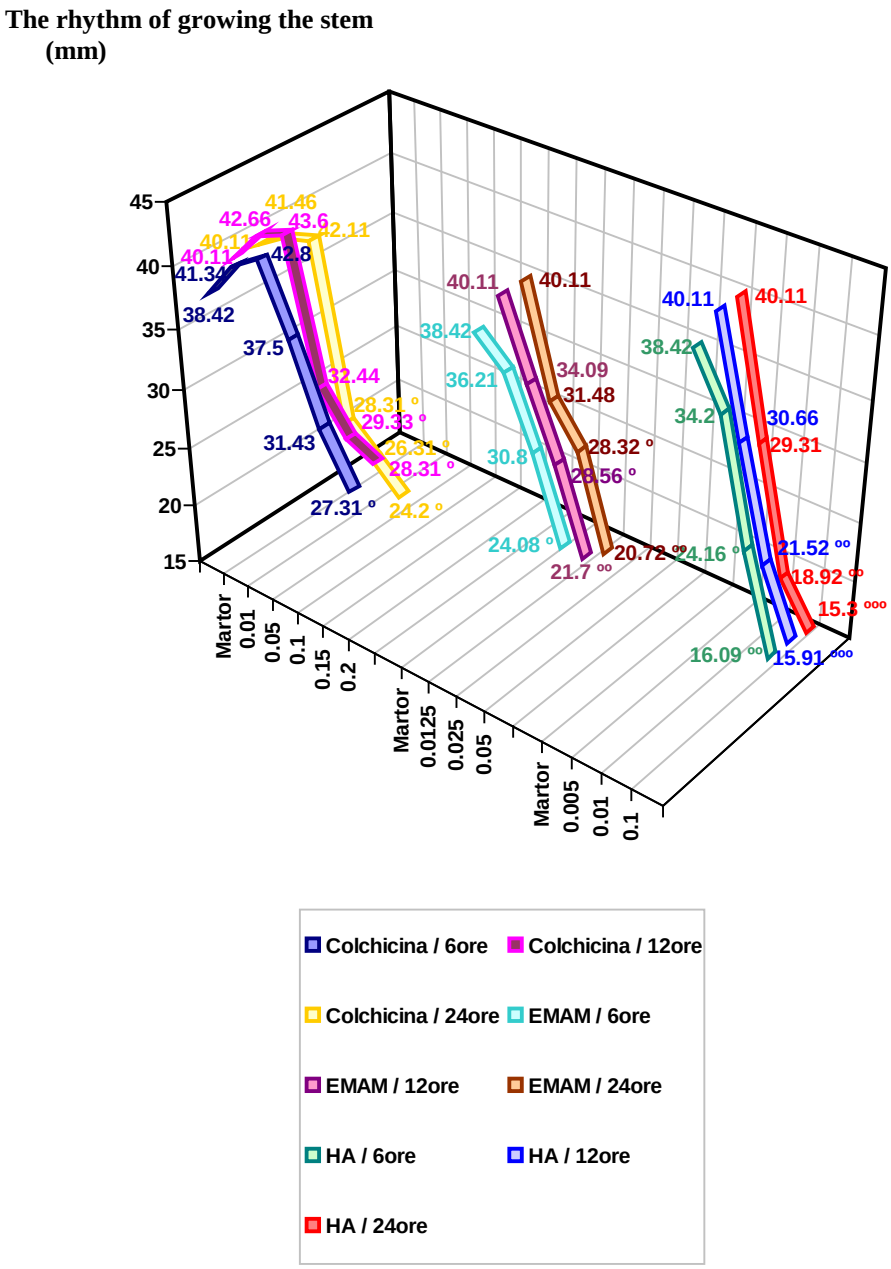

Fig. 3. The effect of chemical mutagen agents upon rhythm of growing the stem

CONCLUSIONS

In order to obtain some lines with valuable characters, we increased the variability by using chemical mutagen agents: colchicines(C), hydroxylamine (HA) and methylic ester of sulphonic methane acid (EMAM).

The germination capacity of seeds is one of the first tests that reflect with certainty the effect of mutagen chemical substances used, comparing average values of the character for each experimental variant with DL 50 value. From the comparison of the results obtained we noticed that HA had the strongest mutagen effect, followed by the methylic ester of sulphonic methane acid(EMAM) and colchicines(C).

The rhythm of growing of the root and stem at *S. marianum* decreased when the concentration of three mutagen agents increased, and also with the increasing time of exposure of 6 hours and 24 hours .

These correlations allow us to appreciate correctly the mutagen efficiency of the three chemical substances used, with the help of the two characters.

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LOIAL – A NEW POTATO ADVANCED CULTIVAR FOR AUTUMN-WINTER CONSUME

LOIAL – UN NOU SOI DE CARTOF PENTRU CONSUM DE TOAMNĂ -IARNĂ

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Abstract. *The improving of the cultivars sets with new and more performances genotypes, represents one of the most efficient ways for increase of the yield productivity, quality and stability. The potato cultivar "Loial" was created at the ARDS of Suceava through sexuat hybridizing followed by individual clonally selection. Loial is a semi later cultivar, having a very high resistance to the Y virus, middle resistance to leaf roll of potato, middle resistance to the potato manna and with a high yield potential (72,9 t/ha). This characteristics recommend it besides the existent cultivars, for introduction in the crop yield in order to perform and diversify the cultivars sets.*

Rezumat. *Îmbunătățirea sortimentului de soiuri cu noi genotipuri mai performante, reprezintă una din căile cele mai eficiente de creştere a productivității, calității şi stabilității recoltelor. Soiul de cartof "Loial" a fost creat la Staţiunea de Cercetare Dezvoltare Agricolă Suceava prin hibridare sexuată urmată de selecția clonală individuală. Loial se înscrie în grupa soiurilor semitârzii, având o rezistență foarte ridicată la virusul Y^0, mijlocie la virusul răsucirii frunzelor(VRF), mijlociu de rezistent la mană şi cu un potențial de producție ridicat (72,9t/ha). Acestea sunt o parte din caracteristicile ce-l personalizează şi-l recomandă pentru introducerea în cultură, alături de soiurile existente în vederea perfecționării şi diversificării sortimentului de soiuri cultivat.*

Utilization in the crop yield of bigger numbers of potato cultivars, means a high genetic diversity and a high possibility to select the most adaptable cultivar at the yield conditions and which suffer more less to the unfavorable crop factors (Fodor I., 1982).

Thus, the diversification of the cultivars set becomes a technical decision more complex which has to satisfy the following conditions:

- The yield maximize for whole cultivated sets;
- The decreasing of the crops disparagement risk because of unfavorable environmental conditions, the diseases and pests.
- The adaptation of the cultivars to the diversity of environmental and technological conditions (*Bodea D., 2001*)

The new cultivar "LOIAL" fulfill all above conditions because of both him yield potential and the other characteristics.

BIOLOGIC MATERIAL AND RESEARCH METHOD

The cultivar „*Loial*“ was obtained through sexuat hybridizing, followed by individual clonally selection.

The cultivar “Loial” was selected from one hybrid population which has as parental forms the cultivar *Concorde* and *Fauna N*. The analyzes and testing processes were realized during 12 years, according of breeding classical scheme.

RESULTS AND DISCUSSIONS

Immediately, after germinating the cultivar „*Loial*“, is remarked through a rapidly and uniform growing rhythm. The radicular system is well developed in the superficial soil layer (20-30 cm).

The potato shrub is well developed and is formed by 5-7 main stems, with semi erect habit, rich in leafs. The stems are thickly, canted with pigments on brown- violet color, which in the bottom part are more intensely. The leafs have the dark green color and on medium dimensions.

The inflorescence is a simple cyma which is formed by 7-10 flowers with corolla on light violet color, and sepals are green anthocian color. The flowering is small, usually the floral buds fall down.

In each hole are 11-14 tubers, big and uniforms. The tuber shape is long oval, regularly, with superficial eyes, and the skin is plane. The suber color is yellow and of the pulp is light yellow.

Referring to the resistance of the viruses diseases attack the studies from the last year emphasized that the cultivar “LOIAL” is very resistant to the Y virus and middle resistant to the leaf roll of (table1).

Table 1

The resistance to the Y virus and to Lef rolls of potato (VRF)

VIRUS	**Middle note MEDIE**		
	LOIAL	DESIREE (Mt.VRF)	KONDOR (Mt. Y^0)
Y^0	9,0	8,0	3,2
VRF	5,0	2,0	6,8

Note: 1-2 : very sensitive
5-6 : middle sensitive
9 : the very high resistance

Concerning the resistance to manna the cultivar „*Loial*“ is middle resistant both to manna on leaf and tubers.

The cultivar “*Loial“* is resistant to *Synchytrium endobioticum* and medium resistant to *Streptomyces scabies.*

Concerning the vegetation period, the cultivar “Loial” is frames in the semi later cultivars group with a vegetation period between 95 and 105 days.

Referring to quality traits, the tubers of the cultivar “LOIAL” is framed in the coking class A-A/B, with starch content on 14,2%.

This cultivar is fated for autumn -winter consumes, in the fresh form, but it is possible to use in the food industry (chips, fried potatoes).

The expression of the cultivar “LOIAL” productivity is dimensioned through very high average yields, between 35,4 t/ha and 50,1 t/ha . In the last three years in four localities the cultivar “LOIAL” accomplished 41,4 t/ha, in comparison with cultivar Desirée which accomplished 34,2/ha, that meaning a spore on 7,2 t/ha, and relatively value on 21% (table 2).

Table 2

The tubers yield obtained by cultivar “LOIAL“ during 1999-2001, in four localities (t/ha)

CULTIVAR	LOCALITY				Average	%
	Suceava	Braşov	Tg.Secuiesc	M.Ciuc		
Loial	38,5	50,1	41,6	35,4	41,4	121,1
Desirée	25,0	44,8	37,6	29,3	34,2	100,0

The obtained results in the last three years in seven localities (the network of the National Institute for Testing and Registration of the Cultivars) emphasized the high productive value of the cultivar “LOIAL”, achieving a medium yield on 34,4 t/ha having a relatively spore on 20,7% bigger then standard (table 3).

Table 3

The tubers yields obtained by cultivar „Loial“ in the network ISTIS (2001-2003)

Locality/Specification		Cultivar	
		Loial	Desirée
Bacău	t/ha	35,5	31,6
	%	112,6	100,0
Hărman	t/ha	35,4	25,0
	%	141,3	100,0
Rădăuți	t/ha	24,6	23,2
	%	106,3	100,0
Satu Mare	t/ha	32,7	26,2
	%	124,9	100,0
Sibiu	t/ha	30,7	27,2
	%	112,2	100,0
Tg. Secuiesc	t/ha	54,0	44,6
	%	120,9	100,0

Târgovişte	t/ha	24,4	19,0
	%	128,3	100,0
Average	t/ha	34,4	28,5
	%	120,7	100,0

The testing of the yield maximum potential of the cultivar "LOIAL" was realized in the Braila Big Isla condition. This cultivar accomplished an average yield on 65,3 t/ha with limits, between 57,2 t/ha and 72,9 t/ha, that mean it is a cultivar with big yield capacity(table 4).

Table 4

The maximum yield potential (t/ha) achieved during 2001-2003

Cultivar	**Braila Big Isla**				**%**
	2001	2002	2003	Media	
Loial	65,7	72,9	57,2	65,3	125,8
Desirée	44,8	62,8	48,0	51,9	100,0

For accomplish of these parameters on performances a high role has the yield stability and the high resistance to the viroses diseases and manna.

CONCLUSIONS

- The cultivar Loial is framed of intensive cultivars group having a high yield potential which is associated with high superior agronomic traits.
- The high resistance to the viruses diseases make possible the seed production without difficulties.
- The cultivar "Loial" is recommended for favorable and very favorable potato crop areas, and in the less favorable are is recommended only in the irrigated conditions.

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THE ASPECTS CONCERNING THE INFLUENCE OF SOME CHARACTERISTICS OF THE EPIGEE PHYTOMASS ON THE POTATO RATED CAPACITIES

ASPECTE PRIVIND INFLUENȚA UNOR CARACTERISTICI ALE FITOMASEI EPIGEICE ASUPRA RANDAMENTELOR DE CARTOF

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Abstract. *In the experiment structure, for emphasize of interrelations between some characteristics of epigee phytomass and the tubers rated capacities, six potato cultivars belonging earlier (Ostara and Magic), semi earlier (Astral and Rapsodia) and semi later (Sante and Desirée) groups were included. The biggest tuber numbers/hole was registered at cultivars Rapsodia and Desire(13) and smaller at the earlier cultivars. The number of the tubers/hole was correlated significant (r =0,92) with number of the main stems. In the comparison with earlier cultivars the tubers dominance at the formatting of the epigee phytomass, it was accomplished 10 days delayed at the semi earlier cultivars, and 20 days delayed at the semi later cultivars. The biggest tuber rated capacities were registered at the cultivar Rapsodia. It observed that between the tubers rated capacities and the main characteristics of the epigeee phytomass (the total weight, maximum leaf surface, cumulated leaf index and the net assimilation rate) there are the most favourable reporting.*

Rezumat. *Pentru evidențierea unor interrelații dintre unele caracteristici ale fitomasei epigeice şi randamentele de tuberculi, în structura experiențelor au fost incluse şase soiuri de cartof aparținând grupelor timpurii (Ostara şi Magic), semitimpurii (Astral şi Rapsodia) şi semitârzii (Sante şi Desiree). Numărul tuberculilor a fost mai redus la soiurile timpurii, iar dintre soiurile testate , Rapsodia şi Desire au avut cel mai mare număr la cuib (13) .Numărul acestora s-a corelat satisfăcător (r =0,92)cu cel al tulpinilor principale. Comparativ cu soiurile timpurii, dominanța tuberculilor la alcătuirea fitomasei epigeice s-a realizat mai târziu cu zece zile la cele semitimpurii şi cu douăzeci de zile la cele semitârzii. Cele mai mari randamente de tuberculi s-au înregistrat la soiul Rapsodia , la care între acestea şi principalele caracteristici ale fitomasei epigeice (greutatea totală ; suprafața foliară maximă , indicele foliar cumulat şi rata asimilației nete) au existat cele mai benefice raportări.*

The major influences on the rated capacity at the surface unit, have been place during formation and tubers growing stages. The tubers formation is preceded by stolons appearance, which can be recorded sometimes at 60 days after planting, (*IANOŞI S., 1994*) and other time, during realization of one leaflets index, on 1,5-2,0 (*BIANU T., 1996, PLĂMĂDEALĂ B., and colab., 1999*). From physiological point of view, as consequence of presence of important active photosynthetic surface have been place a high carbohydrates transfer to the stolons primordies. After a radiar expansion period of the stolons, their thickness and a good supply with carbohydrates, in order to maintain the tubers process, have been place, their migration to the top of the stolons (*MOKRONOSOV T.A, 1990*). At the end of this phenophase follow the first stage of the tubers growing, which depended by the carbohydrate, hormones, macro and micro elements contents, so

that, to be capable to maintain the mitotic division. *PETERSON L.R ., and colab. (1985)*, say that the tubers growing in this manner have been until they have a diameter on 30 mm and the middle weight is 30-40 gr.

The increase of the nutritive substances proportions for tubers growing (*MORBY J., MI-THORDE F.L., 1975*), constituted the main support for stage covering by intensive tubers growing. These processes are accomplished only by cellular extensions (*COUTREZ – GEERINCK DANIELLE; 1972, PETERSON L.R., 1985*). Often, the biggest tubers growing rates it overlapped with the stage when it realized the largest leaf surface actively photosynthetic (*BURTON W.G., 1989*). After touching of a maximum accumulating rates, function by genetic structure of the cultivars, it follow a new stage on progressive senescence of the leafs, which is reflected through continuous diminishing of the tubers growth rate and finalising of some physico chemical characteristics of the whole tuber (*MAC KERRON D.L., DEVIES M .V., 1986, SRUIK C.P. , WIERSWMA G.S., 1999*).

BIOLOGIC MATERIAL AND RESEARCH METHOD

In the experiments structure, for emphasize of some aspects concerning the influence of some characteristics of epigee phytomass upon tubers rated capacities, six potato cultivars belonging earlier (Ostara and Magic), semi earlier (Astral and Rapsodia) and semi later (Sante and Desirée) groups were included. We selected these cultivars because there are some differences among them, referring to characteristics of the phenotype. The field design was realized after blocks method in three replications. All crop measures in according with adequately technology of the Suceava Plateau conditions, were accomplished.

RESULTS AND DISCUSSIONS

Referring to the middle number of the tubers/hole (table 1) we observed some aspects. The relatively stability of tubers number,10 days later at the semi earlier cultivars and 20 days later at the semi later cultivars was accomplished, in comparison with earlier cultivars. Concerning the tubers number, among the three precocity groups there are not big differences. Thus at the earlier cultivars 8-9 tubers/hole, 11 tubers/hole at cultivar Astral were harvested. The biggest tubers number/hole at the cultivar Rapsodia (semi earlier cultivar) and Desiree (semi later cultivar) were harvested. The cultivars Sante and Astral had in more stages approximately the same number of tubers/hole. Almost the cultivar Sante had a good capacity for tuberization until the end of the July. This characteristic there is at the cultivars Rapsodia and Desiree, too. The tuberization was accomplished with more intensity, when the plants realized the leaflet index on 1,3-1,5, in comparison with the stage when the leaflet index was 0,3-0,4. Concerning the dependence of the tubers number by the stolons number (maximum number) can not be pointing out the interrelations on proportionality, because the correlation coefficient is only 0,746. The correlation coefficient on 0,923** shows a bigger dependence of the tubers number by the main stems. The data from the table 1 emphasize that the maximum number of the stolons was registered in the stage when their tuberization was very slowly. It is necessary to mention that the untuberized stolons numbers, which maintained more stages, was bigger then the tubers number/hole (2,5-3,0 times).

Table 1

The dynamic of the stolons and tubers number/hole (average of the years 1997 and 1999)

Cultivar	Vegetation period															
	10		20		30		40		50		60		70		80	
	No. stol	No. tub.	No. stol.	No. Stol	No. stol.	No. sto.	No. stol.	No. Stol	No. stol.	No. stol	No. stol.	No. Stol	No. stol.	No. Stol	No. stol.	No. stol
Ostara	4	-	15	-	22	6	17	7	13	8	12	8	8	8	-	8
Magic	6	-	19	-	27	7	24	8	21	9	18	9	12	9	-	9
Astral	6	-	21	-	31	9	27	10	24	10	20	11	12	11	-	11
Rapsodia	9	-	23	-	30	9	33	10	26	12	22	12	16	13	-	13
Sante	8	-	18	-	27	8	30	9	27	11	22	11	16	12	-	12
Desirée	9	-	20	-	29	9	32	11	29	12	24	12	18	13	-	13
DL 5 %	2	-	2	-	4	1	5	1	5	1	3	1	3	2	-	2

The cultivars Rapsodia and Desiree have the same characteristics, concerning the middle tubers number/hole, the dynamic of the stolons tuberization and the transformation percentage of the stolons in the tubers (37-38%). The tubers weight in the epigee phytomass after 30 vegetation days, at the earlier cultivars was on 1,4 times bigger in comparison with the tubers weight realized by the semi earlier cultivars and on 2 times in comparison with registered values at the semi late cultivars (table 2). Also, from the table 2, it observed that the tubers percentage registered at the earlier cultivars, in a certain stage, it was registered after 10 days at the semi earlier cultivars and after 20 days at the semi later cultivars.

Table 2

Participation of the tubers to the making of the epigee phytomass (%)

Cultivar	Vegetation period							
	30	40	50	60	70	80	90	100
Ostara	30	39	45	57	68	80	-	-
Magic	24	40	45	56	66	80	-	-
Astral	20	32	37	46	54	64	77	-
Rapsodia	18	33	41	47	55	64	78	-
Sante	14	23	34	41	49	59	68	79
Desirée	15	24	36	42	45	53	65	81

Making up the variation series with registered values at „n" days of vegetation of the earlier cultivars, n + 10 days at the semi earlier cultivars and n +20 days at the semi later cultivars, the variability coefficients (S%) have values between 0,01 and 0,2.

The evaluation method of the T. K.Goluvko (1986) was confirmed only at the earlier cultivars, because the tubers weight must represent 70% from the whole phytomass. In Suceava conditions during experiments, in order to accomplish the above condition, the semi earlier cultivars have to grows another 10 days and the semi later cultivars another 20 days (70 days from the germinating). The middle weight of the tubers/hole was 565 -686 g at the earlier cultivars, 721 -784 gr. at the semi earlier

cultivars and 669-758 gr. at the semi later cultivars (table 3). The yield crop of the cultivar Sante was over fulfilled by the cultivars Ostara and Astral until the second stage on harvesting (40 days of vegetation) and by cultivar Magic until fifty stage (70 days of vegetation). Also, the cultivar Desirée accomplished the same yield crop like cultivar Sante, but after 60 days of vegetation was over fulfilled by the cultivar Sante.

Table 3

The evolution of the weight tubers – g/shrub (average of the years 1995-1999)

Cultuvar	Specification	Days of vegetation							
		30	40	50	60	70	80	90	100
Ostara	Average	99	208	304	424	491	565	-	-
	Diference	44***	69 ***	22	19	-53	-81	-	-
Magic	Average	93	252	383	545	624	686	-	-
	Diference	38***	113 ***	101***	140***	80*	40	-	-
Astral	Average	78	191	292	415	546	667	721	-
	Diference	23 **	52 ***	10	10	2	31	1	-
Rapsodia	Average	75	200	342	472	601	706	784	-
	Diference	20 **	61***	60 **	67**	57	60	64	-
Sante	Average	55	139	282	405	544	646	720	758
	Diference	Standard							
Desirée	Average	56	132	276	388	475	549	623	669
	Diference	1	-7	-6	-17	-69 ^{0}	-97 ^{0}	-97 ^{0}	-89 ^{0}

At the plants maturity, the smallest weight tubers/hole was registered at the cultivar Ostara (565 g), followed by Magic and Desirée (686 g and respectively 669 g). The cultivars Astral (721 g), Sante (758 g) and Rapsodia (784 g) registered the biggest yields. After 30 days from the germinating it registered a middle weight of one tuber on 96 g at earlier cultivars, on 77 g at semi later cultivars. The included period between 30 and 50 days of vegetation, through a rapidly development of the tubers, especially at the semi later cultivars (5,13 times at Sante and 4,93 times at Desirée) are manifested. A rapidly grows rhythm at the cultivar Rapsodia (4,56 times) and Magic (4,12 times), was registered.

During period 50 – 70 days of vegetation the growing of the weight tubers was diminished at all cultivars. After 50 days of vegetation the most important grows of the tubers were registered at the cultivars Sante (1,92 times), Astral (1,86 times), Rapsodia (1,75 times) and Desirée (1,72 times).

The analyzes of the decades rhythm emphasize that, 75-80% form the annual yields, after 60 days of vegetation, at the cultivars Ostara and Magic, after 70 days of vegetation for cultivars Astral and Rapsodia and after 75-80 days of vegetation for cultivars Sante and Desiree, were registered. The data from the table 4 emphasize the possibility of the rated capacities dependence by the earlier stages. Generally the contoured tendencies after 30 days of vegetation was kept with a significant fidelity not only after 10 days (r = 0,846 ***), and after 20 days (r=0,648 ***). This temporary

correlation between tendencies in years 1998, 1999, was more significant at the cultivars Magic and Sante.

Table 4

The induction of the initial rated capacity upon rated capacities registered after 40-50 days of vegetation („r")

Specification		Rated capacities	
		40 zile	50 zile
Years	1995	0,616	0,168
	1996	0,578	0,626
	1997	0,783	0,626
	1998	0,968 **	0,794
	1999	0,977 **	0,774
	1995-1999	0,846 **	0,648 **
Cultivars	Ostara	0,849	0,805
	Magic	0,951 *	0,990 ***
	Astral	0,768	0,739
	Rapsodia	0,259	0,326
	Sante	0,816	0,993 ***
	Desirée	0,632	0,774

The net assimilation rate represent the division between final yield and leaf surface of one shrub after 30 days from the germinating. The biggest values of the net assimilation rate (ran) were registered at the cultivars Ostara and Magic (table 5). The cultivars Magic and Desiree have a different net assimilation rate but these cultivars have the same yield level (686 g and respectively 669 g/hole), that mean the „ran" depended by not only the epigee phytomass and by his influence upon the crop biology.

Table 5

The dependence of the net assimilation rate (r.a.n) by the used cultivars[1)]

Cultivar	Years					Average		
	1995	1996	1997	1998	1999	r.a.n.	Differences	Significances
Ostara	19,7	16,7	14,2	20,1	27,3	19,6	6,7	***
Magic	18,0	19,8	20,0	19,1	23,0	20,0	7,1	***
Astral	12,7	17,5	15,8	13,8	13,7	14,7	1,8	
Rapsodia	13,3	17,2	16,7	15,5	16,9	15,9	3,0	
Sante	11,5	13,1	10,8	15,1	14,2	12,9	Mt	
Desirée	11,6	13,2	10,2	12,7	13,5	12,0	-0,9	
DL 5 %	2,4	1,3	1,8	1,4	2,8	3,0		

1) – the rated capacity (g.) at 1^2 on leaf surface, cumulated by one shrub, after 30 days of vegetation.

The data from the table 6 emphasize that the biggest rated capacity of the tubers was registered when this indicator was influenced by more characteristics of the crop yield. Thus, at the cultivar Rapsodia, all four characteristics had a significant contribution to accomplishing of the biggest yield of tubers. But at the cultivar Ostara the smallest rated capacity of the tubers was registered, any characteristics of the crop did not correlate with the yield potential.

Table 6

The influences of some characteristics of the green phytomass upon the tubers rated capacities of one shrub („r")

Cultivar	Correlated characteristics			
	Phytomass total weight	Leaflet index cumulated [1)]	Net assimilation rate [2)]	Leaf surface/shrub [3)]
Ostara	-0,09	0,23	0,53	0,16
Magic	0,68	0,91 *	0,83 *	0,61
Astral	0,89 *	0,99 **	0,15	0,33
Rapsodia	0,93 **	0,99 **	0,99 **	0,97 **
Sante	0,85 *	0,74	0,74	0,88 *
Desirée	0,93 ***	0,86 *	0,79	0,71
Average	0,34	0,76 ***	-0,02	0,38 *

1) – after 30 days of vegetation; 2) – the yield registered after 30 days of vegetation; 3) – maximum.

CONCLUSIONS

- The tubers number/hole was smaller at the earlier cultivars. The biggest tubers number/hole had the cultivars Rapsodia and Desirée (13).
- The tubers numbers/hole was correlated significant with number of the main stems (r=0,92).
- In comparison with earlier cultivars, the tubers dominance to making of the epigee phytomass was accomplished, 10 days later at the semi earlier cultivars and 20 days later at the semi later cultivars.
- The biggest yield tubers were registered, at the cultivars Rapsodia and Sante, (784 g and respectively 758 g/hole).
- During years 1995-1999 the most intensively rhythm by tubers growing in the stage from 30 to 50 days of vegetation, was registered.
- The relative rhythms variability by decades growing of the tubers is due of the particularity of the tested cultivars (62-94%) and in a smaller manner (8-31%) is due meteorological conditions.
- The biggest rated capacities of the tubers were registered at the cultivar Rapsodia, because of the good correlations between rated capacities of the tubers and the main characteristics of the epigee phytomass (total weight, leaf surface, leaflet index and the net assimilation rate) .

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USE OF RAPD TECHNIQUE FOR REVEALING DNA POLYMORPHISM IN *GINKGO BILOBA* L. SPECIES

UTILIZAREA TEHNICII RAPD PENTRU EVIDENȚIEREA POLIMORFISMULUI ADN LA SPECIA *GINKGO BILOBA* L.

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***Abstract*:** *Random Amplification of Polymorphic DNA (RAPD) analysis is a valuable tool in studying genomic DNA polymorphism in plants. In this study, we used RAPD technique to reveal the possible intraspecific genetic variation in Ginkgo biloba grown in different sites in Romania and Denmark. Perhaps this variation could be a possible explanation for the observed variations in the efficacy of medications with different G. biloba extracts (KUDDDUS at all., 2002). Ten of the twenty decamer primers yielded scorable amplification patterns. These primers generated polymorphic bands among the genotypes studied. Some of the primers produced no amplification or unreadable gel smears. A dendrogram was constructed based on genetic distances using the program Tree View.The genotypes analyzed clustered into two main groups and the values of genetic distances between data shows that there are some DNA differences.*

Rezumat: *Tehnica RAPD este o metodă eficientă pentru evidențierea polimorfismului ADN–ului izolat de la plante. În acest studiu a fost utilizată tehnica RAPD pentru a pune în evidență prezumtiva variabilitate intraspecifică existentă între indivizi de Ginkgo biloba L. cultivați în zone din România şi Danemarca. Este posibil ca aceasta variabilitate să fie o explicație a eficacității diferite a unor medicamente fabricate din diferite extracte de ginkgo izolate de la indivizi de diferite proveniențe (KUDDDUS at all., 2002). Extracția ADN-ului total a fost realizată din embrioni zigotici maturi, utilizând metoda Lodhi et all. (1994) modificată de Pop R şi colab., 2003. Zece din cei 20 de primeri decamerici au generat fragmente de ADN amplificabile şi benzi polimorfice la genotipurile analizate. Unii primeri nu au generat produşi de amplificare PCR sau în geluri au apărut benzi intens colorate, nelizibile. Pe baza distanțelor genetice şi utilizând programul Tree View a fost întocmită o dendrogramă, existând anumite diferențe la nivelul genotipurilor analizate.*

Key words: DNA, RAPD, *Ginkgo biloba*, molecular polymorphism

INTRODUCTION

In recent years, ginkgo extract has been extensively studied for its various medicinal qualities (DIAMOND et al., 2000, LOGANI et al., 2000). Meanwhile hundreds of controlled scientific studies and research on the chemistry, pharmacology and clinical effects of the leaves have been conducted, mostly by European researchers over the last decades, using the German/ French extract EGb761, also called Kaveri, Tebonin, Tanakan, Rökan and Ginkgold.

Some studies (JACOBS B.P. and BROWNER W.S., 2000) shows that *Ginkgo biloba* has been considered a "recalcitrant plant taxa". There are a few reports regarding the possibility to use the molecular markers for detecting DNA polymorphism in *Ginkgo biloba* L. (KUDDUS at al., 2002, YONG-QI at al., 2003, FAN X. X. at al., 2004). The studies achieved in the last 10 years were referred to interest for an accurance botanic classification. For example, recent molecular analysis of the *G. biloba* genome, while far from complete, suggests a much closer relationship to the cycads than to the conifers (HASEBE, 1997).

We used RAPD analysis to reveal the intraspecific genetic variations in *Ginkgo biloba* grown in different sites in Romania and Denmark. Perhaps this variation could be a possible explanation for the observed variations in the efficacy of medications with different *G.biloba* extracts (KUDDUS at al., 2002).

MATERIAL AND METHODS

Biological material used for DNA isolation was represented by kernel of seeds collected in autumn 2006 from mature plants grows in Botanical Garden Cluj-Napoca, Botanical Garden Craiova- Romania, Student Residence Hasdeu Cluj-Napoca, Arboretum KVL and Botanical Garden Copenhagen- Denmark.

Prior to isolation, approximately 400 mg kernel seeds were grind in liquid nitrogen into a fine powder. Total DNA was extracted using the protocol developed by Lodhi *et al.* (1994) and modified by Pop *et al.* (2003). Extraction buffer has the following composition: 100 mM Tris-HCl, 20 mM EDTA, pH =8.0, 1.4 M Na Cl, 2% (w/v) CTAB and 2% PVP-40 and 0.2% β-mercaptoethanol. This buffer was also supplemented with 5 mM ascorbic acid and 4 mM DIECA. DNA concentration and the absorbance ratio at A_{260}:A_{280} was quantified in a BioPhotometer Eppendorf. Reaction mixture for PCR in 25 µl volume consisted of 50 ng DNA, 200 µM of each dNTP (Promega), 0,2 µM primer (Mycrosynth, see table no. 1), 2,5 mM $MgCl_2$, 2,5 mM 10 x Buffer, 1 U Taq DNA Polymerase (Promega), 2% PVP (Sigma), bidistillated sterile water.

Table 1

Primers used in DNA amplification of regenerants obtained

No	Primer	Sequence (5' – 3')	No. of polymorphic bands/primer
1	OPA 03	AGT CAG CCA C	2
2	OPA 01	CAG GCC CTT C	5
3	OPAB 11	GTG CGC AAT G	4
4	OPAB 18	CTG GCG TGT C	-
5	OPA 04	AAT CGG GCT G	7
6	OPAL 20	AGG AGT CGG A	3
7	OPE 14	TGC GGC TGA G	1
8	OPC 02	GTG AGG CGT C	-
9	OPC 04	CCG CAT CTA C	5
10	OPD 16	AGG GCG TAA G	6
11	OPD 19	CTG GGG ACT T	3
12	OPF-20	GGT CTA GAG G	1

Amplification was performed in a Eppendorf Mastercycler Gradient programmed for the following thermal profile: an initial denaturation step – 3 min at

95^{o}C, followed by 45 cycles of 1 min. at 93^{0}C, 1 min. at 34^{0}C, 1 min. at 72^{0}C. A final extension step at 72^{0}C was performed for 10 minutes. The molecular marker used was 100bp DNA Step Ladder (Promega Corp., Madison, WI, USA). Gels were visualized on a UV light Biospectrum AC Imaging System (UVP BioImaging Systems, Upland, CA) after staining with 0,5 µg/µl Ethidium Bromide for 25 min.

Gel images were analyzed using TL120 software (Nonlinear Dynamics, Newcastle upon Tyne, UK) and the bands resulted after RAPD amplification were scored as present (1) or absent (0), data entered into a binary matrix. The genetic distance between accessions was calculated using Nei and Li's coefficient of similarity. Cluster analysis was conducted with a Neighbor-Joining algorithm using FreeTree software and a dendrogram was constructed, using the TreeView software.

Table 1 shows the nucleotide sequences of RAPD primers used in DNA amplification of analyzed *Ginkgo* individuals. Sign (+) suggest the presence of specific, polymorphic DNA fragment generated in RAPD reaction with described primer and (-) the absence of specific, polymorphic DNA fragment generated in RAPD reaction with described primers.

RESULTS AND DISCUSSIONS

DNA fragments generated after PCR amplifications with RAPD primers had the length comprised between 200-1800 bp, respectively 300-1400 bp for the majority. The primer OPA 04 produced maximum 7 polymorphic bands; primer OPD 16 generated 6 polymorphic bands; OPA 01 and OPC 04 primers gave 5 polymorphic bands, OPF 20 1 polymorphic band. The agarose gels analysis reveal genetic differences among some of the individuals. The dendrogram illustrating the genetic relationships among individuals grown in different sites in Romania and Denmark (Botanical Garden Cluj-Napoca-Romania, Botanical Garden Craiova-Romania, KVL Arboretum Horsholm-Denmark, Botanical Garden Copenhagen-Denmark, KVL Garden-Denmark).

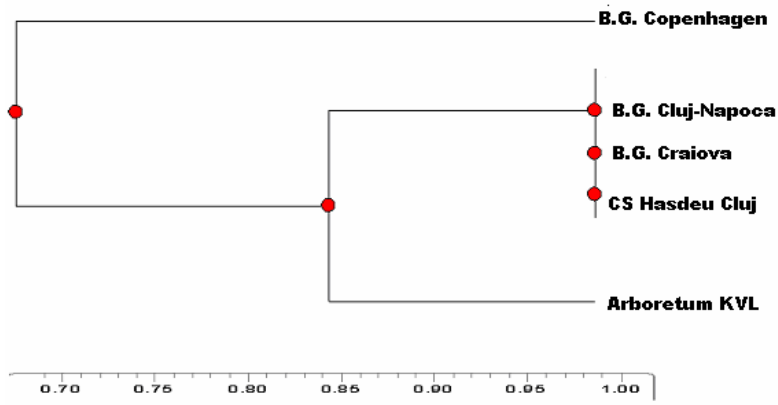

Fig. 1 Neighbor Joining dendrogram illustrating genetic relationships among *G. biloba* individuals grown in different Romanian and Danish sites.

In DNA samples originated in *Ginkgo biloba* provenances from Romania there have been registered few polymorphic bands, with band size comprised

between 400-680 bp, while in those originated in Danish *G. biloba* provenances the number of polymorphic bands has been much greater (more than 6), with band size comprised between 640-800 bp.

These results could be explained by the rather common origin of Romanian *Ginkgo biloba* samples while the Danish *G. biloba* provenances are known to have different origine (Japan and China).

CONCLUSIONS

1. Based of these results it could be staded that AFLP technique, involving primers with the previously mentioned base pair sequences, can be successfully used to reveal molecular polymorphism among DNA samples of *G. biloba* originated in various sites.

2. A through analysis of these polymorphic bands, including statistical ones, could render possible the identification of subspecies or clines within different provenances of *G. biloba*.

3. Such data are of real interest for medicinal use of various *G. biloba* geographic provenances.

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USE OF RAPD TECHNIQUE FOR MOLECULAR CHARACTERIZATION OF SOME *BRASSICA SP.* CULTIVARS AND *BRASSICA RAPA CAMPESTRIS* IN ORDER TO ANALYSE GENE FLOW POLLINATION DUE TO *APIS MELLIFERA*

UTILIZAREA TEHNICII RAPD PENTRU CARACTERIZAREA MOLECULARĂ A UNOR SOIURI DE RAPIȚĂ AMELIORATĂ (*BRASSICA RAPA*) ŞI A RAPIȚEI SĂLBATICE (*BRASSICA RAPA CAMPESTRIS*) ÎN VEDEREA ANALIZEI TRANSFERULUI ORIZONTAL DE GENE DATORAT SPECIEI *APIS MELLIFERA*

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Abstract. *RAPD technique was used to put in evidence molecular polymorphism to 6 improved breeds of Brassica sp. cultivars: Astrid, Eldo, Orkan, Gabriella, Dexter, Alaska and its wild relative Brassica rapa campestris. The protocol used for genomic DNA extraction was described by Lodhi et al. (1994), improved by Rodica Pop et al. (2003). The quality of extracted DNA corresponded quantitative and qualitative for optimal RAPD analysis. After agarose gel image analyzing using TL 120 v2006e and TL 100 DM soft were found that from the total of 41 primers, 9 did not generate amplification products, 20 were mono-morphic and respectively 12 were polymorphic. UPGMA dendrograma of genetical differences betrayed that there are some differences between improved breeds and its wild relative. Regarding the intra-specific differences between the 6 breeds, Eldo breed shows some differences comparing with the other 5. The following step of the study is gene flow pollination due to Apis mellifera.*

Rezumat. *Tehnica RAPD a fost utilizată pentru a evidenția polimorfismul molecular la şase soiuri (Astrid, Eldo, Orkan, Gabriella, Dexter, Alaska) de rapiță ameliorată (Brassica sp.) şi la specia sălbatică (Brassica rapa campestris). Protocolul de extracție utilizat pentru izolarea ADN-ului genomic, descris de Lodhi şi colab. (1994) şi modificat de Rodica Pop şi colab. (2003) a permis obținerea unui ADN care a corespuns calitativ şi cantitativ analizelor RAPD efectuate la materialul biologic studiat. În urma analizei imaginilor gelurilor de agaroză cu pachetul de programe TL120 v2006e şi TL100 DM s-a constatat că din totalul de 41 primeri folosiți, 9 primeri nu au generat produşi de amplificare, 20 au fost monomorfi, respectiv 12 au dat polimorfism. Dendrograma UPGMA alcătuită pe baza distanțelor genetice indică faptul că există unele diferențe între specia sălbatică şi soiurile cultivate de rapiță. În ceea ce priveşte soiurile analizate se observă că soiul Eldo a fost diferit genetic de celelalte cinci soiuri luate în studiu, fapt confirmat şi de imaginea obținută în unele geluri de agaroză. Datele experimentale obținute cu ajutorul tehnicii RAPD sunt parte integrantă a unui studiu privind transferul de gene realizat prin intermediul speciei Apis mellifera.*

Key words: RAPD, *Brassica sp.*, *Brassica rapa campestris*, gene flow

INTRODUCTION

Three *Brassica* species are important oilseed crops globally - *Brassica napus* (rapeseed, oilseed rape), *Brassica rapa* (turnip rape, sarson), and *Brassica juncea* (indian mustard, oriental mustard). The first two are referred to collectively as rapeseed, while *Brassica juncea* is considered a mustard. The term, "canola," describes grain from any of the above species that has less than 2% erucic acid (C22:1) in seed oil, and less than 30 micromoles per gram of aliphatic glucosinolates in the oil-free meal (Canola Council of Canada website www.canola-council.org). Grain from any of these species that does not meet canola quality standards is referred to as "rapeseed," or in the case of *Brassica juncea*, as "mustard grain."

There is some experimental evidence to suggest that the stigmas of oilseed rape flowers are partly sheltered from windborne pollen trajectories. For example, the field measurements of out-crossing from caged and naturally exposed oilseed rape plants (Ramsay *et al*., 1999) show that pollination can be dramatically reduced when insects are excluded by cages. Landscape-scale studies of out-crossing (Thompson *et al.*, 1999; Squire *et al*., 1999) suggest that the greatest risk of GM pollen transport is from insect pollination closest to the source, and honeybees have been identified as the principal pollinator for oilseed rape at large distances. Observations of honeybee flights of 1 – 2 km to collect nectar and pollen have been known for some time (Eckert, 1933) and recent studies have recorded bees foraging on oilseed rape at 5 km from a hive (Ramsay *et al.*, 1999).

During the last years molecular techniques became increasingly used for the identification of gene flow *via* pollination. All these studies required a high purity of the expected DNA. The presence of contaminants in DNA preparation often makes the samples viscous and renders DNA unrestrictable in endonuclease digestion and unamplificable in PCR (polymerase chain reaction). These contaminants are usually removed by inclusion of polyvynilpyrrolidone (PVP-40), diethyldithiocarbamic acid (DIECA), sodium bisulfite, ascorbic acid or beta-mercaptoethanol in the extraction buffer (Weising *et al.*, 1995).

MATERIAL AND METHODS

Biological material used for DNA isolation was represented by young plants grown in pots and originated from six cultivars of oilseed rape. DNA was extracted from young leaves of *Brassica sp.* of the following cultivars: Astrid, Eldo, Orkan, Gabriella, Dexter and Alaska. Prior to isolation, approximately 400 mg of leaves were grind in liquid nitrogen into a fine powder. Three isolation protocols were tested: **A.**, a modified protocol described by Doyle and Doyle 1990, **B.** a protocol described by Roger *et al.*,1988 and **C.** a modified version (Rodica Pop *et al.*, 2003) of the protocol published by Lodhi *et al*. (1994). Protocol A has the following composition of the extraction buffer: 100 mM Tris-HCl, 20 mM sodium EDTA, pH = 8, 1,4 M $NaCl_2$, 2% (w/v) CTAB and 0,2% of beta mercaptoethanol added just before use. Extraction buffer in protocol B has the similar composition except the 1% PVP-40 who was also added just before use. Extraction buffer in protocol C has the similar

composition as in protocol B except for the PVP concentration that was enhanced to 2%. This buffer was also supplemented with 5 mM ascorbic acid and 4 mM DIECA.

DNA concentration was measured through the spectrofotometric method with the Nanodrop BioPhotometer. The BioPhotometer is used for rapid, simple and convenient measurement of the most common methods in research labs in the fields of molecular biology and biochemistry. The experiments concerning DNA purity was made in three replications and interpreted as a bifactorial test with A factor (cultivar) with six graduations and fator B (method) with three graduations.

The obtained data were computed according to analysis of variance in bifactorial experiments (Ardelean *et al.*, 2002).

RESULTS AND DISCUSSIONS

Table 1 shows the average of DNA concentration of analyzed cultivars:

Table 1

Mean of DNA concentration of analysed cultivars isolated with three protocols

Cultivar	Mean of DNA concentration (ng/µl) isolated by		
	Protocol A	Protocol B	Protocol C
Astrid	2045	1970	2836
Eldo	2846	3047	2948
Orkan	1978	2334	2683
Gabriella	1445	1978	2164
Dexter	2389	2003	2314
Alaska	1890	1893	3339

As it can be seen in table 1 the average yields of isolated DNA ranged from 1445 to 3339 ng/µl of fresh tissue. These results demonstrated that the protocols we used are suitable for extraction of high quantity DNA from young leaves of *Brassica sp*. The results of analysis of variance for data obtained in bifactorial experiments concerning the influence of cultivar and protocol of DNA isolation upon the purity of extracted DNA is showed in *table 2*.

Data obtained by Duncan test shows that DNA isolation protocols affected significantly the purity of isolated DNA and the extraction protocol C are obviously superior compare to the other two methods (table 2). The factor cultivars had no significant influence upon experimental data. This suggests that the used protocols are valid for any of the tested cultivars.

Table 2

The effect of cultivar and DNA isolation protocol upon the purity of extracted DNA at 6 cultivars of oilseed rape (*Brassica rapa*)

Cultivars	DNA isolation protocols			Mean for cultivars
	A	B	C	
Astrid	1,75 b*	1,56 b	2,03 a	1,78 **A**
Eldo	1,40 bc	1,35 bc	1,82 a	1,52 **A**
Orkan	1,32 bc	1,49 bc	1,92 a	1,76 **A**
Gabriella	1,20 bc	1,30 bc	1,95 a	1,48 **A**
Dexter	1,64 b	1,42 bc	1,87 a	1,64 **A**
Alaska	1,33 bc	2,15 a	1,80 a	1,76 **A**
Mean for DNA isolation protocols	1,44 **M**	1,54 **M**	1,88 **N**	-

*The differences between two variants with a common letter are not significant

SD 5% for cultivars: 0,33-0,42;
SD 5% for DNA isolation protocols: 0,38-0,4;
SD 5% for cultivars x DNA isolation protocol interaction: 0,5-1,6;

The interaction of the two experimental factors (cultivars and DNA isolation protocols) shows that the lowest value of DNA purity (1, 20) was obtained at Gabriella cultivar when DNA was isolated by A protocol. As it can be seen in table 2, the best value of DNA purity was registered at Astrid cultivar isolated by C protocol.

Regarding the polymorphism of the random amplified fragments (RAPD), there are 12 primers from the total of 41 which are polymorphic and the image analysis using TL120 v 2006e and TL100 DM program shows that there are primers with a number of fragments between 3 and 5 (*table 3*).

Table 3

The number of polymorphic fragments generated by the RAPD primers to *Brassica rapa* and *Brassica rapa campestris*

Nr. crt.	Polymorphic primers	Number of polymorphic fragments/primer
1.	OPA 03	3
2.	OPA 09	4
3.	OPAB 18	3
4.	OPB 08	5
5.	OPB 17	3
6.	OPB 18	5
7.	OPC 02	4
8.	OPC 04	3
9.	OPD 16	5
10.	OPD 19	3
11.	OPF 20	3
12.	OPP 18	4

The appearance of polymorphic fragments suggests that there are some genetic differences between the 6 improved cultivars of *Brassica sp.* and its wild relative *Brassica rapa campestris* (*fig. 1, 2* and *3*). That requires the application of further molecular techniques as ISSR and SSR (Inter Simple Sequence Repeat-ISSR or Simple Sequence Repeat-SSR) and sequencing in order to detect very precise these genetic differences.

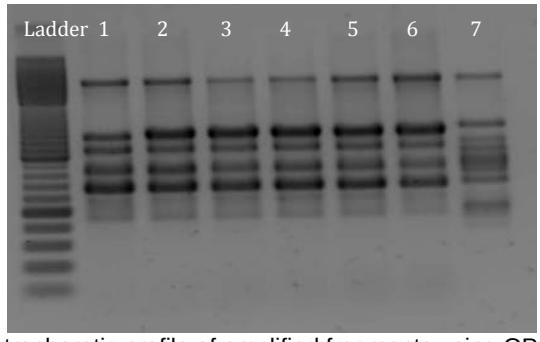

Fig. 1. Electrophoretic profile of amplified fragments using OPC 16 primer
1. Astrid; 2. Eldo; 3. Orkan; 4. Gabriella; 6. Dexter; 7. *Brassica rapa campestris*

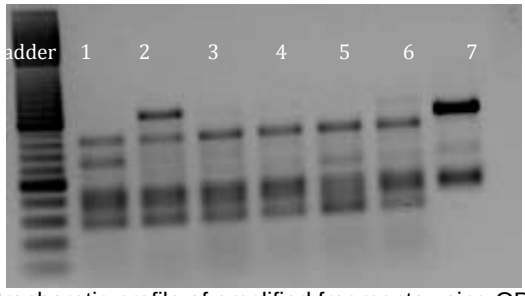

Fig. 2. Electrophoretic profile of amplified fragments using OPC 04 primer
1. Astrid; 2. Eldo; 3. Orkan; 4. Gabriella; 6. Dexter; 7. *Brassica rapa campestris*

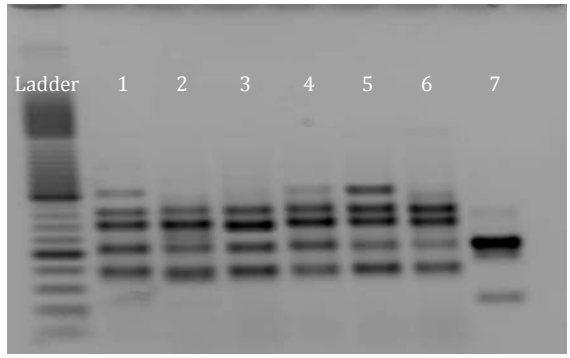

Fig. 3. Electrophoretic profile of amplified fragments using OPD 19 primer
1. Astrid; 2. Eldo; 3. Orkan; 4. Gabriella; 6. Dexter; 7. *Brassica rapa campestris*

The dendrogram UPGMA (FREETREE soft) indicate that Eldo cultivar is genetically different from the other 5 cultivars, and all of improved cultivars are significantly different by *Brassica rapa campestris* (*fig. 4*).

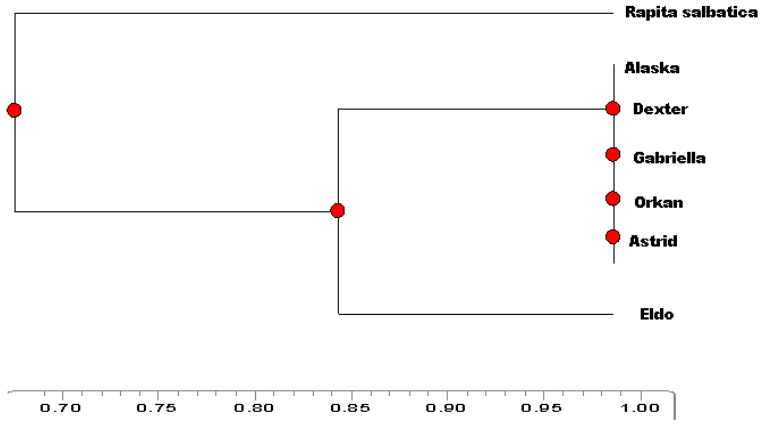

Fig. 4. UPGMA dendrogram to *Brassica sp.* and *Brassica rapa campestris*

CONCLUSIONS

✓ DNA isolation protocol **C.** represented a modified version (Rodica Pop *et al.*, 2003) of the protocol published by Lodhi *et al*. (1994) yields DNA purity value significant higher than protocol **A.** and **B.**;

✓ The use of PVP-40, DIECA and ascorbic acid in the extraction buffer in protocol **C.** minimized the damage caused de contaminants like polyphenols and polysaccharides to the nucleic acids;

✓ DNA extracted by protocol **C.** can be successfully used in our future studies concerning RAPD and AFLP analysis for revealing gene flow *via* pollination of oilseed rape;

✓ Eldo cultivar and *Brassica rapa campestris* can be used like markers in order to analyze gene flow pollination due to *Apis mellifera*;

✓ There are required further molecular techniques to get thoroughly into genetic structure of analyzed cultivars, such ISSR, SSR and sequencing.

Acknowledgements

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CYTOGENETIC EFFECTS INDUCED BY TREATMENT WITH ETHIDIUM BROMIDE AT *PAPAVER SOMNIFERUM* SPECIES

EFECTE CITOGENETICE INDUSE DE TRATAMENTUL CU BROMURĂ DE ETIDIUM LA SPECIA *PAPAVER SOMNIFERUM* L.

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Abstract: *Our study shows some changes that are at Papaver somniferum, at the division cells from the radicular apex, as the results of the treatment used with ethidium bromide. One noticed a decrease of the mitotic index at the variants analysed. The percentage of ana-telophases with aberration decreased slightly at the variants treated with mutagen substance. The treatment with ethidium bromide in the concentration 0,01%, 0,02%, 0,03% and 0,04% for 6 hours of on opium poppy radicular meristems were expressed by chromosomial mutations, especially in ana-telophases: bridge, thick bridge, multiples bridges, chromatic material expulsed and fragment, retarded and expulsed chromosomes, interphases with micronuclei. Mutations are changes of the genetic, physiologic and biochemical equilibrium of the some species; they influence negatively its efficiency. Mutants can have however, important features that can be used in the improvement programmes of that species (Ghiorghiță, I. G., 1999).*

Rezumat: *Studiul nostru are în vedere evidențierea modificărilor din diviziunea celulară din apexul radicular de la Papaver somniferum, ca rezultat al tratamentelor cu bromură de etidium. Am observat o scădere a indicelui mitotic la variantele analizate. Procentajul ana-telofazelor cu aberații a scăzut uşor la variantele tratate cu substanțe mutagene. Tratamentul cu bromură de etidium în concentrații de 0,01%, 0,02%, 0,03% şi 0,04% pentru 6 ore a meristemelor radiculare de mac s-a exprimat prin mutații cromozomiale, în special în ana-telofaze: punți, punți îngroşate, punți multiple, material cromatic expulzat şi cromozomi expulzați, interfaze cu micronuclei. Mutațiile reprezintă modificări genetice, fiziologice şi biochimice asupra echilibrului speciilor; ele influențează negativ eficiența lor. Mutantele pot fi importante pentru îmbunătățirea programelor acestor specii (Ghiorghiță, I. G., 1999).*

MATERIAL AND METHOD

Biological material 2 years seeds belonging to the species of Papaver somniferum L, variety De Botosani from the Agricultural and Zootechnic Researches Station of Secuieni, Neamt, harvest 2005. The mutagen factor used was represented by ethidium bromide in concentration of 0.01%, 0.02%, 0.03% and 0.04%, which represents the variants used in the experiment. Each variant of treatment sue on the seeds for 6 hours.

The germination was secured in Petri plates, on filter paper, at room's temperature (24ºC ± 2ºC). The harvest of the roots was realised when they were 10-15 mm high and they had been fixed in absolute ethylic alcohol / glacial acid acetic

(3:1), at room's temperature for 10-20 hours. To keep this biologic material for analyses it was secured in ethylic alcohol 70%, in the refrigerator. It was used a solution of HCl 50%, for hydrolysis, for 14 minutes and to stain at was used a Carr reagent. The preparations were realised with the squash method, they were seen at the microscope with 20X object lens and they were photographed with a 100X objective in immersion.

RESULTS AND DISCUSSIONS

a) **The mitotic index (MI)**

The treatment with ethidium bromide determined a decrease of the value of the mitotic index at all the variants. The most important decrease was recorded at the variant 0.04% (0.13), followed by the variant 0.03% (0.15). The concentrations applied had an inhibitory effect on the process of mitotic division at the cells level of the radicular apex (tab. 1, fig. 1).

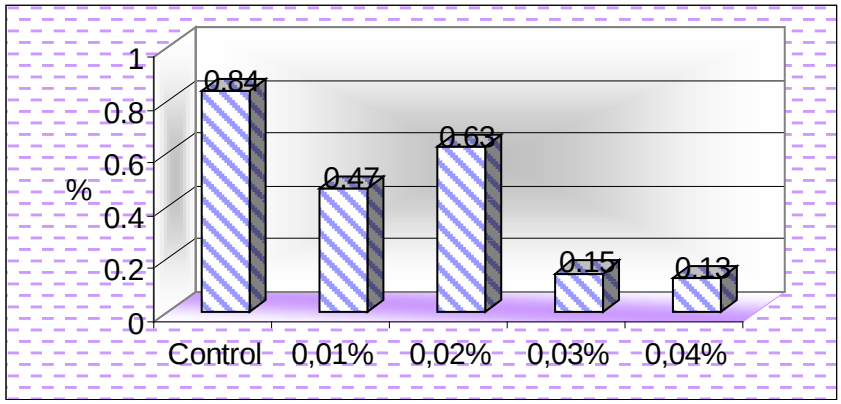


Fig. 1 Proportion of cells in division

b) **The frequency of the phases of mitotic division**

One could notice that all the tests analysed the most important percentage belong to the cells in prophase, followed by those in metaphase, telophase and anaphase.

The frequency of cells in prophase increased after the treatment used comparatively to control, at all the variants, with the exception of the variant 0.01%.

The percentage of the cells in metaphase decreased comparatively to control, at the concentrations applied, the most important decreased being recorded at variant 0.04%.

The cells value recorded an increase at all the variants, in anaphase, this value triplet at the variant 0.03%, comparatively to the control.

The percentage of cells increased at the variant 0.01% and 0.04%, in telophase, comparatively to control, but the high concentration, 0.03% induce significantly decrease (tab.1, fig. 2).

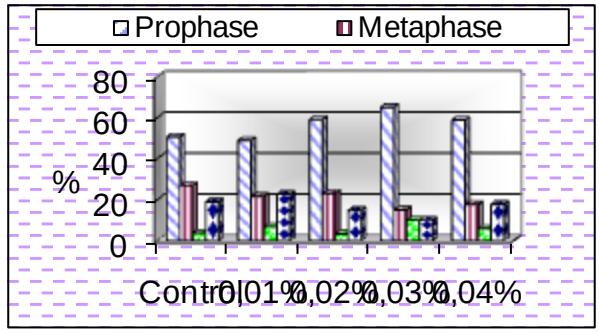


Fig. 2 Proportion of cells in division after the treatment with mutagen agent

c) **The frequency of cells with aberrations**

The treatment with ethidium bromide at *Papaver somniferum L.* didn't significantly change the frequency of cells with aberrant ana-telophases comparatively to control. The percentage of cells with aberration decreased slightly at the variants where the mutagenic treatment was used while this decrease was considerable at the variant 0.02% (36.36%) comparatively to 60.46% to control.

The main types of simple aberration were: ana-telophases with bridges, retarded chromosomes, and with expulsed chromosomes.

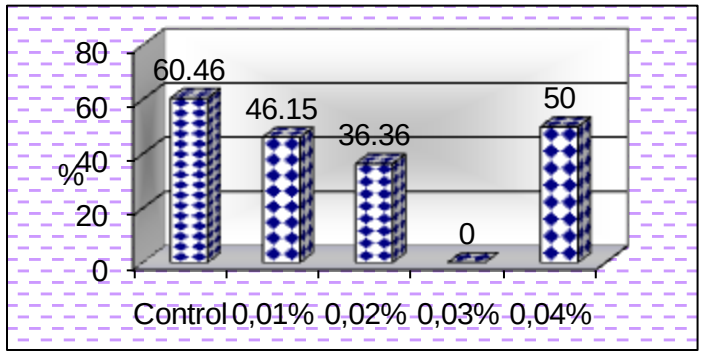


Fig. 3 Proportion of cells in aberrant ana-telophases

CONCLUSIONS

The treatment with ethidium bromide had an inhibitory effect on the process of mitotic division of the cells from the radicular apex, at the species *Papaver somniferum L.*

As concerns the phases of mitotic division, the percentage of the cells in prophase was higher than to those in metaphase, telophase and anaphase, at all variants analysed.

The treatment with ethidium bromide didn't determine the increase of the percentage of cells with aberrations according to literature data, but on the contrary it caused a slight decrease of it, at all the variants analysed.

Table 1

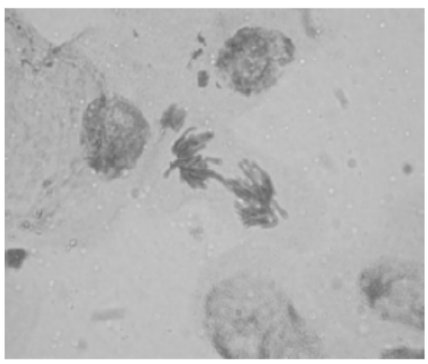
Mitotic index in radicular apex of *Papaver somniferum* after treatment with ehitium bromide

Variant	Total analysed cells	Total cells in interphase		Total cells in mytosis		Cells in mytosis								Mitotic index
						Prophase		Metaphase		Anaphase		Telophase		
		Nr.	%	Nr.	%	Nr.	%	Nr.	%	Nr.	%	Nr.	%	
Control	22592	22402	99.16	190	0.84	96	50.53	51	26.84	7	3.69	36	18.94	0.84
0.01%	18688	18600	99.52	88	0.47	43	48.87	19	21.59	6	6.81	20	22.73	0.47
0.02%	9713	9652	99.37	61	0.61	36	59.02	14	22.95	2	3.28	9	14.75	0.63
0.03%	13360	13340	99.85	20	0.14	13	65.00	3	15	2	10.00	2	10.00	0.15
0.04%	13176	13159	99.87	17	0.12	10	58.82	3	17.64	1	5.89	3	17.65	0.13

Table 2

The frequency of ana-telophases with aberration at *Papaver somniferum* after the treatment with ethidium bromide

Variant	Total ana-telophases	Total aberrant ana-telophases		Types of aberrations in ana-telophases										
				Bridges			Retardatary chromosomes			Expulsed chromosomes			Multi polar A-T	Complex aberration
		Nr.	%	1	2	n	1	2	n	1	2	n		
Control	43	26	60.46	1	4	2	1	2	1	2	-	4	2	5
0.01%	26	12	46.15	8	-	-	-	-	-	-	1	-	-	3
0.02%	11	4	36.36	1	-	1	-	-	-	-	-	-	-	2
0.03%	4	-	-	-	-	-	-	-	-	-	-	-	-	-
0.04%	2	1	50.00	-	-	-	-	-	-	-	-	-	-	1



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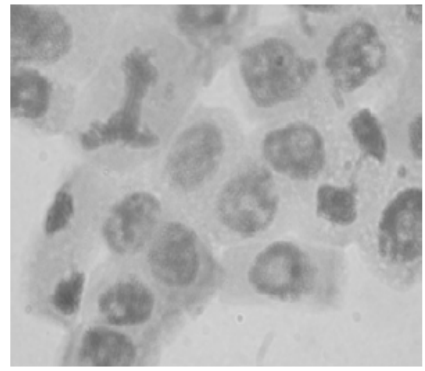

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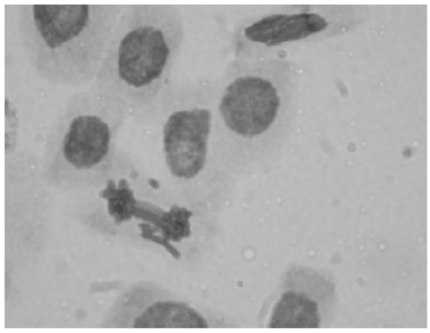

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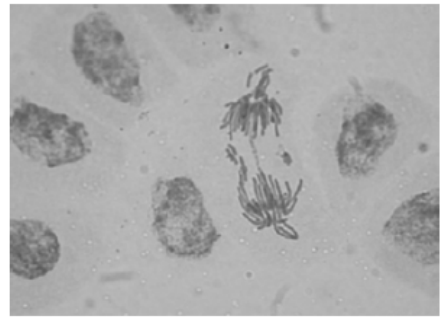

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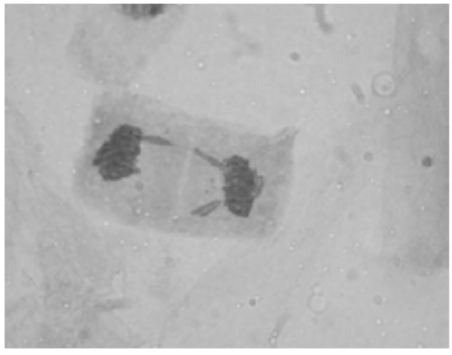
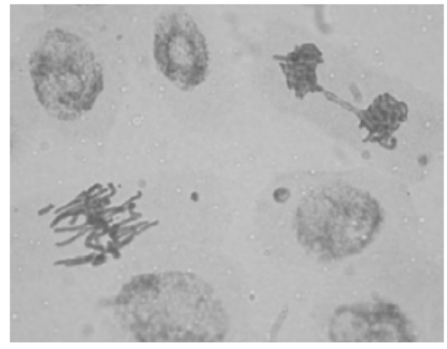


e)



f)

Fig. 1

a) A-T with bridges; b) tripolar A-T and thick bridges; c) A-T with multiples bridges, chromatic material expulsed and fragment; d) A-T with bridges, retarded and expulsed chromosomes; e) Telophases with discontinue bridges and retarded chromosome; f) A-T with double bridge and retarded chromosomes, and interphase with micronuclei.

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TECHNICAL REQUIREMENTS FOR THE ACCREDITATION OF GMO ANALYSIS PROCEDURES

CERINȚE TEHNICE PENTRU ACREDITAREA PROCEDURILOR DE ANALIZĂ OMG

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Abstract. *Transgenic crops are spreading more rapidly than any other agricultural technology in history. However, different views on this subject had caused intense controversy. In order to ensure transparency and to meet consumers' needs, EU legislation established new policies such as labeling, traceability and post-market monitoring of GMO derived food and feed products. The implementation of these policies is based on molecular analyses performed by accredited laboratories. The main steps of an integrated protocol for qualitative and quantitative GMO analysis of plant-derived foodstuffs are presented and discussed. This protocol encompasses sampling and test sample preparation, DNA extraction, quantification of DNA extracts, qualitative analysis based on PCR and quantitative determination using real-time PCR approaches. The main features of ISO standards in this field are also covered, in order to facilitate the understanding of method accreditation process.*

Rezumat. *Plantele transgenice sunt considerate ca fiind tehnologia agricolă cu cea mai rapidă răspândire din istorie. Acest domeniu a generat însă numeroase controverse atât în rândul consumatorilor cât şi la nivelul decindeților şi al comunității academice. Pentru a spori încrederea consumatorilor, UE a adoptat politici mai transparente în acest domeniu, concretizate prin introducerea unor concepte ca etichetarea, trasabilitatea sau monitorizarea post-market a produselor derivate din OMG-uri, destinate consumului uman sau animal. Aplicarea acestor politici are la bază analize moleculare efectuate în laboratoare acreditate. Sunt descrise şi discutate etapele unui protocol integrat de analiză calitativă şi cantitativă a conținutului în OMG-uri al alimentelor derivate din plante. Un astfel de protocol cuprinde ca faze principale eşantionarea şi obținerea probei test, extracția ADN-ului, cuantificarea ADN-ului, analiza calitativă utilizând reacția PCR şi analiza cantitativă cu ajutorul tehnicii real-time PCR. Se fac trimiteri la standardele ISO în domeniul analizelor OMG, documente necesare pentru derularea şi finalizarea procesului de acreditare.*

The most important advantage of genetic engineering over traditional breeding programs is the possibility of creating cultivars with new characteristics that are not determined by genes present in the natural gene pool of the species to which the cultivar belongs, *i.e.* genes originating from unrelated organisms.

Since their introduction, transgenic crops are spreading more rapidly than any other agricultural technology in history (Raney, 2006). However, different views on

genetically modified organisms (GMOs), regarding their release into the environment, cultivation, importation and particularly, their utilization as food or feed ingredients, had caused intense controversy which raised the need for regulative approaches. No specific international regulatory systems in the field of GMOs are currently in place. However, several international organizations are involved in developing protocols for GMO analysis (Querci *et al*., 2004) in order to ensure safe use and to facilitate imports of this technology.

The use of GMOs is regulated in the European Union (EU) by a set of strict procedures laid down in several Directives and Regulations (*e.g.* Directive 2001/18/EC, Regulation (EC) 1829/2003, Regulation (EC) 1830/2003. The EU has identified traceability and labeling as two major issues in ensuring transparency and assisting consumers into making an informed choice (Querci *et al*., 2004). The implementation of the regulatory system is, in part, based on the availability of validated methods of analysis and subsequently on a harmonized application within the EU boundaries.

From a scientific point of view, at the European level, the Institute for Health and Consumer Protection (IHCP) of the Joint Research Centre (JRC) of the European Commission and the World Health Organization are the most active institutions in the field. The Biotechnology and GMOs Unit (B&GMOs) of the JRC's IHCP has the mandate to make sure that all methods are in place for the control of food samples (http://biotech.jrc.it/). These methods are to be used by specialized national control laboratories most of which are part of the European Network of GMO Laboratories (ENGL). In the context of EU food and feed regulation, the JRC assisted by ENGL acts as the Community Reference Laboratory (CRL) in the field of GMOs. The CRL has the mandate to evaluate and validate analytical methods, to ensure that they are fit for the purpose of regulatory compliance and to provide scientific and technical advice in case of disputes (http://gmo-crl.jrc.it/). Therefore, the validation and accreditation of analytical methods are important tools for ensuring proficiency.

To comply with the EU legislation operators involved in GMO detection need to answer three sequential questions: detection, identification and quantification of GM content. GMO detection is based on analyses performed by specialized GMO testing laboratories. These laboratories have special facilities and work programs to include analyses which comply with the world wide good laboratory practices, requirements and acts in the field of biotechnologies, also covering GMOs. The main topics that are generally considered important for the correct functioning of a GMO testing laboratory are: laboratory set-up and implementation, how to avoid contamination, forward-flow system, good laboratory practice, method selection, proficiency testing, method validation and accreditation (EC, 2005).

DISCUSSIONS

There are three types of methods that can be used to identify GMOs as such or contained in food and feed: phenotype identification, DNA-based and protein-based methods. Protein-based methods are using the antigen-antibody interaction and include lateral flow strips for rapid field identification, and ELISA. However,

DNA-based techniques are more often/frequently used in GMO analysis. In this case, qualitative analysis is usually based on PCR, while quantitative measurement is archived by real-time PCR, technique considered to be the most powerful tool for quantitative nucleic acids analysis (Kubista *et al*., 2006).

Providing correct, that is reliable and repeatable, analytical results is the most important factor in satisfying customers. High quality results are produced when the testing laboratory is able to work in a proper and acceptable way, following existing international standards, choosing analytical methods that are officially validated, if available, or at least demonstrated to give reliable and repeatable results (EC, 2005).

According to the EU legislation analytical methods used for food and feed control purposes shall be validated before their use by control laboratories (ENGL document). Method validation is therefore regarded as an important parameter for assessing technical performances of GMO testing laboratories. Performance criteria include: specificity, sensitivity, limit of detection (LOD), limit of quantification (LOQ), accuracy, trueness, precision, repeatability, reproducibility, dynamic range, applicability and measurement uncertainty (ENGL, 2005; ISO 24276:2006; Žel *et al*., 2006). More information on how to define or calculate these parameters are available in ISO standards 24276 and 5725. Literature on performance requirements for analytical methods for GMO testing is also available on the ENGL web page (http://engl.jrc.it/).

Accreditation of the laboratory is overall highly advisable. Among different quality assurance tools, accreditation is the most detailed and valuable one (EC, 2005). ISO defines accreditation as a procedure by which an authoritative body gives formal recognition that a laboratory operates a quality system, is technically competent, and is able to generate technically valid results. This does not guarantee that a given analytical result is correct, but it does establish standards that must be met and a framework approach to detect non-conformities when they occur (EC, 2005). The official ISO standard defining the general requirements for the competence of testing and calibration laboratories is ISO standard 17025. Requirements to comply in with this standard include: demonstrated technical competence of laboratory personnel, use of well defined test methodology, use of CRMs and participation to proficiency testing schemes, equipment management and calibration, records management and provision of adequate test reports including traceability (ISO/IEC 17025:2005). In addition to the need of compliance to the general requirements for the competence of testing and calibration laboratories according to ISO standard 17025, is worth knowing that specific documents defining the criteria and analytical protocols for the detection and quantification of GMOs have been elaborated. ISO standard 24276 serves as horizontal document for GMO testing laboratories, while ISO standards 21568, 21569, 21570, 21571, 21571 and 21572 deal with different analytical steps of detecting, identifying and quantifying GMOs.

The following indications are considered to be crucial when testing samples with the PCR/real-time PCR technique. However, the concepts can be adapted to fit other

procedures, such as ELISA and microarrays. The two most important requirements regarding the working area are the presence of separated areas and the implementation of a unidirectional work flow. Ideally, for each specific step of the procedure a physically separated area is needed and each of these areas is to be fitted with dedicated equipment (EC, 2005; Žel et al., 2006).

An important factor for testing laboratories is contamination avoidance (EC, 2005; Žel et al., 2006). It is generally believed that the main contamination sources in a GMO testing laboratory are: cross-contamination, aerosols, dust. Precautions should apply to rooms, equipment, working methods, personnel. The opportunity of contamination to occur will be highly reduced by establishing a unidirectional workflow (Žel et al., 2006). Good laboratory practice for contamination avoidance also include: changing lab coats every time a separated area is entered; the same applies to gloves; using sterile and aerosol resistant tips; routine cleaning and decontamination (before and after work) of laboratory working areas and equipment (Žel et al., 2006). An additional suggestion for the GMO testing laboratories is to install specific air flow systems for key areas (EC, 2005; Žel et al., 2006). The system has the provide positive/negative pressure, depending on the situation, in order to keep avoid spreading of contaminants.

Calibration of equipment, such as pipettes and real-time PCR instruments, is also of great importance in order to ensure repeatability and reproducibility of analytical methods.

Another important aspect is monitoring analytical performance over time. Valid and reliable measurements depend on the regular use of reference materials (EC, 2005). Availability of reference materials is crucial in case of quantitative analysis where it is necessary to construct a calibration curve at known GM concentration. Certified Reference Materials (CRMs) should be used on a regular basis in order to have a good quality assurance system. In Europe CRMs suitable for GMO detection and quantification are produced by the JRC Institute for Reference Materials and Measurements (IRMM).

Aside from reference materials, any analytical procedure requires the use of suitable controls (EC, 2005; Žel et al., 2006). The types of controls that should be used in a GMO analysis can be found in ISO standard 24276.

A general procedural flowchart for GMO analysis starts with sample preparation, followed by the extraction and purification of the analyte (DNA or protein), detection of the analyte, interpretation of collected data and reporting of results.

Sampling is a very important and complex step within the process of GMO analysis. However, this task is usually carried out by specialized personnel employed by national authorities. Some practical considerations on the sampling process are available in EN/TS ISO 21568:2005.

Prior to DNA isolation some of the samples preparation (*e.g.* milling, reduction of size) is carried out in a dedicated area. The enemy in this specific case is the production of dust and precautions to keep this area clean and to avoid contamination are crucial at this stage (EC, 2005). The purpose of a proper sample preparation is to ensure that the test portion is a homogenous representation of the whole laboratory sample.

A large variety of DNA extraction and purification methods are available and used in GMO analysis: CTAB-based extraction protocols (Somma, 2004), Wizard® Magnetic DNA Purification System for Food (Promega), DNeasy Plant Mini Kit and QIAamp DNA Stool Mini Kit (Qiagen), MagNA Pure LC DNA Isolation Kit I (Roche) etc. These methods differ in terms of principle, ease of use, cost per sample, efficiency etc. Each laboratory should select and implement an extraction method according to its own needs and resources. General consideration and examples of extraction methods for GMO analysis and manual extraction protocols are also provided in EN ISO 21571:2005. One important consideration is that each unknown sample should be extracted at least in duplicate (EC, 2005). Validated methods for DNA extraction are also available on the CRL web page (http://gmo-crl.jrc.it/).

DNA quantification is important in order to assess the characteristics of the extracted DNA. It is usually achieved by spectrophotometer measurement or by agarose gel electrophoresis. The second method offers indications on the molecular weight of extracted DNA. The first option provides information about the concentration and the purity of the extract important in determining the LOD and LOQ of analytical methods. Examples of methods for DNA quantification can be found in EN ISO 21571:2005, Annex B.

From a technical point of view, PCR and real-time PCR in the filed of GMO analysis are covered by ISO 21569 and ISO 21570, respectively. These documents provide information on technical aspects of these methods as well as examples of analysis methods for screening, taxon, construct and event identification and characterization. Validated methods for quantification of different GM events are also available on the CRL web-site (http://gmo-crl.jrc.it/).

In the case of qualitative PCR each extraction should be analyzed in duplicates, while for real-time PCR amplifications must be carried out in at least in triplicate (European Communities, 2005). For quantitative PCR four to six values are needed to construct the standard curve (EN ISO 21571:2005).

US Environmental Protection Agency also provides guidelines on quality assurance and control for laboratories (EPA, 2004).

Results should be reported according to the precise guidelines detailed in the international standards. In case of accredited laboratories, ISO standards 21569 and 21570 provide the guidelines for correct and comprehensive reporting of results.

CONCLUSIONS

We can summarize that there are three critical factors for ensuring reliable analyses: the competence of the operators (ensured by proper training), the application of good analytical methods (ensured by the validation process which verifies that the method, already optimized can be successfully implemented while maintaining its features) and the overall quality of the laboratory (ensured by the implementation of a quality system such as accreditation and by regular participation to proficiency testing schemes).

There are also some issues that are not yet properly solved or fully understood in order to be implemented in routine analysis of GMOs. These include: proper sampling of bulk commodities; quantification of stacked events; increase of GM events; lack of adequate CRMs for all tested matrices; biological diversity of a particular GMO, *i.e.* zygosity or ploidy; conversion of the measurement units; new emerging methods for analysis, such as microarrays or other non-DNA-based assays; cost-efficiency of analyses.

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THE IMPACT OF SOME PROTECTIVE AGENTS ON THE BIOSTABILITY OF WOOD

IMPACTUL UNOR AGENȚI DE BIOPROTECȚIE ASUPRA BIOSTABILITĂȚII LEMNULUI

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Abstract. *The aim of this paper is to pointing out some possibilities of testing and investigating the biodegradation of some natural composite structures represented by fir and beech wood test-samples. These have been used both in a treated state and untreated on the surface. The treatment has been achieved through brushing in both directions. The products used for the treatment have been used in different of concentration and they are both of organic origin (unmodified and modified straw lignin, furan resin) and inorganic origin (copper chloride and copper- ammonia solution). The testing of the level of biodegradation and of the level of bio-protection implicitly have been achieved in different environments, namely indoors, outdoors, through burying them in soil (in the absence of plants) and in soil cultivated with bean plants. The consequence of these tests was to establish that the efficiency of the treatment applied on the wooden material depending on the kind of the used product.*

Rezumat. *Lucrarea îşi propune evidenţierea unor posibilităţi de testare şi investigare a biodegradării unor structuri compozite naturale reprezentate de epruvete de brad şi fag. Acestea s-au utilizat atât în stare netratată ,cât şi tratate la suprafaţă. Tratamentul s-a realizat prin pensulare în dublu sens. Produsele pentru tratament s-au utilizat în concentraţii diferite şi sunt atât de natură organică: lignina din paie nemodificată/modificată, răşina furanica ,cât şi de natură anorganică: clorura cuprică şi solţtie cuproamoniacală. Testarea gradului de biodegradare şi implicit a gradului de bioprotecţie, s-a efectuat în medii diferite şi anume: în interior, în exterior, prin îngropare în sol (în absenţa plantelor) şi în sol cultivat cu plante de fasole. În urma acestor teste, s-a constatat că eficienţa tratamentului aplicat pe suprafaţa materialului lemnos depinde de natura produsului utilizat.*

The composite materials, which are more and more frequently named "the materials of the future" belong to the category of the "new materials", to "the advanced or engineer- materials" and they form a primary field which is predominantly studied worldwide (9, 16).

The composite structures have prevailed due to their superior functioning compared to the individual materials and due to the possibility of modelling their properties according to the field in which they are used (11).

For this purpose, the wood as a composite material is evaluated both as a model structure and in connection with its exploitation in various fields as a renewable product and compatible with the environment. Despite all these, in some cases the biodegradability of wood can represent a shortcoming and for this

reason now these are studying various possibilities of bio-stabilization. Having in view the toxicity of the classic biocide agents nowadays there can be noticed the tendency of obtaining the resistance to the microorganisms attack with regard to the systems based on the properties of some natural products such as lignin types and the aromatic compounds (1). It is known that wood is commonly degraded by a series of biological agents whose action can be increased by the climate factors and by the types of environment where it is temporarily kept or after being processed. These natural agents of destroying the wood are the most significant through the amplitude of the effects on wood (2, 6,11).

In other words, the composition and the structure of the wood make it vulnerable to the attack of some natural destroying factors (damaging factors) both biotic (biological) and abiotic, physical and chemical (environment factors, fire). They produce specific phenomena of degradation represented by the alteration of the physical, mechanical and/or biochemical characteristics of the wood. In order to control, and adjust the process of biodegradation of the lignocellulose composite elements there have been set various methods of bio-protecting them, using different techniques both modern and traditional developed as techniques of preserving wood (chemical change, thermal treatment, superficial or depth treatment with resins, polymers and polymerizable substances, impregnation with inorganic salts and other compounds, inclusions in composite materials (other materials), protection, gluing (3, 4, 15).

Wood protection is an extremely complex process which involves a rigorous selection of the chemical agents that has to assure the efficiency and the persistence of the treatment. The chemical substances used in the treatment of wood can have two or more properties at the same time; an example is the case of the insect-fungicide substances and of the substances with fireproof action; they can be both organic and inorganic (11-13).

The wood chemical compounds (the polysaccharides and the lignin) are characterized by different biological stability. Thus the lignin is the component resistant to the action of the microorganisms, whereas the polysaccharides are characterized by a reduced stability (5, 6).

Having in view the natural features of lignin, the present paper presents a comparative study of its role in the process of bio-stabilization along with the furan resins and the chemical agents such as the copper chloride and the copperammonia solution.

For this reason the present work has the purpose of approaching two processes which are in reciprocal interdependence, the process of biodegradation and that of bio-protection of the wood respectively. Besides, some methods of testing and investigating the biodegradation of some lignocellulose composite materials have been the subjects of a previous work (17-19).

MATERIAL AND METHODS

The following materials have been used within this study:

- fir test-pieces having the size (7.5X3.0X1.5) cm and the equilibrium relative humidity U1=13.63% and beech test-pieces having the size (8.5X4.3X1.5)cm and the equilibrium relative humidity U1=14.74%;

- unmodified straw lignin from the Granit Recherché Développement S.A. company and straw lignin modified through hydroxymetylation (7, 8, 10, 14).
- the Biorez furan resin from the Trans Furans Chemicals company [14].
- copper chloride;
- tetraminocopper hydroxide(cuproxam);
- ammonia solution 0.1N.

Fir and beech test-pieces have undergone surface treatment through brushing in both directions with unmodified/modified straw lignin, rendered soluble in ammonia 0.1N and furan resin solution 36%,copper solution and cuproxam. The used products have been used in solution with the concentrations of 1, 3 and 5%. After the treatment, the wooden test-pieces have been dried under air conditions, they have been weighed by means of the analytical balance with a precision of 0.01 g and then they have undergone various tests of bio-stability through:

- maintaining them in laboratory conditions;
- maintaining them in the outdoor environment;
- burying them 7-8 cm deep in soil in the absence of plants;
- burying them in soil cultivated with bean plants (the Vera variety), the same depth.

The soil that has been used has the following characteristics: equilibrium relative humidity, U=14.40%, pH=7.96, organic carbon contained, C=0.1586%, total nitrogen content (organic nitrogen and mineral nitrogen), Nt=0.206%.

The tests were made between June 2006 and March 2007. In parallel with the analysis of the mass losses, the contact angle of the treated and untreated wooden test-pieces was also determined. This represents a direct action of the process of biodegradation. Thus a reduced wetting angle highlights an intense wetting and this indicates a high level of biodegradation (17-19).The applied method was according to the SR EN 828/2001-L73 standard, and the processing of the data was achieved by means of a computational soft.

RESULTS AND DISCUSSIONS

Figure 1 presents the values of the wetting angle values for the same type of test-pieces, deposited under the conditions of the environment. Though kept indoors, the test-pieces are noticed to have a certain level of mass losses. Thus there can be registered mass losses and value reductions of the wetting angle, which can be attributed to the elimination of some volatile products that could be formed under the action of the treatment agents or as a consequence of the humidity and temperature variation during storage of the samples. The most visible changes can be noticed in the case of the beech wood, probably due to its structure characterized by more advanced porosity.

There can be noticed that the exposure of the wooden plates to an outdoor environment determines a reduction of the values of the wetting angle values (figure 2) and therefore a increase of the wetting level and of the level of biodegradation respectively. The interference of the environment factors (the light radiations, the humidity variations) is visible and can mainly produce effects of removing the treatment agents without showing any phenomena of microbiologic attack. The effects of protection of the studied products follow the same order

according to the type of the wood species and of the agent used. The concentration of the products tested as biocides has an important role in all the experimental variants studied. The mass losses are reduced along with the increase of the concentration of the treatment agent.

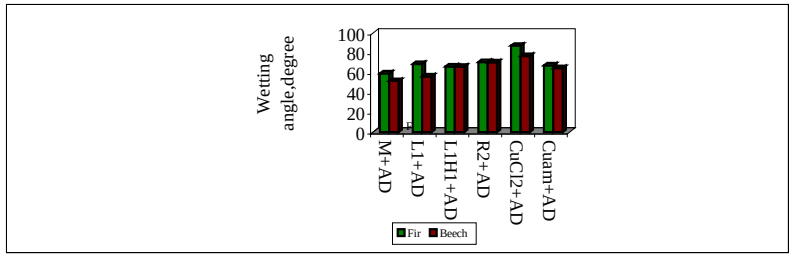

Fig.1 – The wetting angle registered al the contact with the distilled water (AD)with fir and beech test-pieces treated with L_1, L_1H_4, R_2, $CuCl_2$, Cuam, stored inodor

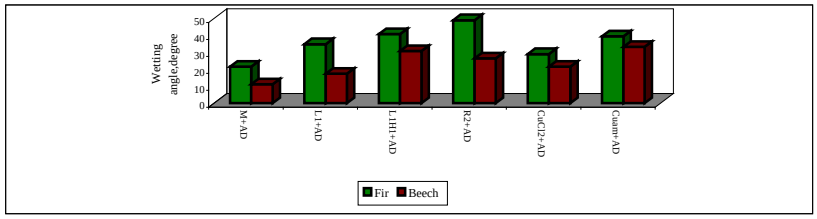

Fig.2 – The wetting angle registered al the contact with the distilled water (AD)with fir and beech test-pieces treated with L_1, L_1H_4, R_2, $CuCl_2$, Cuam, stored outdoors

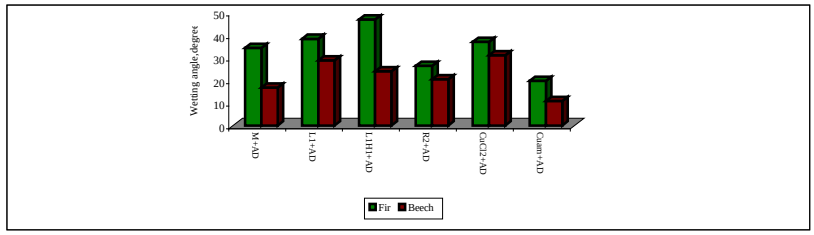

Fig.3 – The wetting angle registered al the contact with the distilled water (AD)with fir and beech test-pieces treated with L_1, L_1H_4, R_2, $CuCl_2$, Cuam, burried in soil

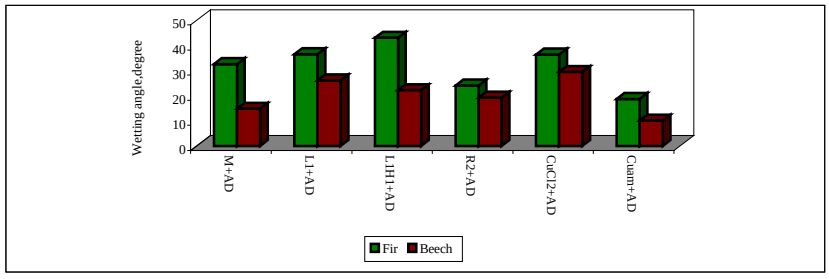

Fig.4 – The wetting angle registered al the contact with the distilled water (AD)with fir and beech test-pieces treated with L_1, L_1H_4, R_2, $CuCl_2$, Cuam, burried in soil cultivated with bean plants

- M-Standard; L1 – unmodified lignin straw; L1H4-modified lignin straw; R2 – Biorez resin having the initial humidity of 36 %;

More than that, the action of the soil cultivated with bean plants involves the achievement of some synergic effects as a result of the interference with the rhizosphere. It is known the fact that the bean plants provide the soil with supplementary nitrogen source which can be favorable to the development of microorganisms. The comparison of the data presented in figures 3 and 4, confirms this hypothesis. Thus, in both cases, it can be noticed that soil burial leads to an increase in mass losses and the values of the wetting angle are more and more reduced. These effects are more visible when the soil is cultivated with bean plants.

The important and notable aspects refer to pointing out the bio-protection activity of the tested products. Thus it is confirmed that both the unmodified and modified lignin and the furan resin offer biological stability to wood. All together the copper ions manifest a well-known activity of inhibiting biodegradation. When the copper ammonia solution is used a more intense action appears which is probably caused by the action of penetrating the wood tissue, and due to complex-forming functional groups of chemical compounds and wood becomes more resistant. The retention of the copper ions by the functional groups of the wood components (among which lignin plays a very important role) can explain their action irrespective of the interaction of these biocides with the wood (the organic ones attach especially to the surface of the wood and the inorganic ones get into the interior of the wood).The registered results could be developed subsequently in order to improve the biocide effects of the treatments with modified/unmodified types of lignin by combining them with copper ions, thus opening new was to introduce of some biocide systems compatible with the environment. The capacity of forming the mentioned complexes was proved in a previous work (13).

CONCLUSIONS

The fir and beech wood test-pieces have been treated with unmodified/modified types of lignin, furan resins and solutions containing copper ions with the view of analyzing and comparing their bio-stabilization effects;

The studies have been achieved analyzing the wetting angle (as indices of the biodegradation level) of the (un) treated samples and stored in various conditions: indoors, outdoors, burried in uncultivated soil or soil cultivated with bean plants;

The experimental data point out the effects of bio-stabilization of the tested products which depend on their type and concentration as well as on the wood species;

The biocide systems based on products obtained from renewable resources (types of lignin and furan resins) represent new opportunities of achieving new treatments of bio-stabilization compatible with the environment. More than that, another possibility is that of obtaining environmental effects by using products of natural origin along with the copper ions, direction which will be further developed.

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STUDIES CONCERNING THE BIOLOGICAL STABILITY OF SOME COMPOSITE MATERIALS IN THE PRESENCE OF SOME BIOCIDES

STUDII PRIVIND STABILITATEA BIOLOGICĂ A UNOR MATERIALE COMPOZITE ÎN PREZENȚA UNOR BIOCIZI

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Abstract. *This work has the purpose of highlighting some possibilities of testing the quality of some biocide systems on the basis of natural products with applications in the protection of the lignocellulose materials represented by test pieces made of fir and beech wood. These have been used both in their untreated state and treated on their surface through brushing both ways. The products tested for the treatment have been used in various types of concentration and they are both of organic origin (unmodified/modified straw lignin, furan resin) and inorganic origin (copper chloride and tetraminocopper hydroxide). Testing the bio-protection and implicitly the biodegradation level has been carried out in several versions, chosen according to the classes of standard biological risk concerning the biological attack. The evaluation of the quality of the studied biocide systems has been achieved by analyzing the resistance of the wooden products studied to the attack of some biological agents). As a result of these tests, it was noticed that the efficiency of the treatment applied on the wooden material depends on the nature of the product used.*

Rezumat. *Lucrarea îşi propune evidenţierea unor posibilităţi de testare a calităţii unor sisteme de biocizi pe bază de produse naturale cu aplicaţii în protecţia materialelor celoligninice, reprezentate de epruvete de lemn de brad şi fag. Acestea s-au utilizat atât în stare netratată cât şi tratate la suprafaţă prin pensulare în dublu sens. Produsele testate pentru tratament s-au utilizat în concentraţii diferite şi sunt atât de natura organică: lignina din paie nemodificată/modificată,răşina furanică, cât şi de natură anorganică: clorură cuprică şi hidroxid tetraaminocupric. Testarea gradului de bioprotecţie şi implicit a celui de biodegradare s-a analizat în mai multe variante, alese în funcţie de clasele de risc biologic standard privind atacul biologic. Aprecierea calităţii sistemelor biocide luate în lucru s-a realizat prin analiza rezistenţei produselor de lemn studiate la atacul unor agenţi biologici. În urma acestor teste, s-a constatat că eficienţa tratamentului aplicat pe suprafaţa materialului lemnos depinde de natura produsului utilizat.*

Through its definition, the term "composite" is attributed to a complex system, made of several materials of various types. The lignocellulose materials are mainly made of cellulose, lignin and hemicelluloses, natural polymers that

represent more reactive groups capable of taking part in reactions of modification. The research that has been made across the years point out the fact that lignocellulose can be modified by means of microorganisms and of the enzymatic systems involved in biodegradation (15).

The composite structures imposed themselves thanks to the superior performances towards individual materials and the possibility of modeling the properties according to the domain of use (1). To this purpose, the wood as composite material is assessed both as a model structure and under the aspect of its use in various domains as a regenerating, recyclable and ecological product (compatible with the environment). Wood is a composite biological material and thus it is inevitably exposed to deterioration, in some cases its biodegradability being a shortcoming and for this reason they are studying various possibilities of bio-stability are being studied at the moment.

In order to control and adjust the biodegradation process of the lignocellulose composites, various bio-protection methods have been prepared for them , using various modern and traditional techniques, actually developed as techniques of “preserving” the wood (chemical modification, chemical treatment, surface treatment or in-depth treatment with resins, polymers and polymerizable substances, impregnation with salt and other substances, inclusion in composite materials (other materials), protection, gluing) (2, 8, 14, 23, 24).

Having in view the toxicity of the classic biocide agents, there can be noticed nowadays the tendency of obtaining resistance to the attack of microorganisms with regard to systems based on the properties of some natural products, such as for example lignins and the aromatic products (10,13).

The chemical compounds of wood (polysaccharides and lignin) can be characterized by different biological stability. Thus, among these, lignin is the material which is resistant to the action of microorganisms, whereas polysaccharides are characterized by reduced stability (16). Having in view the natural characteristics of lignin, the present work carries out a comparative study of the influence that lignin shows in the process of bio stability, along with the furan resins and chemical agents such as the copper chloride and the tetraminocopper hydroxide (cuproxam) For this reason the present work intends to adopt two processes that are in interdependent reciprocity, the process of bio protection and that of bio degradation of the lignocellulose materials respectively. More than that, some methods of testing and investigating the bio degradation of some composite lignocellulose materials have formed the subjet of some previous studies. (23, 24).

MATERIAL AND METHODS

For this study the following materials have been used:

- test pieces made of fir wood having the size 7,5X3,0x1,5) cm and the equilibrium relative humidity U_r=13,63% and test pieces made of beech wood having the size (8,5x4,3x1,5) cm and the equilibrium relative humidity U_r=14,74%;

- unmodified straw lignin coming from the company Granit Recherche developpement and straw lignin modified through hydroximetilation (3,17,19, 23) (table 1);
- Biorez furan resin coming from the company Trans Furans Chemicals 36%;
- Copper chloride;
- Tetraminocopper hydroxide (cuproxam)
- Ammonia solution 0,1 N

Table 1.

The characteristics of the unmodified (L1) and modified (L1H4) straw lignin

Characteristics	**L_1**	**Characteristics**	**L_1H_4**
Relative humidity,%	5.00	Relative humidity,%	5.85
Ash,%	2.30	Ash,%	0.64
pH in suspension	2.70	pH in suspension	3.50
p-OH	1.70	Rap. OH Al/OH Ar A 2930/A1510	0.84
Carboxyl groups	3.80	Carbonyl groups	0.73
Manganese,%	0.7	Rap.CH2O/L1 (W/W)	0.2583
Nitrogen,%	1	Phenol OH A 1345/A1510	0.69
Uronic acid,%	0	alcohol OH (moles/C9)	0.30
Solubility in acids, %	1	total OH (moles/C9)	0.99

The fir and beech test pieces have undergone the surface treatment trough brushing both ways (in the direction of fibers, perpendicularly (transversally) on these and in the end again in the direction of fibers with unmodified/modified straw lignin, rendered soluble in ammonia 0,1 N and with furan resin solution 36%, copper chloride and cuproxam. The biocides have been used with the following concentration values: 1, 3 and 5 %. The impregnation of the wood test-pieces was carried out in a period of time between 5-10 minutes, after which these were dried under air atmosphere and room temperature conditions for 24 hours. After achieving these operations, the composites have undergone different bio stability tests, taking into account the classes of risk concerning the biological attack on the bio test of wood. The treated fir and beech test-pieces were placed on the soil surface under natural conditions in a stationary unit from the farm “Vasile Adamachi” from USAMV, Iasi. The stationary unit is placed near an area covered with woody vegetation, in order to obtain the optimal conditions for natural infections. The observations have been done every 14 days, collecting the material on which the emersion of the degradation areas could be noticed. The materials have been transported to the laboratory in sterile bags, and there they have undergone the mycetological test.

In order to determine correctly the micromycetes that attach to the wood, the fieldwork samples have been brought to the laboratory and after they have been put in

Petri containers on humid filter paper, they have undergone the thermostatation. After the attachment of the micromycetes has been noticed, these have been mashed on the agar medium Czapek, medium where the micromycetes have to develop in order to determine correctly the genus and species referred to.

RESULTS AND DISCUSSIONS

As a result of the samples analysis, the appearance of the following micromycetes has been noticed:

PENICILLIUM BREVI-COMPACTUM-Dierckx in Soc. Scien. Brux. XXV, p.88 (1901); Thom, The Penicllia, p.295-296 (1930); J.Gilman, A Manual of Soil Fungi, p.255 (1957); Raper and Thom, p.407-409, fig. 106,107(1968); Domsch end Gams, Pilze aus Agrarböden, p.98 (1970)

The fungus can be found on *Fagus silvatica L.* wood treated with $CuCl_2$, Cuam and resins, which is a new host in Romania for these mycetes.

PENICILLIUM FUNICULOSUM- Syn.: *Penicillium pinophilum* Hedgcock.- Thom, U.S. Dept. Agr.,Bur. Anim. Ind., Bul. 118, p.69, fig.27(1910);Thom, The Penicllia, p.464-465, fig.77(1930); Gilman, A Manual of Soil Fungi, p.280(1957); Raper, Thom and Dorothy Fennell, A Manual of Penicillia, p.616, fig.616, fig. 159(1968).

The colony of the micromycete on *Abies alba Mill* wood treated with $CuCl_2$ and Cuam, resin and modified lignin is hairy, green with numerous hyaline conidiophores, with smooth walls, typically bivertical, of 100-300 μm. Gilman mentions it from different American states and in Romania it is mentioned by Misirliu Elibabeta et collab. , from Alpine soils 1964, On paper by Ana Hulea, Piticas Gh 1970, Papacostea P. and collab., from the podsol soils in the Apuseni Mountains-1076 and by Iacob Viorica from The soil of vegetable greenhouses in 2003. In Romania, *Abies alba Mill*. is a new host for this mycete.

ALTERNARIA GEOPHILA- Daszewska, Etudé sur la désagrégation de la cellulose dans la terre de bruyére et la turbe, Bul. Soc. Bot. Geneva II, 4 p. 294(1912); Gilman, A Manual of Soil Fungi, p. 348(1957).

The fungus can develop on *Fagus Silvatica L.* wood treated with $CuCl_2$, placed on the surface of the soil for several months under ordinary climatic conditions. Gilman mentions the fungus from the Swiss and Egyptian soils. The *Alternaria geophila Dasz* fungus is new in Romania on the Fagus silvatica L wood, which seems to be a good host.

STACHYBOTRYS ALTERNANS - Bonorden, Handb., p.117(1851); Sacc., Fungi ital.,del., tab. 898 et Syll. Fung., IV, p.269(1886); Lindau, Rab., Kr. Fl. (Ed. II) VIII, p.628(1910); Migula, Kr. Fl. Bd. III, Pilze 4 Teil, 2 Ab., p. 236, taf. CXXVII, fig. 3-5 (1934); Gilman, A Manual of Soil Fungi, p. 321 (1957). The *Fagus silvatica L.* wood treated with Cu Cl_2, lignins and furan resins placed on soil for several months is invaded by the mycelium of the blackish-brown fungus. Gilmann mentions the fungus in the USA and Puerto Rico soils. In Romania it was found in soil as saprophyte fungus by E. Docea and G Melica in 1953, Revolceanu and I Alteras in 1958, 1959, 1960, by

C. Sandu-Ville- on cotton-wadding in 1961, by Th. Chifu – in soil in 1971 and by Viorica Iacob in 1991 on *Vitis vinifera L.* In Romania *Fagus silvatica L.* is a new host of this micromycete.

CHAETOMIUM FUNICOLA - Cooke, Britsh Fungi, p. 176(1873); Cooke W.B. and Shaw C.G.,Western Fungi, III, Mycol. XXXII/9, p.512(1952); Gilman, A Manual of Soil Fungi, p. 177, Plate III,(1957); C.Sandu-Ville, Ciuperci *Pyrenomycetes - Sphaeriales* din România, p.228(1971).

The *Fagus silvatica L.* treated with resins and copper solutions placed on soil for several months presents little black dots represented by the fungus top. Gilman mentions the micromycete in the Canadian, Californian and German soils and in Romania, C. Sandu-Ville mentions its appearance on wheat in 1969 and in 1971, and E. Ulea mentions it in 1991 on vine.

HUMICOLA GRISEA - Syn.: *Monotospora daleae* Mason- Traaen, Nyt. Mag. Naturvid., 52, p 34 (1914); Gilman, A Manual of Soil fungi, p. 326 (1957); Ellis, Dematiaceous Hyphomycetes, p. 60, Fig. 29. B (1971).

The micromycete develops on the surface of the *Fagus Silvatica L.* wood treated with lignins and resins and on *Abies alba* wood treated with cu CuCl2 solution colonies, white at the beginning then, in grey nuances. It is mentiones in the soils of England (after Gilman) and in Romania it was signaled by Viorica Iacob in 1973 on vegetal remains on the wheat and corn monocultures, and by Ioachimescu - Dinulescu Marilena in 1978, as a degradation factor for the wood in mines. The beech and the fir tree are new hosts for this micromycete in Romania.

FUSIDIUM VIRIDE- Grove, Journ of Bot.,1955, p.164 (18545); Sacc. Syll. Fung. IV, p. 261(1886); Gilman, A manual of Soil Fungi, p. 207(1957).

The isolated fungus on *Abies alba Mill.*wood treated with modified and unmodified lignin forms on the Czapek agar medium a very fine filamentous thallus from where the conidiophores can be destroyed with difficulty.

Also a *FUSARIUM* species from the fir wood was isolated on the Czapek agar medium [4-7, 9, 11, 18, 20].

CONCLUSIONS

The fir and beech test pieces have undergone the attack of some fungi responsible for the process of degradation of the lignocellulose materials. The samples treated were visually and microscopically examined in order to establish the level of development of the fungus mycelium. It was noticed that the fungi species which develops on the lignocellulose material depends on the nature of the chemical substance and its concentration when used.

As a consequence of the studies made, it has been noticed that on the *Fagus silvatica L.* and *Abies alba Mill* has types of micromycetes have appeared, among which the *Alternaria geophila* Dasz. is new for the Romanian microflora, and for the other micromycetes described , the beech and the fir tree are new hosts for our country. More micromycetes have been found on the beech test pieces than on the fir ones.

The results obtained could be subsequently developed for the improvement of the biocide effects of the treatments with modified/unmodified lignin, thus opening the way, through the modification with copper ions, toward the introduction of biocide systems compatible with the environment.

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PRELIMINARY TEST RESULTS CONCERNING THE EFFECTS OF ANIONIC CLAYS ON PLANT GROWTH

REZULTATE PRELIMINARE PRIVIND EFECTELE ARGILELOR ANIONICE ÎN CREŞTEREA PLANTELOR

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Abstract. *Layered double hydroxides (LDHs) or the so-called anionic clays are the analogue of the extensively studied family of cationic smectite clay minerals, a group of minerals which tend to fill out when they are inserted into water (bentonite includes minerals from smectite group). The anionic clays exhibit anion sorption, anion diffusion and exchange properties together with surface basicity making them materials of importance for many modern applications. These anionic clays are useful in agriculture due their physical and chemical properties, which decrease the pollution effects, in order to obtain organic products. In this work, a preliminary test concerning the effects of some anionic class on tomato plant growth is presented. Seeds of tomato (Lycopersicon esculentum) were put into Petri dishes on double filter paper together with suspensions from some anionic clay and they were kept here for 6 days. The dynamic of germination and the growth has been monitorized during the first phenophase of growth. Our results showed that the anionic clays could modify the plant growth.*

Rezumat. *Argilele anionice (LDH) sunt analogii unei familii intens studiate de argile minerale cationice, smectitele, un grup de argile minerale care tind să se umfle când sunt introduse în apă (bentonita include minerale din grupul smectite). Argilele anionice prezintă proprietăți de sorbție a anionilor, de difuzie a anionilor şi de schimb şi datorită bazicității superficiale sunt materiale cu importanță şi aplicații în domenii moderne. Aceste argile anionice sunt materiale care pot fi folosite in agricultură datorită proprietăților fizice şi chimice, care permit micşorarea efectelor poluarii, cu scopul obținerii unor produse agricole ecologice. In această lucrare este prezentat un test preliminat privind efectele unor argile anionice în creşterea plantelor de tomate. Semințele de tomate (Lycopersicon esculentum) au fost puse în sticle Petri cu hârtie de filtru şi suspensia de argilă şi au fost ținute aici timp de 6 zile. A fost monitorizată dinamica germinației şi creşterea plantelor în timpul primelor fenofaze. Rezultatele noastre arată că argilele anionice pot modifica dezvoltarea plantelor.*

INTRODUCTION

Mesoporous synthetic clays (MSCs) are derived from layered structures (heterostructures of porous clays). A series of mesoporous synthetic organo-clay complexes has been prepared by hydrothermal crystalization of gels containing silica, magnesium hydroxide, lithium fluoride, and an organic of choice, followed by calcination to remove the organics. Layered double hydroxides (LDHs) or the

so-called anionic clays are the analogue of the extensively studied family of cationic smectite clay minerals, a group of minerals which tend to fill out when they are inserted into water (bentonite includes minerals from smectite group). The anionic clays exhibit anion sorption, anion diffusion and exchange properties together with surface basicity making them materials of importance for many modern applications (1), (2), (3), (10). Recent reports on the advantages of mesoporous materials as drug delivery vehicles have imposed research in novel applications and several materials with this purpose have been reported (7). The potential of mesoporous materials to improve the permeability of large hydrophilic drug substances has also been explored. Due their capacity of ion exchangers, anionic clays have been used to remove the toxic compounds from water as arsenite (9). M. Lakraimi and coworkers (4) studied the ion exchange from the molecule of pesticide 2.4-dichlorophe- noxyacetate (2.4D), the paraquat by the anionic clay [Zn-Al-Cl] using X rays and IR spectroscopy.

There is also an increasing amount of research on the effects of nanomaterials on plant growth. Limited studies reported both positive and negative effects of nanoparticles on higher plants. It was pointed out that some nanoparticles enhance the abilities of absorbing and utilizing water and fertilizer and apparently hasten its germination and growth. On the other hand, the toxicity of nanoparticles may be attributed to two different actions a) a chemical toxicity based on the chemical composition, e.g., release of (toxic) ions; and (b) stress or stimuli caused by the surface, size and/or shape of the particles (5). However, there are still many unresolved issues and challenges concerning the biological effects of nanoparticles.

In this paper, the comparative effects of some anionic clay on germination rate, root elongation, growth of *Lycopersicum esculentum* were analyzed. Germination rate and root elongation, as a rapid phytotoxicity test method, possess several advantages, such as sensitivity, simplicity, low cost and suitability for unstable chemicals or samples. These advantages made them suitable for developing a large-scale phytotoxicity database and to study mechanisms of phytotoxicity (8).

MATERIAL AND METHODS

To study the effect of anionic clays on plant growth, four clays have been prepared and we sorted the following variants:

1. control
2. MgFeLDH (Mg Fe Layer Double Hydroxide) (301);
3. MgAlLDH+Fe_3O_4 (303);
4. ZnAlLDH (401);
5. MgAl LDH (405);

50 seeds of tomatoes were put into Petri dishes on double filter paper together with 5 mL treatment solution (a suspension that contains 0.4g of clay and 40mL bidistilled water). Here the seeds were kept in dark and at optimal temperature (20-23^{0}C) for a week. Every day we poured bidistilled water for control and treatment solution for the other variants to determine seed germination. After that the

germinated seed were planted in the greenhouse where they developed in optimal conditions. The soil was prepared from celery soil in proportion of ¾ and red peat (produced by Kekkilä Ozi from Tuusula, Finland) in proportion of ¼. After 12 days the tomato plants were pricked out in pots and here they continue to growth.

RESULTS AND DISCUSSIONS

In figure 1 the seed germination is presented.

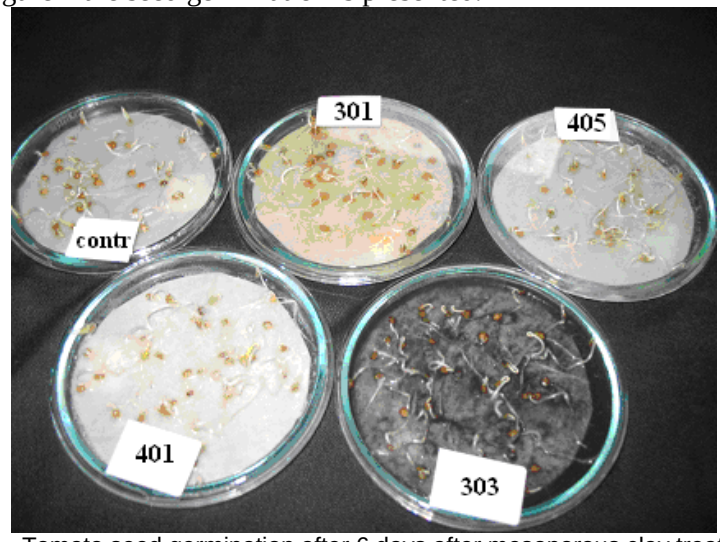

Fig.1 – Tomato seed germination after 6 days after mesoporous clay treatments

Figure 2 shows the tomato seed germination dynamics after 7 days and figure 3 the root dimension after 7 days

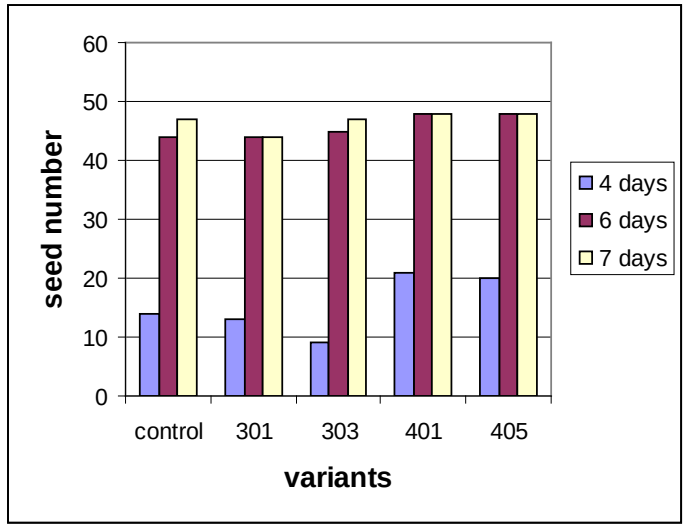

Fig.2 – Tomato seed germination dynamics after mesoporous clay treatments

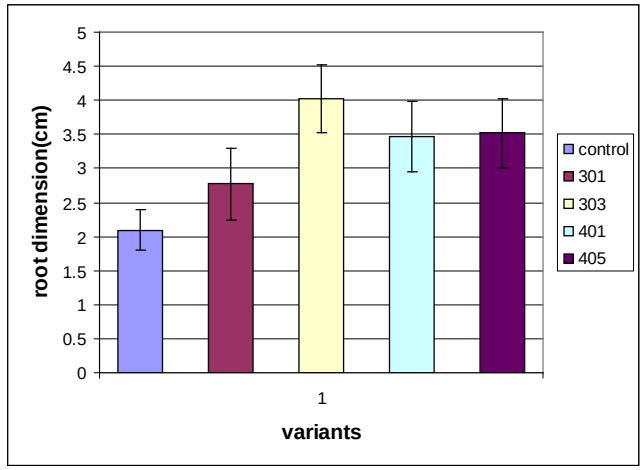

Fig.4 – Tomato root dimension e after 7 days of mesoporous clay treatments. Error bars are confidence intervals (n=50)

From figure 4 we can see that the errors bars don't overlap for 303, 401 and 405 variants; this means a highly significant difference exist between these variants (6). The strongest increase of the plant roots has been observed for the seeds treated with clay from variant 303 (almost twice as much as control).

Figure 5 shows the results of the measurements for the height of tomato plants after 9 weeks

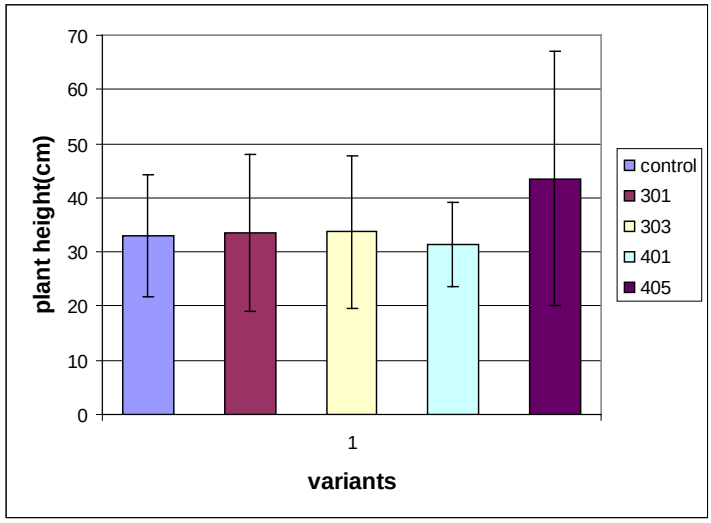

Fig.5 – The height of tomato plant s, 9 weeks after planting

Figure 5 shows that the highest plants are whose treated with MgAl LDH (variant 405), but there are no highly significant difference between variants.

We also monitorized the tomato growth as a function of quantity of clay used in treatments. In this case, 100 seeds of tomatoes were putted into Petri

dishes on double filter paper together with 10 mL treatment solutions containing MgAlLDH (suspensions that contains 0.5g of clay and 50mL bidistilled water (C1) and 1g of clay and 20ml bidistilled water (C2)). After 6 days, the seed germination is presented in figure 6 and the germination rate in figure 7.

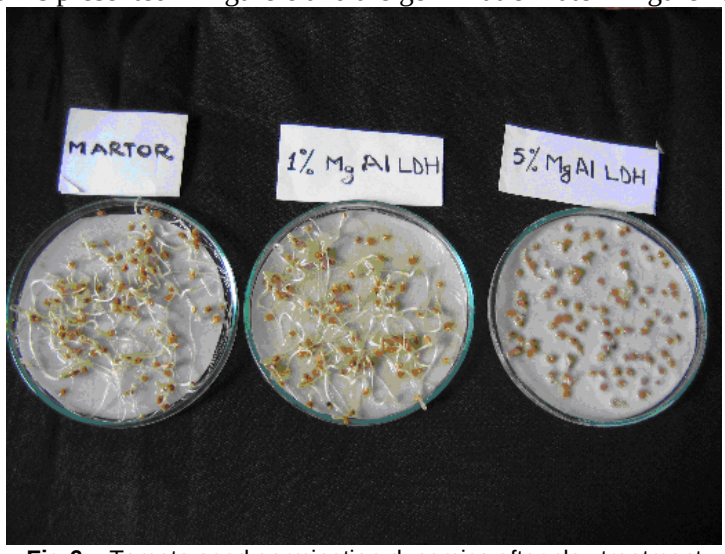

Fig.6 – Tomato seed germination dynamics after clay treatment

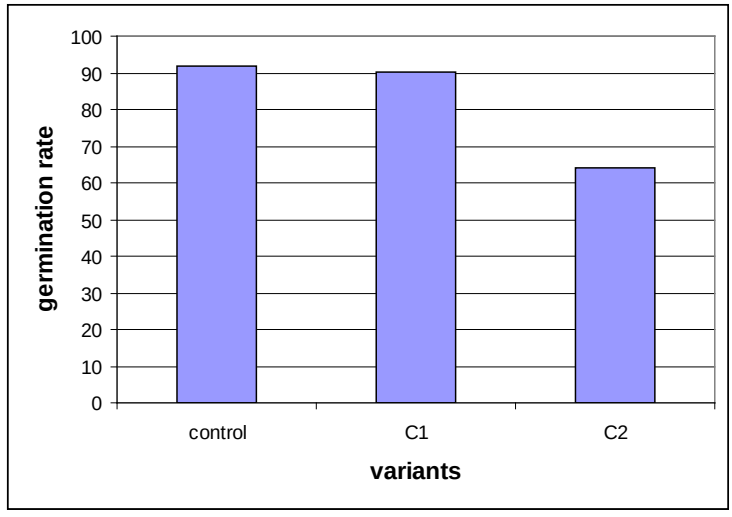

Fig.7 –Germination rate after clay treatment

Figures 6 and 7 show that anionic clays could produce an inhibition of growth and this inhibition depends on quantity of clay used in treatment.

CONCLUSIONS

The mesoporous clays are useful in agriculture due their physical and chemical properties, which could decrease the pollution effects, in order to obtain organic products.

The best anionic clay from point of view of root growth was the variant 303, variant containing Mg and magnetite; the variant 405, containing Mg, contributes to improve the plant growth, Mg being an essential element in plant nutrition.

The inhibition of germination and growth, when a greater quantity of clay has been used in the treatment, is probably due to the stress caused by the size and the number of the particles from suspension.

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HYDRODYNAMICS OF SOIL WATER-THEORETICAL APPROACH

HIDRODINAMICA APEI IN SOL-ABORDARE TEORETICA

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Abstract. *The variable amount of water contained in a unit of mass or volume of soil is an important factor affecting the growth of plants. In this paper we will study the hydrodynamics of soil water considering the macroscopic and saturated characterization of the soil.*

Rezumat. *Cantitatea de apa continuta in sol este un factor important care afecteaza cresterea plantelor. In aceasta lucrare ne propunem sa studiem hidrodinamica apei in sol folosind caracterizarea macroscopica a solului.*

Soil is an important reservoir of fresh water. Soil transforms noncontinuous rainfall or snow into a continuous flow of water to the roots of the plants. The retention capacity of soil able to sequester rain water is approximatively equal to the capacity of all lakes. Transport of water and soluble materials occurring naturally or anthropogenically and is linked to hydrologic process. Water is important for plant function; constituents within soil are mobilized and transported as a result of precipitation or irrigation. Other role played by water is to transport agents for chemicals pollution. The distance and rate of their motion on and bellow the soil surface depends of hydrological events. The quality of continental water resources in space and time is greatly influenced by soil hydrology.

For all process described above is very important to have mathematical models that can describe these processes [4]. For the mathematical model is necessary to find some reasonable assumption about the soil system and water flow.

If the system is in equilibrium no flow will occur. If we do not have equilibrium the flow will occur from region of high to low hydraulic head. If we assume that soil system is at macroscopic scale and saturated the primary flow equation is the Darcy's equation. When Darcy's equation is combined with conservation mass the result is the continuity equation. The continuity equation can have several different form; these forms are generically known as soil water flow equations [5].

If we assume that soil is an unsaturated system we use the Richards equation.

In this note we work with soil system at macroscopic scale and saturated conditions.

BERNOULLI AND POISEUILLE EQUATIONS

In order to understand Darcy's equation we start with classical relationships from fluid dynamics the Bernoulli and Poiseuille laws.

Bernoulli equation relates the total potential for ideal fluids (non-viscous fluid), which is one that is incompressible and which exhibits steady and irrotational flow.

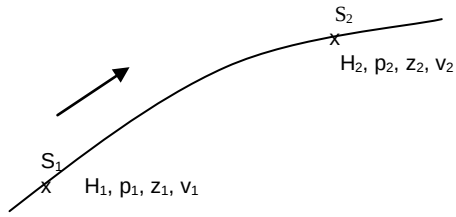

Figure 1 Position and head along the streamline

If *p, z, v* represent pressure elevation and velocity at points S_1 and S_2, the sum of gravitational, pressure and inertial energy at positions S_1 and S_2 are the same along any streamline:

$$\frac{p_1}{\rho g} + z_1 + \frac{v_1^2}{2g} = \frac{p_2}{\rho g} + z_2 + \frac{v_2^2}{2g} \text{ (ideal fluids)} \quad (1)$$

For real fluids viscosity produce a loss of energy that must be overcome. For most problems of interests in soil the velocity head will be negligible compared with pressure and gravitational terms, and the Bernoulli equation is replaced by

$$\frac{p_1}{\rho g} + z_1 + \Delta H = \frac{p_2}{\rho g} + z_2 \text{ (real fluids)} \quad (2)$$

where $\Delta H = H_2 - H_1$, H_1, H_2 are hydraulic heads. If the flow is from S_1 to S_2 then H_1 is greater than H_2 and ΔH become negative. Relation (2) will be used for porous media flow.

Poiseuille's laws relates flow rate to the loss of energy in a horizontal tube.

$$Q = -\frac{\pi R^4 \Delta p}{8\eta \Delta x} \quad (3)$$

where

Q represents discharge rate (m^3/s),
R represents radius of tube,
η represents viscosity $(kgm^{-1}s^{-1})$,
Δp represents pressure gradient along tube.

Negative sign means that fluid flow from higher to lower pressure and Q is positive for flow in the horizontal x direction.

Flux density represents flow per unit area and is denoted by J_W. Relation (3) becomes

$$J_W = -K^* \frac{\Delta h}{\Delta x} \tag{4}$$

where $K^* = \frac{\rho g R^2}{8\eta}$, thus J_w is proportional to the pressure head gradient $\frac{\Delta h}{\Delta x}$ and J_w is inversely proportional to the viscosity.

DARCY'S EQUATION

In 1859 Darcy experimentally demonstrated for columns of sand a linear relationship between the flux density J_w and hydraulic gradient, the Darcy's equation for saturated flow is

$$J_w = -K_s \nabla H \tag{5}$$

Equation (5) shows that the flux density is proportional to the driving force of the water flow which is the gradient of the potential. In the literature J_w is also called Darcian velocity [$L \cdot T^{-1}$]. The negative sign in equation (5) means that the water flows in the direction of the decreasing potential. The constant value K_s depends upon the nature of the soil and is numerically equal with flow rate when the hydraulic gradient is unity.

The values of K_s are between 0.1cm·day^{-1}(10^{-8} ms^{-1}) and 10^2cm·day^{-1}(10^{-5} ms^{-1}).

Poisseuille equation (4) and Darcy equation (5) seem to be the same but they are not. Darcy equation is an empirical equations and it is expressed in volume of flow per unit area per unit time. Other assumption used is that of isotropic medium, otherwise the hydraulic conductivity value depends on the flow direction.

It is important to know when we can use the Darcy equation. For a high or low gradient the Darcy equation does not work. For high velocities J_w becomes nonlinear respects with hydraulic gradient because of turbulent flow.

A mathematical criterion to distinguish laminar flow by turbulent flow is given by Reynolds numbers:

$$R_e = \frac{|J_W| \rho d}{\eta} \tag{6}$$

Where d is the effective pore diameter. For $R_e < 1$ laminar condition are expected. In all soils other than sand d is not completely determined so is very difficult to determine the Reynolds number and there are used other criterions.

CONCLUSIONS

In this section we discuss some aspects regarding the applicability of Darcy equation.

If we study the soil system at microscopic scale the flow in each individual pore is considered and for each defined continuous pores the Navier – Stokes equations apply. For the solution we do not have detailed description of the geometrical characterization of individual pores to obtain a solution for the representative

elementary volume. Even if we find these geometrical details the voluminous calculations will be necessary even for a small representative elementary volume.

The macroscopic approach of water transport relates with the entire cross section of the soil with the condition of representative elementary volume is satisfactory. Water does not flow through entire macroscopic area, it flows only in the area not occupied by the soil phase and by the air phase; in that case we deal with unsaturated soils.

We have assumed that we have a saturated with water, inert rigid soil. Water is flowing through all pores of the soil under a positive pressure head. In fields this situation is rarely find. Usually it is quasi – saturated with the soil water content $\theta_W = mP$ where $m \in [0.85, 0.95]$ at $H \geq 0$ and P is the porosity. The air occupies $P(1-m)$ volume and it is not considered.

Laminar flow prevails only at relatively low flow velocities and narrow tube. Conveniently laminar flow is the rule rather than the exception in most water flow process taking place in soil because of the narrowness of soil pores [1].

In order to solve equation (5) we have to measure saturated hydraulic conductivity, that is one of the principal soil characteristics and for it determination only direct measurements are appropriate [2].

The Darcy's equation may be extended to the layered soils system for cases when the flow is parallel, perpendicular or is an angle less than 90º with the layer.

In the scientific literature deviations from the Darcy equation was observed within pure clay having very large specific surfaces (e. g. 10^2 $m^2 \cdot g^{-1}$). The reasons for this behavior are:

- Clay particles shift and the clay paste consolidate due to the imposed hydraulic gradient and the flow of water.
- Viscosity of water close to the clay surface is different than that of bulk water or that in the center of the larger soil pores.
- The coupling of the transfer of water, heat and solute.

Other case when the Darcy's equation does not work was discussed in [3] for losses.

With all this difficulties emphasized in this note Darcy's equation is either exact or at least a very good approximation for soil water hydrodynamics.

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ON THE ZINC EFFECT IN TOMATO PLANT NUTRITION

DESPRE EFECTUL ZINCULUI ÎN NUTRIȚIA PLANTELOR DE TOMATE

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Abstract. *The effects of zinc toxicity on the growth and the photosynthetic activities of tomato plants were studied using treatment solution of 5% concentration from $ZnSO_4*7H_2O$ and Zn (ac)* 2 H_2O salts. The seeds of tomato (Lycopersicon esculentum) were put into Petri dishes on double filter paper together with their treatment solution and they were kept here for 6 days. After that they were planted in pots in the Biophysics Laboratory where they developed in low conditions of temperature (16-20^{0}C). The dynamic of germination and the growth were monitorized and the pigment content (Chlorophyll A, Chlorophyll B and Carotenoids), which is essential for the photosynthetic apparatus, was analyzed spectrophotometrically with SPECORD 200. Our measurements showed an inhibitory effect only for Zn (ac)* 2 H_2O treatment. This means that Zn has not a fitotoxic effect on tomato plant growth in contradiction with other authors' results which suggest that zinc excess involves the stomata closing, the increase of CO_2 concentration in the leaves, the inhibition of certain enzyme of the Calvin cycle, a degradation of photosystem and the chlorophyll decomposition.*

Rezumat. *In această lucrare au fost studiate efectele de toxicitate ale zincului asupra creşterii şi a fenomenului de fotosinteză la plantele de tomate folosind solutii de tratament cu concentrația de 5% ale sărurilor $ZnSO_4*7H_2O$ şi Zn (ac)* 2 H_2O. Semințele de tomate (Lycopersicon esculentum) au fost puse în sticle Petri cu hârtie de filtru şi soluția de tratament unde au fost ținute timp de 6 zile. Apoi semințele au fost plantate în ghivece la laboratorul de Biofizică unde s-au dezvoltat în condiții de temperatură joasă (18-20^{0}C). A fost monitorizată dinamica germinației şi creşterea plantelor şi a fost analizat conținutul de pigmenți (clorofila a, clorofila b şi carotenoizi), care este esențial pentru aparatul fotosintetic, folosind un spectrofotometru SPECORD 200. Măsurătorile noastre arată un efect inhibitoriu numai pentru soluția ce conține Zn (ac)* 2 H_2O. Aceasta înseamnă că Zn nu are un efect toxic asupra creşterii plantelor de tomate, în contradicție cu rezultatele altor autori care sugerează că excesul de Zn implică închiderea stomatelor, creşterea concentrației de CO_2 din frunze, inhibiția anumitor enzime ale ciclului Calvin, degradarea sistemului fotosintetic şi descompunerea clorofilei.*

INTRODUCTION

Many authors examined the inhibitory effect of heavy metal compounds on growth and the performance of photosynthetic apparatus of plants. There are two aspects on the interaction of plants and heavy metals: (i) heavy metals show negative effects on plants, and (ii) plants have their own resistance mechanisms against toxic effects and for detoxifying heavy metal pollution. Many studies report that heavy metals affected germination percentage, root and shoot lengths and root and shoot dry matter, that heavy metals inhibit pollen germination, pollen tube growth and seed germination, causing ultra-structural changes (2),(3).

The effect of heavy metal Zn on plant growth is controversial.

Zn toxicity on soybean (*Glycine max* (L.) Merr.) is reported by Tracy Shyte and Sheila Macfie (7). The authors showed that the highest dose of zinc (2000 mg/kg) reduced plant height to 55% of control and dry weight to 70% of control. Concentrations of both metals were highest in root tissues (10-fold higher for cadmium, and up to 2-fold higher for zinc). The effects of high doses of one metal on the uptake of the other metal can be partially explained by the effects of one metal on the bioavailability of the other metal.

Rout and Das also have reported zinc toxicity (6). Author's studies concerning the physiology and biochemistry with regard to zinc zinc toxicity, uptake and transport of zinc showed that the major change was seen in the nucleus. The chromatin material was highly condensed and some of the cortical cells showed disruption and dilation of nuclear membrane. The cytoplasm became structureless, disintegration of cell organelles and the development of vacuoles were also observed; the number of nucleoli also increased in response to zinc.

On the other hand, the Zn effect is considerable on pollen during flowering (5). A deficit of Zn reduced the size of anthers, the pollen producing capacity and the size and viability of the pollen grains. Increasing the Zn supply from deficient to sufficient at the initiation of flowering decreased the severity of Zn deficiency effects on pollen and stigma morphology, pollen fertility and seed yield. Structural and functional changes induced in pollen grains and stigma of Zn deficient plants and associated decrease in seed setting of lentil indicate a critical requirement of Zn for pollen function.

MATERIAL AND METHODS

The seeds of tomatoes (*Lycopersicon esculentum*), were put into Petri dishes on double filter paper together with their treatment solution of 5% concentration from $ZnSO_4*7H_2O$ and $Zn(CH_3COO)_2$ and they were kept here for a week. Germinated seeds were planted in pots at the Biophysics Laboratory where they developed in low conditions of temperature (16-20^{0}C). Then we sorted the following variants:

1. untreated plants
2. treatment with $ZnSO_4*7H_2O$
3. treatment with $Zn(ac)_2$

After 6 weeks the biometric measurements and pigment analysis have been performed.

RESULTS AND DISCUSSIONS

The height of plant for control and the treatments with Zn are given in figure 1.

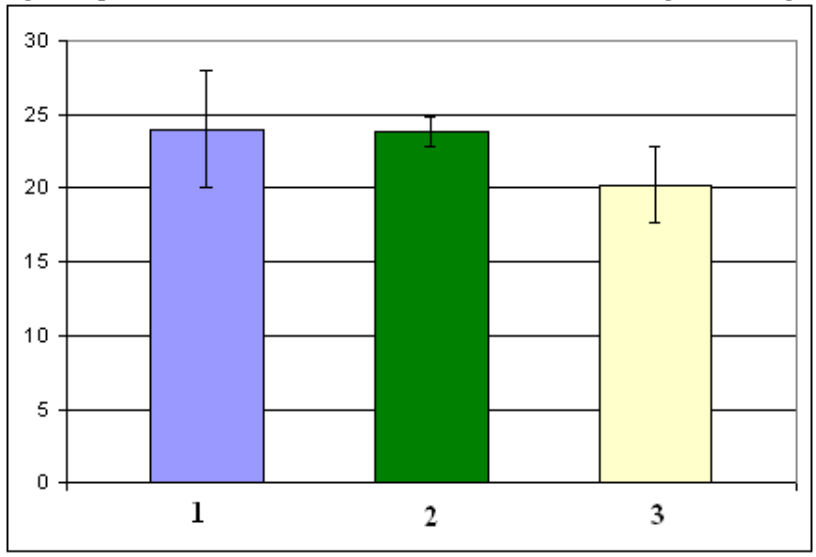

Fig.1 - The height of tomato plants. The error bars are the standard errors.

Figure 1 shows that Zn sulphate doesn't affect the plant growth. In addition plant roots treated with Zn sulphate are developed, especially the lateral roots as in figure 2.

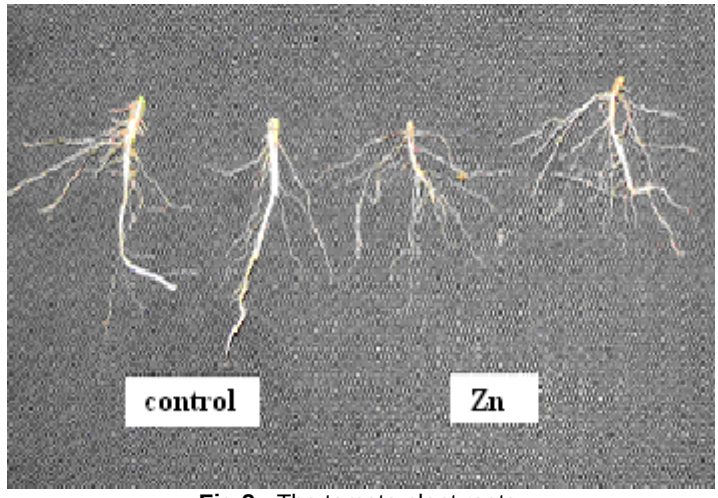

Fig.2 - The tomato plant roots.

The plant biomass is given in figure 3

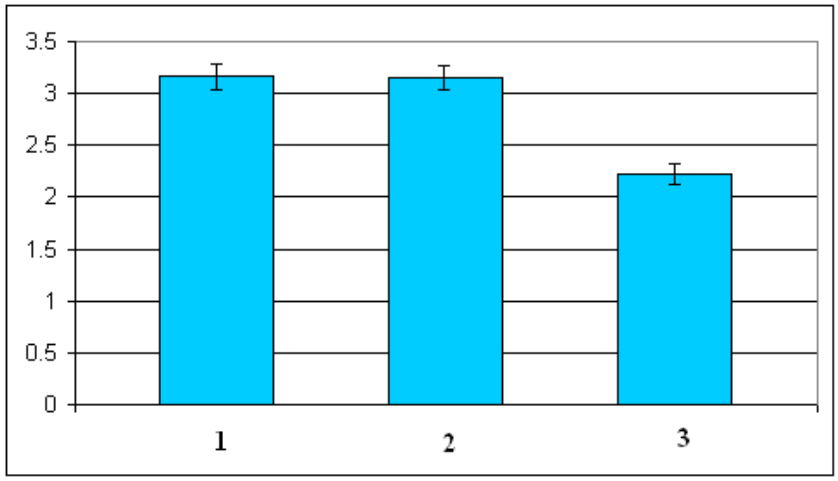

Fig.3 - The biomass of tomato plants. The error bars means standard errors

From these figures we can see that the $ZnSO_4*7H_2O$ has no effect on plant growth, but Zn acetate decrease biomass of tomato plant.
Student test shows only for plant biomass treated with Zn acetate statistic significant diferences (table 1).

Table 1.

Student test for tomato plant biomass

t-Test: Two-Sample Assuming Equal Variances		
	Variable 1	*Variable 2*
Mean	3.146	2.224
Variance	0.00908	0.00983
Observations	5	5
Pooled Variance	0.009455	
Hypothesized Mean Difference	0	
df	8	
t Stat	14.99236541	
P(T<=t) one-tail	1.93434E-07	
t Critical one-tail	1.85954832	
P(T<=t) two-tail	3.86867E-07	
t Critical two-tail	2.306005626	

From table 1 we can see that the probability $P=3.8686*10^{-7}< <0.001$, this means very significant differences. On the other hand Student test for Zn sulphate shows insignificant difference between control plants and treated plants.

The pigment analysis was performed with a spectrophotometer SPECORD M 42, immediately after the solutions were prepared.

The content of the photosynthetic pigments was calculated with the following formula:

Chl a = (9.784 * E662 - 0.99 * E644) * V* 100 / m

Chl b = (21.462 * E644 - 4.65 * E662) * V*100/ m

Car = (4.695 * E440 - 0.268 * (5.134 *E662 + 20.436 * E644) * V *100 /m

where:

- E662, E644, E440 is the absorbance,
- V is the volume of the solvent
- m is the mass tissue.

The content of photosynthetic pigments is presented in figure 4

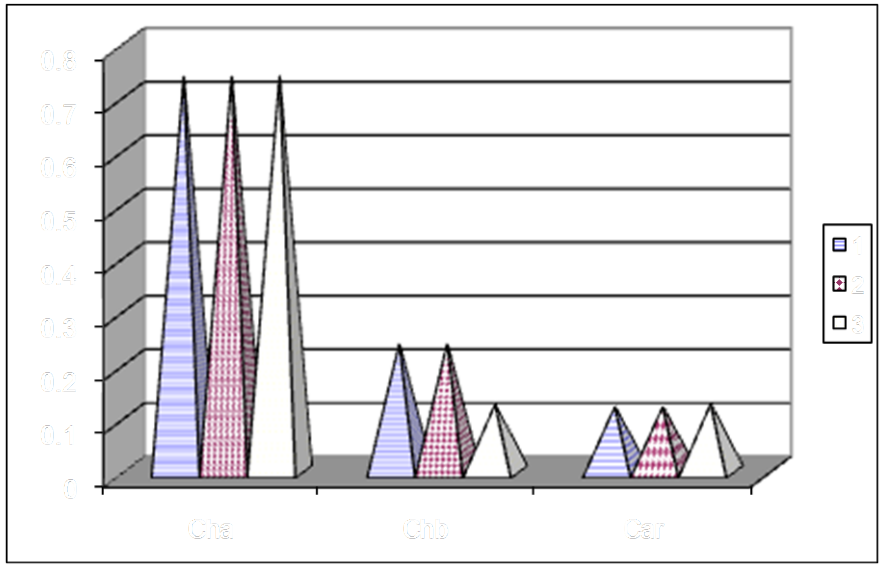

Fig.4 - Content of photosynthetic pigments

From figure 3 we can see that Zn treatments did not affect the content of photosynthetic pigments (only Zn acetate slowly decreases the content of chlorophyll b).

Our results are sustained by Mirzapour and Khoshgoftar. The authors showed that addition of 20 kg Zn ha^{-1} as $ZnSO_4$ significantly increased seed production and shoot dry-matter yield of sunflower, while other Zn treatments had no significant effect on shoot dry-matter yield, or decreased it (2). Goldur and colab reported an argument for our results that sustains the favorable effect of Zn. (1). The authors identified a very important effect of Zn at molecular level, modification of ASR1 (abscisic acid stress ripening) protein. Overexpression of the ASR1 in transgenic plants increases their salt-tolerance. The ASR1 protein possesses a zinc-dependent DNA-binding activity. Addition of zinc ions resulted in a global change in ASR1 structure from monomer to homodimer. Upon binding of zinc ions, the protein becomes ordered. Tomato leaf soluble ASR1 is unstructured in the absence of added zinc and gains structure upon binding of the metal ion.

CONCLUSIONS

Our results regarding Zn effect prove the fact that Zn as Zn sulphate has no fitotoxic effect on plant growth (on rate of germination, height of plant, photosynthetic pigment). In addition Zn suply produces the development of the plant roots, especially lateral roots. This is a consequence of the fact that Zn is a nutrient for plant, like Fe and Mn and it activates many enzimes. It implies triptophan synthesis, a component of auxine, the fytohormone which produces the plant growth.

In this phase of research we didn't performe measurements concerning Zn toxicity al cellular level.

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DESIGNING A COURSE MATERIAL FOR E-LEARNING

PROIECTAREA UNUI CURS PENTRU E-LEARNING

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Abstract. *Distance learning via the Internet (e-Learning) technologies is considered to be among the most efficient ways to improve the quality of teaching and studying. E-Learning design and development is driven by transformational learning, i.e. learning that improves long-term performance through facilitating behavior change as well as enhancing complex decision-making, problem-solving and the generalization of learning in novel situations. Using Moodle open-source software, various tools for producing the user interface, the knowledge pages, multiple-choice quizzes, and interactive learning programs are described. Results for the course "Biophysics and Agro-meteorology" are presented. The described design and production of e-learning courseware can be applied to other fields as well. The derived course material is embedded into a more complex e-learning service under development within a Grid Computing project that was initiated by four universities and a research institute of Iasi, Romania. The e-learning service for agricultural sciences is one of the tasks that The University of Agricultural Sciences and Veterinary Medicine of Iasi are developing as project partner.*

Rezumat. *Tehnologiile e-learning sunt considerate în prezent printre cele mai eficiente metode de predare şi studiu individual. Prin e learning se îmbunătăţeşte pe termen lung calitatea educaţiei prin formarea unor deprinderi noi de învăţare ce se obţin prin plasarea studentului în situaţii de rezolvare creativă a unor probleme, prin stimularea interactivităţii şi cooperării în timpul studiului. Lucrarea prezintă elementele generale ale un proiect de curs realizat folosind mediul de dezvoltarea Moodle pentru aplicaţii de e learning. Luând ca studiu de caz cursul, „Biofizică şi Agrometeorologie", adresat studenţilor de la specializări din ştiinţele agricole, sunt abordate instrumentele pe care mediul de dezvoltare le pune la dispoziţie. Maniera de realizare a cursului prezentat poate fi aplicată şi pentru alte proiecte. Acest curs este inclus într un serviciu de e learning mai complex, aflat în curs de construcţie în cadrul unei reţele academice de tip Grid computing dezvoltată prin colaborarea a cinci universităţi şi un institut de cercetare din Iaşi.*

INTRODUCTION

E-learning means much more then using electronic support to provide learning tools. It is a whole suite of education technologies and that can use the Internet, a network, or a standalone computer [2]. However, e-learning would not be possible without a modern computer infrastructure. E-learning applications include Web-based learning, computer-based learning, virtual classrooms, and digital collaboration. Content is delivered via the Internet, intranet/extranet, audio or video tape, satellite TV, and CD-ROM.

E-learning can be categorized with three types [3]. The first type is an *open-university education*. Another type of e-learning is *short courses*, which last only a few weeks and comprise a single subject. A third type is *self-study by means of tutorials*.

The e-learning platforms represent virtual realities which change the way people experience and interact with computers. Using online learning through the Internet, individuals can share information through remote interaction with each other. Students can collaborate to learn, solve problems, can meet and interact. The virtual environments can be used in the field of education, having the potential to facilitate more active student and instructor collaboration, and help to provide distance education. E-learning software environments allow the instructors to teach courses according to their pedagogical and technological choices. On the other hand, students get a real classroom experience even while accessing the courses remotely [4].

AN E-LEARNING SERVICE FOR STUDENTS IN AGRICULTURAL SCIENCES

In 2006, four faculties and a research institute in Iasi, Romania started a collaborative research project named Academic Grid for Complex Applications. The acronym of the project is GRAI. The Faculty of Horticulture from The University of Agricultural Sciences and Veterinary Medicine of Iasi is one of the partners. One of the tasks that it undertook within the project is the development of an e-learning service for students in agricultural sciences.

The curricula in different specialties of Agriculture (Agronomy, Horticulture, Animal Husbandry etc.) include a large diversity of courses. Previous expertise shows that teaching disciplines like Physics, Mathematics or Economics is quite difficult, as the core knowledge of students in agricultural sciences is remote from those areas, and their skills in dealing with the respective concepts are not always very strong. As e-learning technologies are considered to be among the most efficient ways to improve the quality of teaching and studying, it looks to be a good idea to use them in teaching the above mentioned topics. In future, This service will be enriched with more and more modules to cover a larger spectrum of topics in agricultural sciences and to provide a modern and efficient learning environment for all types of educational frameworks.

For the design and of the e-learning service, the **Moodle** development environment was chosen. **Moodle** [5] is an ongoing development project designed to support a social constructionist framework of education. It is provided freely as Open Source software (under the GNU Public License). **Moodle** has the following main modules.

Site Management. This module is used for managing the website site of the course. This application incorporates authentication mechanisms, which enables students to create their own login accounts which are verifiable by confirmation.

User Account Management. Using this module, different sets of accounts can be created. An *admin* account has administrative privileges and controls course creation and user accounts. Every individual has one account assigned by the administrator Access privileges may vary for these accounts.

Course Management. The teacher can set the course formats by week, by topic or by social format. An array of course activities such as Quizzes, Forums, resources, assignments, etc can be developed. Activity reports can also be generated for logging and tracking access information. Graphs and visual information can be embedded in these reports.

Assignment module. This module is used to post assignments with due dates wherein students can upload their assignments. It also provides a time-stamp feature for student submissions and to display grades.

Chat module. This module is, as obviously, text-based communication.

Forum Module. This module enables discussions between teachers, teachers and enrolled students, or between students.

Quiz Module. The quiz module relies on a database of questions and is able to generate a quiz for every student. Questions can be sequential or random. The module allows quizzes to be created automatically and inserting the time-frame for each quiz. At the teacher's discretion, quizzes can be set for students to attend multiple times and can also include images, true or false questions, short- answer questions, embedded answer questions, etc.

The pedagogy of a courses is based on the fact that students have different education background. During the courses the progress of the learning is tested by the participants themselves (self-tests) and/or by the teacher. The design of a courseware is planned in accordance with its contents, which is given by the curricula.

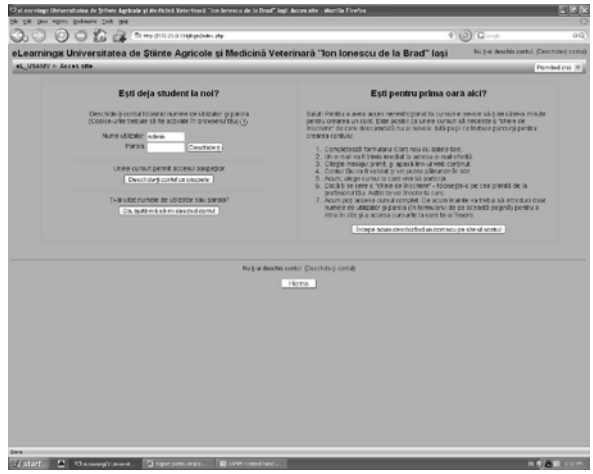

Fig. 1 - First page (start page)

The participants in the e-learning courses must have access to the Internet, a browser (for example Internet Explorer) and an e-mail program. The teachers post lessons, literature, assignments and comments to the participants; the participants send answers and questions to the teacher; participants can be monitored. A calendar informs about the schedule of the course. Communication between the participants and the teacher can also be carried out by means of chatting, where several persons can take

part at the same time. Besides the electronic means of communication, hard-copy material such as books and CDs, may be handed out to the participants of the courses.

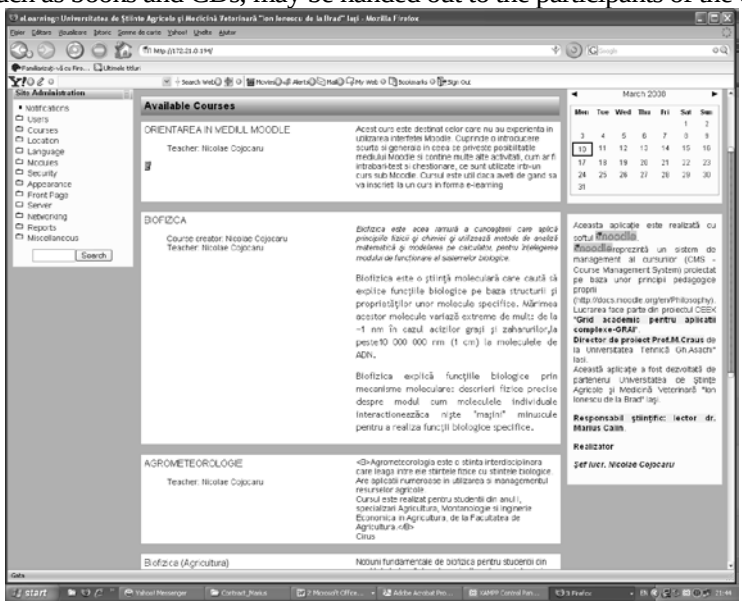

Fig. 2 - Available courses

CONCLUSIONS

Nowadays, e-learning technologies are considered to be among the most efficient ways to improve the quality of teaching and studying.

E-learning can improve the efficiency of teaching in all areas of agricultural sciences and its usage would have a beneficent effect.

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5. ******* - Moodle home page: http://www.moodle.org; installation support, hosting, development, consulting at http://moodle.com/.

CLUSTERING TECHNIQUE – APPLICATIONS WITHIN BIOLOGY AND HORTICULTURE LESSONS

TEHNICA CLUSTERING – APLICAȚII LA LECȚIILE DE BIOLOGIE ŞI HORTICULTURĂ

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Abstract. *For any didactical activity, the teacher select from the methodological register only those methods considered to be, at a certain moment, the most efficient for reaching the aim and established objectives. Taking into consideration that not every type of learning is efficient for the formation of the school children personality, in the present time is thought that the active and interactive learning, specific to the modern instruction, is favouring the formation of intelectual and action abilities, which are preserved during the entire life. One of the techniques which can be used for interactive teaching-learning Biology and Horticulture is the clustering technique. During the lesson, the teacher can combine the clustering technique with other methods, allowing the school children to actively participate for gaining knowledge.*

Rezumat. *Pentru orice activitate didactică, profesorul selecționează din registrul metodologic doar acele metode pe care le consideră, la un moment dat, a fi cele mai eficiente pentru atingerea scopului şi obiectivelor stabilite. Având în vedere că nu orice tip de învățare este eficientă pentru formarea personalității elevilor, în prezent se consideră că învățarea activă şi interactivă, specifice instruirii moderne, favorizează formarea unor capacități intelectuale şi acționale, care se păstrează pe tot parcursul vieții. Una dintre tehnicile ce poate fi folosită în predarea-învățarea interactivă a Biologiei şi Horticulturii este tehnica Clustering. În desfăşurarea lecției, profesorul poate combina tehnica Clustering şi cu alte metode, astfel încât elevii să participe activ, la însuşirea cunoştințelor.*

”The only certain thing we can transmit to our students and which will be certainly useful for them in the future is to teach them to learn, as an attitude for their entire life. This is the most general habit which the modern education should form at them” (Cerghit, I., 2006) .

The didactical method is “an essential way for carrying out an instructive action”, showing “*how should* to proceed, *how* to teach and *how* to learn, *how* to teach other people to learn (Cerghit, I., 2006).

Within didactical activity, by a certain method, the teacher hold a dialogue with the school children, establishing certain relations with them, which are influencing the nature and effects of learning. By selecting and using of a certain didactical method within a lesson, the teacher should take into consideration not only the direct and immediate results obtained by the school children by learning, but also the indirect effects which this is producing, namely practising and development of certain superior intelectual processes, abilities and skills, which are necessary to the individual for all the rest of life.

Based on these reasons, it is considered at present that is more important the use of certain methods, which are aiming at the development of capacity to observe and explain, to explore and discover things and nature phenomena, to make assumptions, to investige independently, to inventand test, to apply, etc., rather than methods by which is intended

the acquiring by the school children of a consistent volume of knowledge, offered "ready-made" by the teacher.

The teacher's option for certain didactical methods, in order to reach the aim and objectives of a didactical activity, depends by "its competence, capacity of pedagogical reflection and analysis of the situation at a certain moment", because "there are no good and bed methods, but adequate methods properly or unproperly used" (Cerghit, I., 2006). For assuring the success of learning for the school children, the teacher should to select the methods and content of the theme which must be teached in a lesson, the abstractization level of the new knowledge, the available teaching tools, the psychosociology of the individuals forming the class, as well as the individual and age particularities of the school children, necessity of their active participation to learning and their willingness to cooperate for this.

The new orientation in the educational practice are aiming at promoting the active-participating and interactive methods, increasing the importance of learning by discovery, promoters of the heuristic methods and those of learning by discovery, as well as at giving strength of the pragmatical orientation of the methodology, with a greater importance given to the use on large scale of the practical-applicative methods.

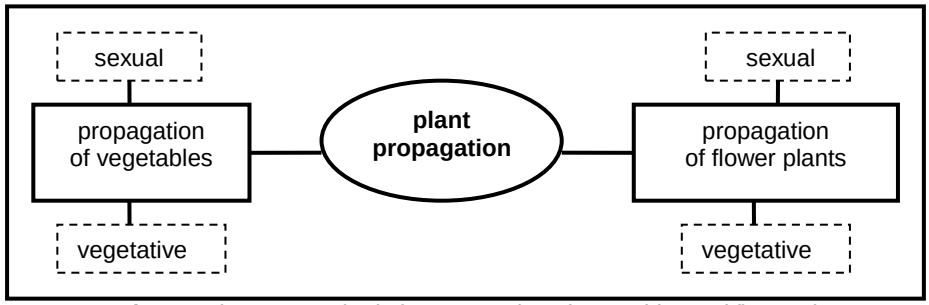

Fig. 1 - "Cluster" – Methods for propagation of vegetables and flower plants

Taking into consideration that not any type of learning is efficient in formation of the personality of school children, at present, the modern education is carried out by the use of the active-participative methods, which are creating the necessary conditions for an individual active learning, as well as by the use of interactive methods, which favor an interactive or interdependent learning. The interactive methods are those which "contribute to creation of some situation of learning focused on the school children disponibility and willingness to cooperate and share each other the ideas, personal views, experiences with opening to all the others" (Bacoş, M., 2002; Cerghit, I., 2006). These methods stimulates the mechanism of thinking, inteligence, imagination and creativity, contributing to the development of creative thinking, sharp biting wit and school children's independence.

One of the interactive techniques which can be used in teaching-learning horticulture and biology is the clustering technique. This technique contribute to the formation of the ability of school children "to structure, systematize, classify, and form overall visions" and also of their ability "to pass from the general to particular and viceversa"(Lozovanu, S., 2001).

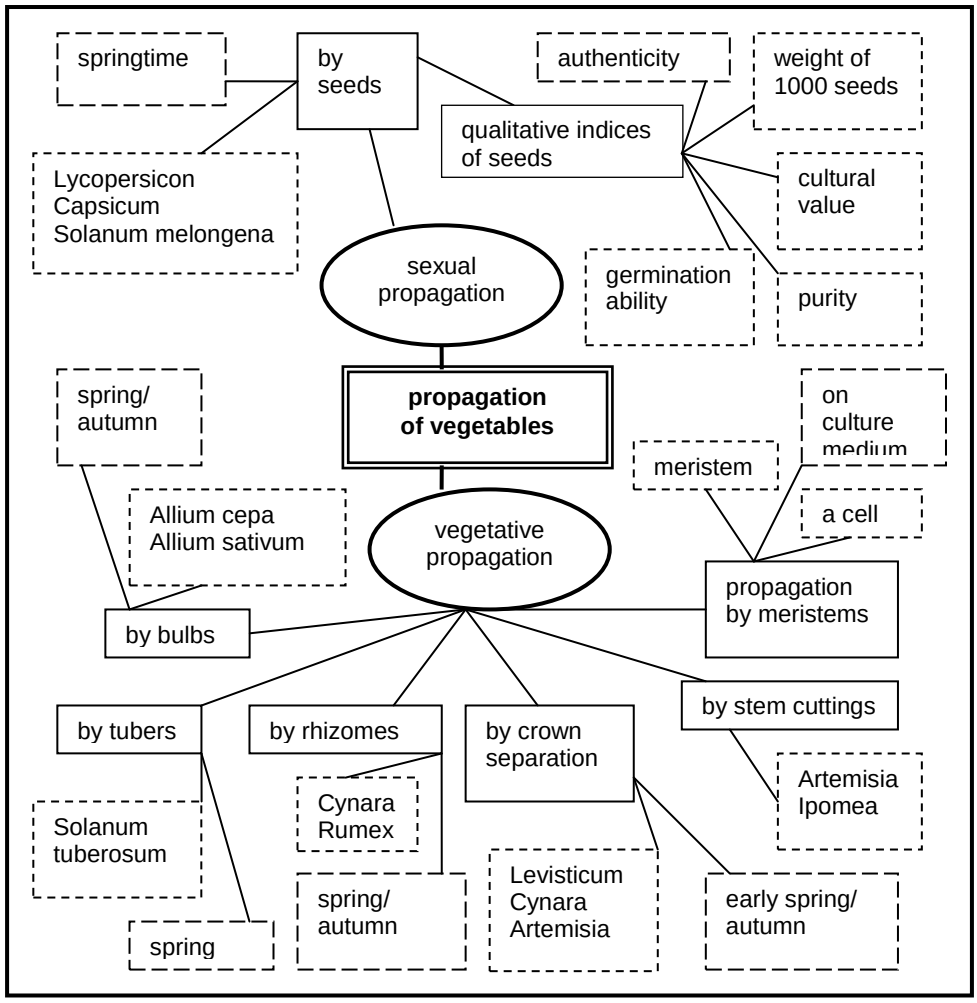

Fig. 2 - "Cluster" – Propagation of vegetables

This technique can be used successfully within recapitulation lessons, at the end of a chapter or school year, for systematizing knowledge already acquired by the school children. For exemplification we have selected the presentation of theme "Propagation of vegetables and flower plants", from the chapter "Cultivation of horticultural plants", 11th class, recapitulation theme at the end of the chapter. Starting from the discussion of the notion of plant propagation, the teacher elaborates, together with the school children, the begining of a cluster (Fig.1), in which the two ways of propagation will be mentioned: sexual (generative) propagation and asexual (vegetative) propagation.

Further on, the activity with the school children can be realized as follows:

a) If the teacher choose for combining the activity within groups with that of frontal activity, then the class will be subdivided in four groups (A, B, C, and D), each of them with 6 school children. Three school children from each group, who will form subgroup 1, will have to complete the data concerning to the propagation of vegetables,

and the other 3 school children, who will form the subgroup 2, will carry out the "cluster" for the flower plant. Remain the choice of the school children which data will be used for constructing the cluster.

By using the different sources of information, they should be able to mention many other plant species for the different types of propagation. For exemple, a possibility for completing the cluster with data concerning the propagation of vegetables and flower plants, is presented in Figures 2 and 3, respectively. Then, by the effort of all the members of each group, the schemes carried out by the subgroups 1 and 2 will be assembled, resulting the final "cluster". After the posting of posters carried out by the use of "clustering" technique, the activity can be continued with the application of the "gallery tour" technique, in which the school children from the groups A and B, respectively C and D, analyze the posters realized by their colleagues. At the end of lesson, by frontal activity, will be carried out on the blackboard another "cluster", starting from the organs of a flowering plant, which will include data concerning to: organs of sexual propagation, organs of vegetative propagation, methods applied for propagation, in general, and exemples of plants for the different modes of propagation.

Another possibility to continue the activity carried out within groups, after the realization of posters by using the clustering technique, and discussion of their content, can consist in realization of a practical work on vegetative propagation, either by a representative of each group, in the front of class, or by each member of the group. It can be realized the propagation of either pelargonium, begonia, or sinningia by cuttings, the propagation of calla by rhizomes, propagation of african violets or lovage by crown separation, propagation of potato by tubers, or the propagation of roses by grafting. At the end of lesson, in the stage of reflection, is applied the "five minutes essay", in which the school children are asked to write a thing they learned from the lesson, and to formulate questions concerning the discussed subject, to which the teacher will answer within the next lesson.

b) If the activity is carried out frontally and individually, the "cluster" will be completed by a few school children on the blackboard, based on the answers given at the questions addressed by the teacher to whole the class. At the end of lesson, by using the Venn diagram, the school children will compare the methods of vegetative propagation of vegetables and flower plants, discovering the similarities and dissimilarities between them.

In Biology, at the 10th class, the clustering technique can be used in a recapitulation lesson on the functions of nutrition in higher plants. At the begining of the lesson, will be elaborated an outset of cluster, establishing that foor each vegetative organ the school children will have to fill in: types, external organization, internal organization and functions. The class will be divided in two groups (A and B), each group being subdivided in 3 subgroups. Subgroups A1 and B1 will complete the cluster with data about the root, subgroups A2 and B2, with data about the stem, and subgroups C1 and C2, with data about the leaf. By assembling the schemes realized by each subgroup will result the final "cluster". The two posters realized by groups will be posted and presented by a member of each group. At the end of lesson, by frontal activity, will be realized on the blackboard a "cluster", taking into consideration the processes involved in plant nutrition (Fig. 4).

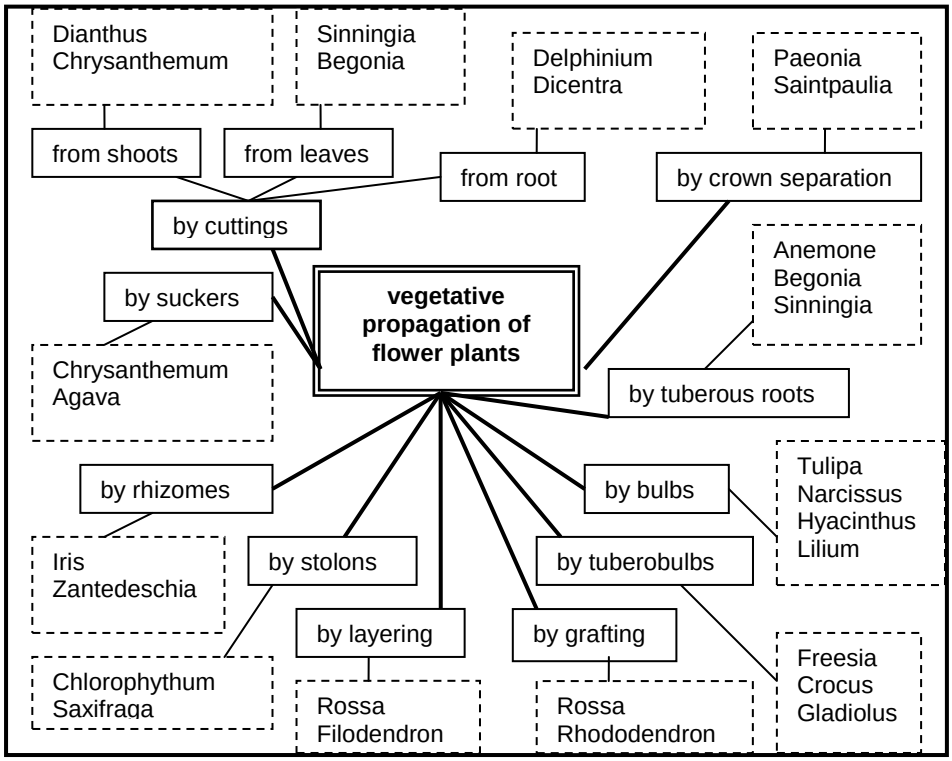

Fig. 3 - "Cluster" – Vegetative propagation of flower plants

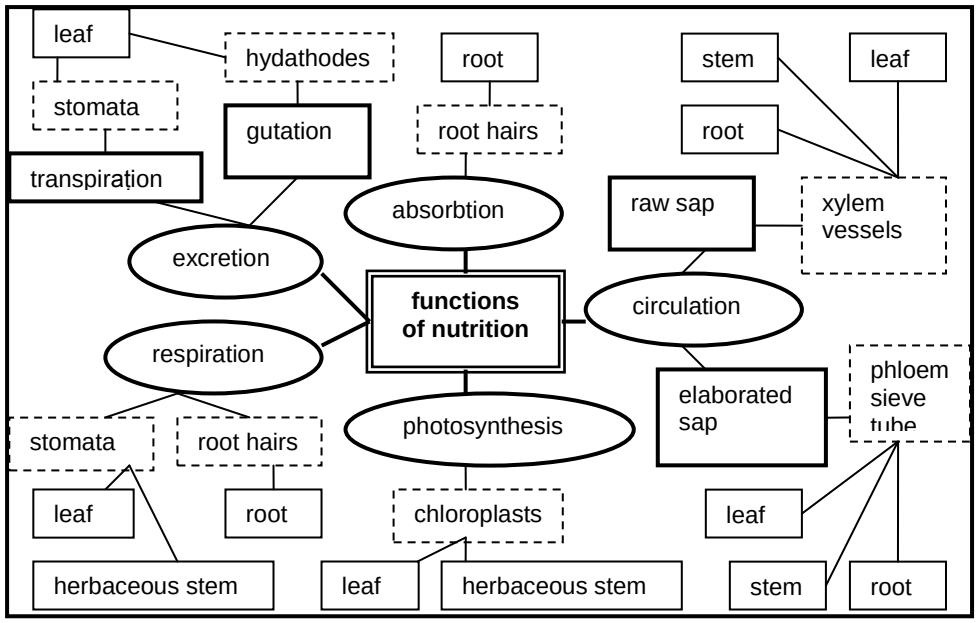

Fig. 4 - "Cluster" – Processes involved in plant nutrition

The clustering technique can be used not only within the recapitulation lessons, but also in the stage of reflection and those of evocation of lesson. For exemple, in the stage of reflection on the lesson "Obtaining of planting material for small fruits", from the chapter Cultivation of horticultural plants, 11th class, the school children can be asked to realize a "cluster" in which to systematize the knowledge on the studied methods of vegetative propagation (Fig. 5).

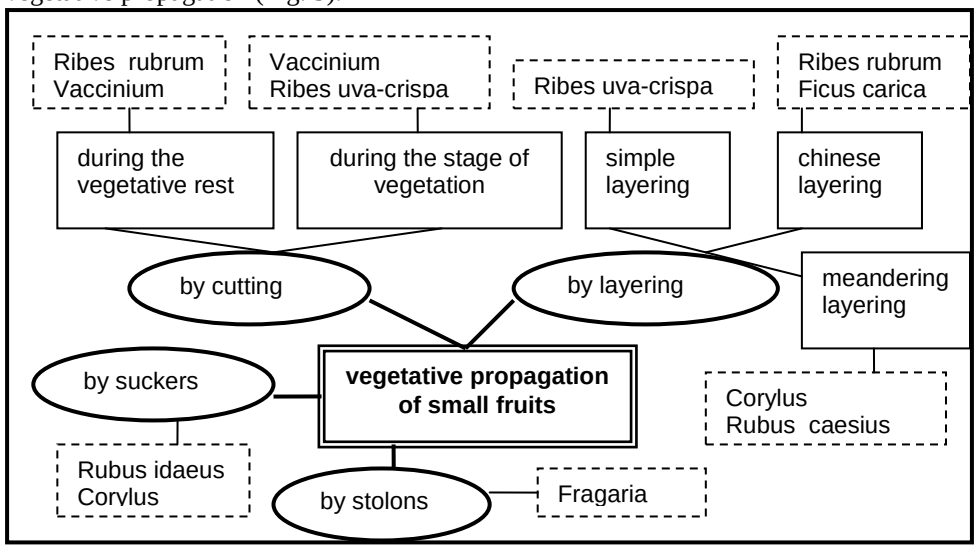

Fig. 5 - "Cluster" – Vegetative propagation of small fruits

Clustering technique, as can be observed from the given exemples, "allows the possibility to the school children to think critically, to systematize the knowledge, to create new links between acquired information, as well as to present graphically the information" (Petruța, 2008).

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POSTMODERN DIMENSIONS OF CURRICULUM. IMPLICATIONS ON THE ACTIVITIES OF THE INSTRUCTIVE-EDUCATIVE PROCESS

DIMENSIUNI POSTMODERNE ALE CURRICULUMULUI. IMPLICAȚII ASUPRA ACTIVITĂȚILOR PROCESULUI INSTRUCTIV

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Abstract: *The present papers analyses some of the most current problems related to the field of curriculum theory and methodology. It emphasizes some aspects of postmodern curricular organization, with fundamental implications on the projection of the activities related to the instructive-educative process. The presented approaches rely on the latest trends in the field of curriculum, underlining the perspective of several theoretical and practical contributions. There are reviewed some essential dimensions of curriculum postmodern approach, as well as the way in which they can be projected, organized and realized.*

Rezumat: *Lucrarea de față analizează unele dintre cele mai actuale problematici legate de domeniul teoriei şi metodologiei curriculumului. Evidențiază câteva aspecte ale organizării curriculare de tip postmodern cu efecte fundamentale asupra proiectării acțiunilor procesului instructiv-educativ. Abordările prezentate au la bază studiul celor mai noi orientări în domeniul curriculumului accentuând perspectiva unor contribuții teoretice şi practice fundamentale. Sunt trecute în vedere câteva dimensiuni esențiale ale abordării postmoderne a curriculumului, precum şi modul în care acestea pot fi proiectate, organizate şi realizate.*

Key words: *curriculum, curricular organization, instructive-educative process, teaching, learning, evaluation*

Introduction in the problems of curriculum

At the level of specialty literature, there can be identified multiple acceptations of the term, these are extremely different depending on the philosophical schools and trends that have generated them, as well as the socio-educational contexts they have been applied in.

An interesting point of view on curriculum can be found in *Encyclopedia of Educational Research* (1960) which defines curriculum as "the assembly of experiences the educated one lives under school coordination. It represents an assembly, more or less planned and controlled, of conditions in which the student learns to behave in various ways" (p. 358).

Among the most outstanding researchers who focused on the problems of curriculum, it worth mentioning: Aoki T., Apple M., Belth M., Bloom B.S., Bobbitt F., Brigs L. J., Bruner J., Cornbleth C., Crețu C., Crişan Al., Cristea S., Cucoş C., De Landsheere G., Dewey J., D'Hainaut L., Doll W. E., Gagne R. M., Giroux R., Glatthorn A., Grumet M., Grundy, Hirst P. H., Hunkins, Hunt M. P.,

Kliebard H., Peters R. S., Pinar W., Potolea D., Reid A. W., Rhoades G., Schubert W., Schwab J. J., Skilbeck M., Sosniak L., Stenhouse L., Taba H., Tanner D., Tanner L., Tyler R., Walker D., Wraga W. etc.

According to C. Crețu (1999), in spite of all the differences present at the level of definitions, curriculum means "the extended area of learning offers and their manner of organization by school institutions, as well as the extremely complex corpus of documents by the help of which there are projected, organized, implemented, evaluated and reviewed, in a flexible and open manner, these *offers, contexts or learning activities*".

As S. Cristea observes (2000), while defining curriculum, it is necessary that the rigorous delimiting of the concept reference field should be done, beginning with the term's etymology and its origins reflected in its historical evolution and finishing with the current pedagogical meanings.

When we talk about curriculum, and especially of curricular organization, we start from curriculum paradigm launched with Ralph Tyler's *Basic Principles of Curriculum and Instruction* (1949). From this moment on, any discussion related to curriculum founds itself beginning with the four principles established by Tyler (*selection of educational purposes, selection of educational experiences, organizing educational experiences, continuous evaluation of attained educational purposes*).

As regards curricular organization we must take into consideration the conceptions of authors such as P. H. Hirst şi R. S. Peters (1970) who have a major contribution to the level of curriculum theory and practice. According to these authors, curricular organization can have two forms: it can be *modular* (or disciplinary) and it can present an *integrative* form. The former variant can produce an artificial atomization of school experiences proposed to the child, while the latter can better correspond to complex interactions presents at the level of social experience the child benefits of outside school.

Postmodern determinations of curriculum

In the field of education, post modernity "designates a *pattern* of approaching the permanent activity of personality's training and development, applicable in a certain evolution of pedagogical theory" (S. Cristea, 2004, p.3). This concept with "a paradigm value" presents two types of conditioning:

- historical (post modernity as a variant of postmodernism). It appears a "repositioning of pedagogical theory" in the context of postmodern culture;
- axiomatic (post modernity as a (re)analysis and (re)synthesizing of a reference system).

We can better understand post modernity in education by considering it a "break from modernity" (p. 4), to the extent to which, unlike it, which treated differently / separately the relations between knowledge and human experience, pot modernity promotes "a new way of understanding the relations between knowledge and experience, between theory and practice at the level of human action" (ibidem), an integrative relation capitalized at the level of curriculum

general theory. It is specific to the instruction action which capitalizes the interdependences between its main actions: teaching, learning and evaluation, actions contextualized by the specificity of the didactic relation.

An analysis of the curriculum can also start from the knowledge of dominant philosophies which lie at the basis of its projection, organization and practical realization. According to some American researchers (John H. Johansen, Harold W. Collins, James A. Johnson, 1986, p.250), two major trends must be taken into consideration at the level of curriculum. These are:

1. *Traditionalism.* This philosophical trend is based on two educational philosophies:

a) the *essentialism* (William C. Bagley, 1938), as a philosophy of education suggests that the emphasis on school disciplines offers education the essential components. The student operates on things in order to learn by observation and nature. The discipline, the necessary reading, memorizing, repetition and examinations are, due to this reason, very important to learning.

b) *the perenialism* (Thomas D'Aquino as the main representative author) is the philosophy which generated essentialism, being a component part of traditionalism. The emphasis is being laid on mental discipline, and school disciplines fully contribute to it. According to the authors mentioned above, in America, the perenialism is associated to Robert M. Hutchins and Mortimer Adler. These authors have promoted the stress on the study of fundamental works, as means of education.

These two philosophies are characterized by the idea according to which the student has to operate on contents in order to achieve the instruments necessary to rational thinking.

The traditional approach underlines the role of mind disciplining as a fundamental means in obtaining knowledge. From this point of view, according to John H. Johansen et all (1986, p.251), we can identify the following estimations related to students, teachers, curriculum and education methods associated to traditionalism:

The student = reasoning is learnt with the help of mental exercises. The student can learn by conditioning. The mind is capable of realizing links between learning sequences.

The teacher = model of study, example, expert. He realizes demonstrations of contents and knowledge; mental discipline, spiritual leader, transmitter of knowledge and tradition.

The curriculum = literature and history as symbol disciplines, mathematics and science as disciplines of the physical world, language and logics as disciplines of the intellect, fundamental works and doctrines as disciplines of the spirit.

The Methods = operating with facts and information. Stress on exercise and memorizing, homework and compulsory reading. Study as means of intellectual discipline.

2. *Progressivism.* Appearing in the 1920s in America, it has its roots in Charles S. Pierce's and William James' works. On the other hand, John Dewey's works have offered "the principles of progressivism as educational philosophy". Dewey opposed the idea according to which school has to exclusively center on mental development. In his opinion, school should offer conditions for full, complete development of the child. Therefore, the disciplines related to social experience are very important. "This experimental method seems to be one of the best methods for realizing the continuous unity of disciplines and methods". This philosophy had a very profound impact on elementary school in the States. Progressivism remains a viable alternative to traditional approaches of education.

Another dimension of progressivism appears under the influence of *existentialism*, as a new way of thinking, represented by J. P. Sartre, A. S. Neill, S. Kirkegaard, F. Nietzsche. It includes more thinking schools and, often, contradictory approaches and is centered on the individual. The idea according to which "the reality of the personal existence makes possible freedom and choice" becomes, according to John H. Johansen et all (1986, p. 252) the foundation of this philosophy. Human personality becomes the foundation on which education is being realized, and the educational goals are stated in terms of "awareness, dedication and affirmation".

As in the case of traditionalism, we can also mention the following considerations on student, teacher, curriculum and education methods:

The student = he is a person who experiments. He has the freedom of choice; self-awareness and student's acceptation are very valuable; human experiences are important to the extent to which they are related to change; learning by experience becomes the fundamental organization of education and curriculum.

The teacher = manager of research project; the teacher functions as a guide for students' activities; he is not an obstacle, always respecting everybody's rights; he has a motivational role.

The curriculum = the content should not be fragmented; students' interests can order what they are to study; group learning and trips are very important; disciplines rely on social experiences.

The methods = choices and personal expression are fully capitalized; Frontal instruction is limited in favor of those learning areas attractive for the student; problem solving, teaching ways of changes management, participation in group activities represent an important part of the socialization process and encourage the practice of choice freedom.

To these philosophies, we can add *behaviorism* (represented by J. Watson, Pavlov, Skinner etc.) as an essential way of thinking and with a strong impact on the level of curriculum.

Therefore, at the level of curriculum projection and organization, there is to be sensed the influence of both categories of educational philosophies. As R. Tyler's observed (1949), school philosophy has a tremendous role in setting curricular objectives. In this way, at the level of curriculum, we need an

"integrative philosophy", capable of offering a way of curricular structuring, representative for all the actors involved. Traditionalism (with its alternatives) and progressivism (with its variants) play an important role at the level of curriculum. As long as curriculum gravitates around pedagogical finalities, both philosophies harmonize at the level of its organization, thus justifying the existence of organization and methodological alternatives.

On the other hand, post modernity contributes to "the consolidation of the core epistemic nucleus" of the education sciences. It justifies and capitalizes, at the level of curriculum theory and practice, the main ways of theoretical and practical foundation of curriculum paradigm. In post modernity, the curriculum paradigm validates two perspectives, different at the educational level (cf. S. Cristea, 2004, p.8-10):

- *deconstruction perspective* which "encourages the detachment of certain elements of the whole, considered more important in a certain determined social and pedagogical context" (such as the education reform, lesson curricular projection, evaluation theory). The tendency manifested also at the level of "disintegration of some fundamental pedagogical sciences in favor of other research areas, considered prioritary in a certain historical stage", leads to the impossibility of satisfying the essential requests of curriculum paradigm, related to "the necessity of unitary approach of the education process and the instruction/education activity, at the level of interactions between objectives-contents-methodology-evaluation, between teaching-learning-evaluation"
- *reconstruction perspective* which "provides the permanent construction of the whole (education, instruction, education/instruction projection), enriched as a consequence of integrating fragmentary analyses in the new structure of the reference system". Such a perspective justifies curriculum paradigm which, once with Tyler's study *Basic principles of curriculum and instruction*, 1949, unifies all the efforts in an axiomatic framework with a strong operative role.

When the subject of curricular projection and organization is brought into discussion, Robert M. Gagné (1977, p.12) argues in favor of following some fundamental principles. They are based on the learning conditions which have to be established at the level of curriculum. The key principles are the following:

1. *Instruction planning has to be made for each individual*, being individual-oriented (instruction individualization) in the process of his development from child to adult, throughout his entire life
2. *Instructive design presents a series of phases* with a short or long duration. The immediate design refers to what the teacher does when he elaborates the lesson plan. The long-term design refers to the set of lessons organized on themes, courses and even to the entire educational system. These stages must be realized as distinct tasks; they should not be realized together. In the former stage, the teacher uses instruments from the latter one.

3. *The instruction systematically projected can affect to a great extent the individual's development.* It is not enough to only provide an educational environment in which the student could develop following his own way, because "unplanned and unguided learning leads almost always to training individuals who are not capable of attaining a meaningful existence in society" (p. 13).

4. *Instruction projection should be based on knowing the way human beings learn.* An extremely important role in developing individual abilities is that of the ways in which they can be formed, in which students are guided to learn. Therefore, the instructive design should take into account *the learning conditions* which are to be established depending on the effects we want to obtain.

Thus, this conception on instruction projection is based on a series of principles which fundaments it. From this perspective, the following question appears (R. M. Gagné, 1977): What kind of knowledge of learning is necessary in order to project instruction? The author argues for taking into consideration those aspects of the theory of learning which refer to "controllable events and conditions", such as: contiguity, repetition (Ausubel, 1968, Gagne 1970), consolidation (Thorndike 1913). Learning conditions are, therefore, external and internal, being dependent on that that learns

Thus, post modernity remains an important scale of curriculum interpretation, which contributes to the expansion of its roles at the level of didactic processes.

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DEGRADATED VEGETATION ASPECTS FROM THE UPPER BASIN OF RIVER'S DORNA (DISTRICT OF SUCEAVA)

ASPECTE DE VEGETAȚIE DEGRADATĂ DIN BAZINUL SUPERIOR AL RÂULUI DORNA (JUD. SUCEAVA)

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Abstract. *In the paper the association Festuco rubrae-Agrostietum capillaris Horvat 1951, subassociation nardetosum strictae (Csürös et Resm. 1960) Oroian 1998 from Molinio-Arrhenatheretea R. Tx. 1937 class, is analyzed both from the phytocoenologic viewpoint and from the viewpoint of the bioforms, of the floristic elements and of the ecological indices. The aspects of the economic (fodder) importance of the species identified in the phytocoenoses of the subassociation which is the object of the study are also described in the paper. Pursuant to the analysis, it had been ascertained that these phytocoenoses are low productive, especially due to the over-grazing.*

Rezumat. *În lucrare se analizează asociația Festuco rubrae-Agrostietum capillaris Horvat 1951 subasociația nardetosum strictae (Csürös et Resm. 1960) Oroian 1998 din clasa Molinio-Arrhenatheretea R. Tx. 1937, atât din punct de vedere fitocenologic, cât şi din punct de vedere al bioformelor, elementelor floristice şi al indicilor ecologici. De asemenea, în lucrare sunt surprinse şi aspecte ale importanței economice (furajere) ale speciilor identificate în fitocenozele subasociației luate în studiu. În urma analizei, s-a constatat că aceste fitocenoze sunt slab productive, mai ales din cauza suprapăşunatului.*

MATERIAL AND METHODS

For the study of the vegetation we used the method of the phytocoenological School in Zurich-Montpellier, perfected by J. Braun-Blanquet and J. Pavillard. On taking into consideration few phytosociological papers of classification (Sanda, 2002, Sanda and collab. 1997, Sanda and collab. 2001), the association was framed in the following coenosystem:

Cls. *Molinio-Arrhenatheretea* R. Tx. 1937
Ord. *Arrhenatheretalia* R. Tx. 1931
Al. *Cynosurion* R. Tx. 1947
As. *Festuco rubrae-Agrostietum capillaris* Horvat 1951
sass. *nardetosum strictae* (Csürös et Resm. 1960) Oroian 1998.

RESULTS AND DISCUSSIONS

The association *Festuco rubrae-Agrostietum capillaris* Horvat 1951 subassociation *nardetosum strictae* (Csürös et Resm. 1960) Oroian 1998 has not been recorded in the area of the Dorna river superior basin (basin which is placed

in the South-Western part of Suceava county) so far. The phytocoenoses of this association, specific to the montane area meadows, are permanently subjected to over-grazing and therefore are degraded.

From **the chorologic** point of view, phytocoenoses of this subassociation have been identified at Dornişoara; along the Dorna axial path, between Tinovul Mare and Dorna; along the Borcut Muncelu forest path.

As regards **the ecology**, the phytocoenoses of this subassociation vegetate at altitudes which range between 924 and 1050 meters, on fields poor in nutritive substances, accomplishing a 100% covering of the vegetation. These phytocoenoses, typical of the montane area, are specific to the meadows which are exclusively intended for the grazing and therefore they are degraded and low productive.

The phytocoenological characterization. Besides the characteristic and edifying species, *Festuco rubra* and *Agrostis capillaris* we notice the presence of the differential species *Nardus stricta, Hypericum maculatum ssp. maculatum, Potentilla erecta*. Beside these, numerous species specific to *Molinio-Arrhenatheretea* class (and implicitly to the phytocoenotaxons which are inferior to this class) participate to the extent of 75%, followed by species of the *Festuco-Brometea* class (14.58%) and *Juncetea trifidi* (4.16%) (table I).

Table 1

Ass. *Festuco rubrae-Agrostietum capillaris* Horvat 1951
sass. *nardetosum strictae* (Csürös et Resm. 1960) Oroian 1998

Relevé number	**1**	**2**	**3**	**4**	**5**	
Altitude (m)	**924**	**924**	**998**	**1050**	**1050**	
Cover of the vegetation (%)	**100**	**100**	**100**	**100**	**100**	
Surface of the relevé (m^2)	**100**	**100**	**100**	**100**	**100**	
Number of species	**34**	**34**	**29**	**21**	**25**	**K**
Charact. ass.						
Agrostis capillaris	1	2	1	3	2	V
Festuca rubra	2	1	2	1	1	V
Dif. sass.						
Hypericum maculatum ssp. maculatum	-	-	+	-	+	II
Nardus stricta	2	3	3	2	3	V
Potentilla erecta	+	+	+	-	+	IV
Cynosurion						
Bellis perennis	+	+	-	+	+	IV
Cynosurus cristatus	+	+	+	-	+	IV
Leontodon autumnalis ssp. autumnalis	+	+	-	-	-	II
Phleum pratense	-	+	+	+	-	III
Plantago major ssp. major	-	-	+	-	+	II
Prunella vulgaris	+	+	+	-	+	IV
Trifolium repens ssp. repens	-	+	+	+	-	III
Veronica serpyllifolia ssp. serpyllifolia	-	+	-	-	-	I
Arrhenatherion						

Campanula patula	+	+	+	-	+	IV
Centaurea phrygia	+	+	-	+	+	IV
Taraxacum officinale	+	+	+	+	-	IV
Arrhenatheretalia						
Achillea millefolium ssp. millefolium	+	+	-	+	+	IV
Briza media	+	+	-	1	+	IV
Carum carvi	+	+	-	-	-	II
Leucanthemum vulgare ssp. vulgare	+	-	+	+	-	III
Luzula campestris	+	-	-	-	-	I
Thymus pulegioides	+	-	-	+	-	II
Deschampsion caespitosae						
Carex palescens	+	-	-	-	+	II
Deschampsia caespitosa	1	+	+	-	+	IV
Molinietalia						
Lychnis flos-cuculi	-	+	-	+	-	II
Potentillion anserinae						
Potentilla anserina	+	+	-	-	-	II
Molinio-Arrhenatheretea						
Alchemilla vulgaris	1	1	1	+	1	V
Anthoxanthum odoratum	-	+	+	-	+	III
Centaurea jacea	+	+	-	-	-	III
Cerastium holosteoides	+	+	+	-	-	III
Euphrasia officinalis ssp. pratensis	+	+	+	-	-	III
Lotus corniculatus	+	+	-	+	+	IV
Plantago lanceolata ssp. lanceolata	-	+	+	-	+	III
Polygala vulgaris ssp. vulgaris	+	-	+	-	-	II
Ranunculus acris ssp. acris	+	+	-	+	-	III
Stellaria graminea	+	-	+	-	-	II
Trifolium pratense ssp. pratense	+	+	1	1	+	V
Festuco-Brometea						
Anthyllis vulneraria ssp. vulneraria	-	+	-	-	+	II
Euphrasia stricta ssp. stricta	-	-	+	+	+	III
Galium mollugo	+	-	-	-	-	I
Hieracium pilosella	+	-	+	+	-	III
Plantago media	+	+	+	-	+	IV
Ranunculus polyanthemos ssp. polyanthemoides	-	-	+	-	-	I
Trifolium pannonicum	-	-	+	-	+	II
Juncetea trifidi						
Campanula serrata	+	-	+	-	-	II
Potentilla ternata	-	+	-	-	-	I
Variae syntaxa						
Cirsium vulgare	-	+	-	+	+	III
Cruciata glabra	+	+	+	+	-	IV

Place and date of the relevées: 1, 2 – axial path Dorna, between Tinovul Mare and Dorna river (27.07.2006), (19.08.2006); 3 – forest path Borcut Muncelu (21.08.2006); 4, 5 – Dornişoara (10.08.2007).

The hemicryptophytes have the highest percentage (87.5%) within **the bioforms' spectrum**, a situation which is absolutely normal for this type of

vegetation. The hemiterrophytes which achieve a percentage of 6.25% and the terrophytes which represent 4.16% follow at long distance. The camephytes occur in these phytocoenoses to the extent of 2.08% (fig. 1).

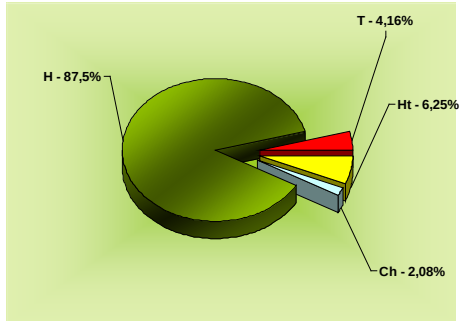

Fig.1 - The bioforms spectrum – as. *Festuco rubrae-Agrostietum capillaris* Horvat 1951 sass. *nardetosum strictae* (Csürös et Resm. 1960) Oroian 1998

Most of the **geoelements** types are Eurasian (Euras.) and European (Eur.), the latter representing together 75% of the total number of species existing in these phytocoenoses. The cosmopolite elements (Cosm.) occur to the extent of 10.42% and the circumpolar ones (Circ.) are represented by 8.33% of the species (fig. 2).

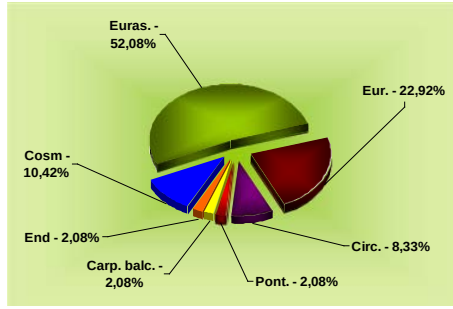

Fig.2 - The floristic elements spectrum – as. *Festuco rubrae-Agrostietum capillaris* Horvat 1951 *sass. nardetosum strictae* (Csürös et Resm. 1960) Oroian 1998

The spectre of ecological indices show that 93.75% of the total number of species are heliophile plants, 68.75% are eurythermal species; 62.51% are plants that prefer the moderate humidity soils, and 29.17% are amphytolerant species from this point of view. 64.58% of the vegetal components of these phytocoenoses endure large variations of the sublayer' pH, being euryionic plants. The fact that the phytocoenoses of this subassociation grow on soils which are less rich in nutritive substances is also reflected by the significant percentage of the species with an ecologic optimum represented by the soils poor in mineral nitrogen (45.82%); the amphytolerant species represent 27.08%, followed by the

species which grow especially on soils with a moderate content of this element (16.66%) (fig. 3).

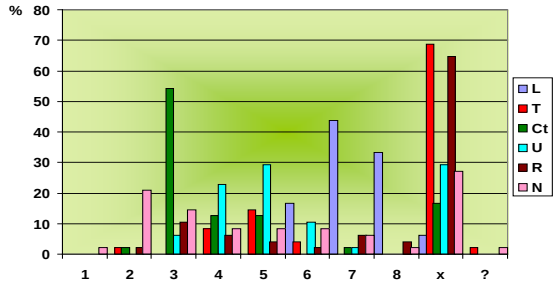

Fig.3 - The ecological indices spectrum – as. *Festuco rubrae-Agrostietum capillaris* Horvat 1951 sass. *nardetosum strictae* (Csürös et Resm. 1960) Oroian 1998

As regards **the economic value** of the species identified in these phytocoenoses, we ascertained, taking into account the specialized literature [5, 6], that more than half (**23** species) have **a fodder value**. Thus from the total number of the fodder value species, 11 species have a low fodder value (*Nardus stricta*, *Bellis perennis*, *Anthoxanthum odoratum*, *Potentilla ternata*, *Plantago major* ssp. *major*, *Briza media*, *Carum carvi*, *Deschampsia caespitosa*, *Anthyllis vulneraria* ssp. *vulneraria*, *Potentilla erecta*, *Plantago media*), 4 species have an average fodder value (*Achillea millefolium* ssp. *millefolium*, *Alchemilla vulgaris*, *Trifolium pannonicum*, *Plantago lanceolata* ssp. *lanceolata*), 5 species have a good fodder value (*Agrostis capillaris*, *Festuca rubra*, *Cynosurus cristatus*, *Taraxacum officinale*, *Lotus corniculatus*) and only 3 species have a very good fodder value (*Phleum pratense*, *Trifolium repens* ssp. *repens*, *Trifolium pratense* ssp. *pratense*) (fig. 4).

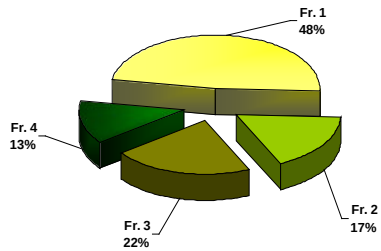

Fig.4 - The spectrum of the fodder value plants: Fr.- fodder plants, Fr. 1 – with low value, Fr. 2 - average value, Fr. 3 – with good value, Fr. 4 - very good value – as. *Festuco rubrae-Agrostietum capillaris* Horvat 1951 sass. *nardetosum strictae* (Csürös et Resm. 1960) Oroian 1998

Within the economic category the noxious species from the meadows were also included, including the weeds that decrease the fodder value of the meadows. Among these, only 2 species can be distinguished in the analyzed phytocoenoses:

Ranunculus acris ssp. acris and *Cirsium vulgare*, each of them achieving the constant value number III.

This analysis confirms the fact that these phytocoenoses are low productive and always subjected to the grazing.

CONCLUSIONS

The floristic composition of the identified phytocenoses is less diversified, being represented by 49 species.

From the phytocoenologic viewpoint, the phytocoenoses of the association which is the object of the study are clearly dominated by species which belong to the *Molinio-Arrhenatheretea* R. Tx. 1937 class and to the phytocoenotaxons which are inferior to it.

The phytocoenoses of this association are low productive and are always subjected to over-grazing, this aspect being also emphasized by the percentage of 65% achieved by the species with a low and average fodder value.

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URTICACEAE POLLEN CONCENTRATION IN THE ATMOSPHERE OF WESTERN ROMANIA

CONCENTRAȚIILE POLENULUI *URTICACEELOR* ÎN ATMOSFERA DIN VESTUL ROMÂNIEI

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Abstract. *This study analyzes the pollen of Urticaceae in the airplankton of Timişoara during the years 2000-2004. Airpollen belonging to Urticaceae was sampled using a VPPS 2000 Lanzoni trap. During the studied period, inter-annual variations, concerning the total annual pollen counts and the beginning, peak and ending dates of the Atmospheric Pollen Season, were reported. The annual totals of Urticaceae pollen in the air of Timisoara recorded in this study show a considerable variation. The yearly sums of pollen noted in Timisoara indicate a trend towards an increase in airborne Urticaceae pollen concentrations. The presence of this airpollen was considerably long in Timişoara. The highest level of pollen emission was recorded in 2003. The pollen spectrum in the atmosphere of Timisoara city shows that Urticaceae pollen is present in varying amounts and generally never more than 15%.*

Rezumat. *Acest studiu analizează polenul produs de Urticaceae în aeroplanctonul din Timişoara pe parcursul anilor 2000-2004. Aeropolenul urticaceelor a fost monitorizat folosind o capcană VPPS 2000 Lanzoni. Pe parcursul perioadei studiate se precizează variațiile interanuale, concentrațiile anuale totale, începutul, vârful şi sfârşitul sezonului polic atmosferic. Sumele polinice anuale indică o creştere a concentrațiilor de polen aeropurtat. În Timişoara, prezența acestui tip de aeropolen este de lungă durată.Cel mai înalt nivel al emisiei de polen l-am înregistrat în 2003. Spectrul polinic al atmosferei oraşului Timişoara arată prezența în cantități variate a polenului urticaceelor dar nu mai mult de 15%.*

Urticaceae is cosmopolitan family and consists of around 52 genera and 1,050 species. The two most important genera are *Urtica* and *Parietaria*. The plants of the *Urtica* genus (nettle) are ruderal weeds very common in nitrified places, such as on roadsides and between cultivated areas. The *Parietaria* species (pellitory of the wall) are less common and are found mostly on the walls of the old city and other nitrified places (Gonzalez Minero et al. 1997; Fornaciari et al. 1992; Corden & Millington 1991; Trigo et al. 1996; Galán et al., 2000). All over Europe, the most allergenic weeds are plants belonging to *Asteraceae* and *Urticaceae*. In Mediterranean area, *Urticaceae* pollen, together with the pollen of olive and grasses, are the aeroallergens with the highest incidence in the population. In fact, *Parietaria*, the most pollinosis-inducing plant in the Mediterranean regions, is significant in inducing allergic diseases. These plants, are mostly anemophilous. *Urticaceae* stamens are bent but when temperature and humidity conditions are suitable they rise to the upright position and release their pollen grains. Hence, the release, transportation and dispersal of *Urticaceae* pollen in the atmosphere are closely linked to atmospheric phenomena. Knowledge of all these

relationships is very important because *Parietaria* pollen grains elicit severe pollinosis in Europe, Africa, Asia, Australia, and the United States of America (Bass & Baldo, 1984; Bousquet et al., 1986; D'Amato & Spieksma, 1990; Vega-Maray et al., 2003).

Airborne pollen of *Urticaceae* is very common everywhere (Charpin et al., 1977). Very little attention has been given to this pollen since the works of the Hyde (1952) and Hamilton (1959). This dearth of research has occurred even though species in this family are recognized widely as allergens and are known to contribute to allergic rhinitis and extrinsic asthma (Emberlin & Norris-Hill 1991). Correlations between *Urticaceae* pollen counts and allergic symptoms have been reported in several papers (among others: Giulekas et al., 1991; Negrini et al., 1992a, b; Voltolini et al., 2000; Larese et al., 1992). Negrini *et al.* observed that mild symptoms, probably due to the most sensitive share of population, were correlated with levels of 10-15 *Parietaria* PG/m^3. According to Viander and Koivikko (1978), 90% of the patients reported symptoms with concentrations above 80 PG/m^3. Differences in the size, the allergenicity and the speed of release of allergens from various pollens could explain the differences in the amount of grains required to provoke symptoms in all the sensitized subjects (Marsh, 1975). Another source of variance could be the different quantitative release of non-pollen particles with allergenic activity coming from various parts of the plants. This phenomenon could be responsible of the increase of symptoms recorded 1-2 days after a pollen peak, even when the daily pollen count was low. In "short ragweed" pollinosis a high content of non-pollen allergenic particles has been found in the air some days after peak pollen (Agarwal et al., 1983). However, it is possible that the delayed symptoms are the results of late reactions, which may occur not only at bronchial level, but even in the conjunctival and nasal mucosa (Negrini et al., 1992). Sensitizations to the *Urticaceae* pollen was 27 patients (5.9%) in the Madrid assessed by skin prick tests (Belver et al., 2007).

MATERIALS AND METHODS

Annual variations in the concentration of pollen in the atmosphere were analysed by the volumetric method. Pollen type of *Urtica-Parietaria sp.* is 3-zonoporate pollen between 14 and 20 µm in size (Alcázar et al., 1998). To date species differentiation of the pollen is not possible.The *Urticaceae* pollen season for each year was defined using the methodology of Nilsson and Persson (1981), whereby 90% of the total yearly count is included. The start of the season is taken from the day when the cumulative sum reaches 5% of the seasonal total and similarly the season ends on the day when the 95% level has been attained. The pollen concentrations are expressed as the number of pollen grains/m^3 of air, the mean daily values being used for the elaboration of tables and graphs.

RESULTS AND DISCUSSIONS

The existence of pollen grains in the atmosphere is a natural phenomenon. It is the result of the sexual cycle of anemophilous plants, such as the *Urticaceae* family. Hence, pollen dispersal is a dynamic phenomenon and this fact should be reflected in the variables that are used to explain it, such as meteorological

parameters. These factors have an influence on the emission, transport, permanence, deposition and capture of pollen grains (Vega-Maray et al., 2003).

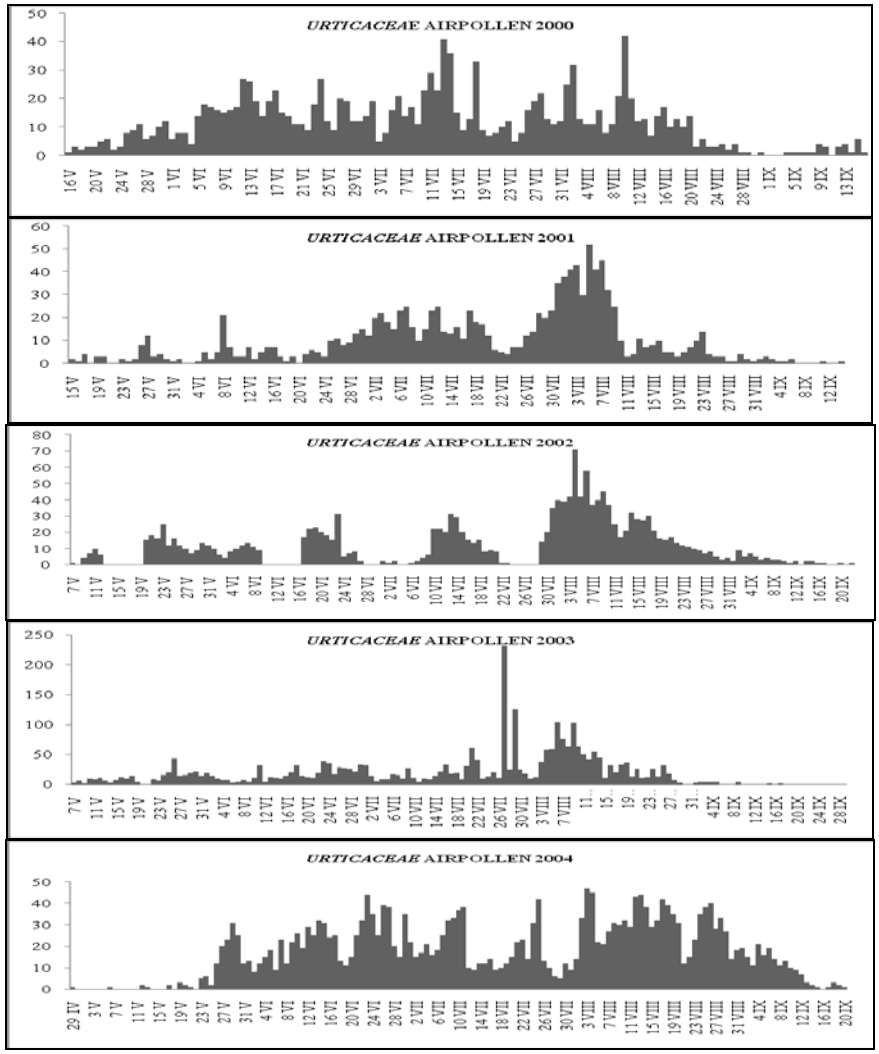

Fig. 1. Quantify *Urticaceae* airpollen evolution during flourishing period of the years 2000-2004

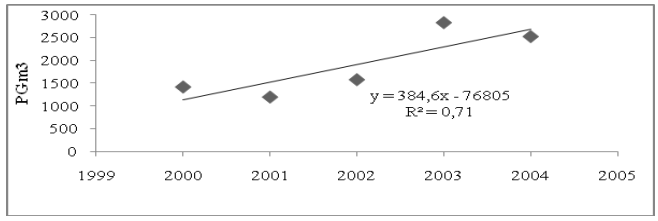

Fig. 2. The annual concentrations in Timişoara (2000-2004)

Table 1.

Selected values characterizing *Urticaceae* pollen seasons in 2000-2004

	2000	2001	2002	2003	2004
Days when was *Urticaceae* pollen in the air	124 (16 V-16 IX)	123 (15 V-14 IX)	139 (7 V-22 IX)	146 (7 V-29 IX)	145 (29 IV-20 IX)
Atmospheric Pollen Season	82 days (30 V-19 VIII)	76 days (7 VI-21 VIII)	97 days (23 V-27 VIII)	91 days (25 V-23 VIII)	98 days (30 V-4 IX)
Pollen Index	11,37%	7,67%	7,87%	11,45%	14,62%
Urticaceae airpollen on the peak days	42 10 VIII	45 7 VIII	71 4 VIII	231 27 VII	47 3 VIII

Table 2.

Monthly pattern of airborne pollen (%), Timisoara, Romania

	April	May	June	July	August	September
2000	-	6,39%	32,06%	**35,16%**	24,50%	1,89%
2001	-	4%	14%	**41,92%**	38,75%	1,33%
2002	-	12,20%	15,90%	19%	**49,50%**	3,40%
2003	-	10,13%	18,33%	32,03%	**38,24%**	1,27%
2004	0,04%	5,85%	27,30%	22,31%	**37,46%**	7,04%

Urtica dioica flowers from June to September. *Urtica urens* flowers from May to September and *Parietaria sp.* from June until October (Ciocarlan, 2000). The aerobiological behaviour of *Urticaceae* and seasonal variations for Timisoara during 2000-2004 are shown and discussed. The results of pollen count for all years are shown in table 1. The course and intensity of the season for *Urticaceae* is shown in Figure 1. Monthly variations of total pollen grains recorded in the atmosphere of Timişoara during the years 2000-2004 are shown in table 2. The months in which maximum pollen concentrations were recorded were the same in all five years: July and August. The longest Atmospheric Pollen Season was observed in the year 2004 (94 days according to Nilsson & Persson, 1981). Five year average pollen season duration were 88,8 days. The *Urticaceae* pollen season is very long. In 2001 pollen season in Timisoara lasted a shorter time. The starts of these APS were uniform, finishing in August (ocassionaly in September – 2004). The annual totals of *Urticaceae* pollen in the air of Timisoara recorded in this study show a considerable variation. As to the interannual variation (figure 2), the linear regression model shows the increasing trend in the annual concentrations for Timişoara. The mean annual pollen count obtained during the period studied was 1912,4 PG, the lowest value being recorded in 2001 with 1200 pollen grains. The highest level of pollen emission was recorded in 2003 with 2832 PG. The peak count of each season fluctuated between 42-231 PG/m^3. *Urticaceae* airpollen constitutes between 7,8% and 14,62% of the annual total of pollen grains. Only few days (in 2003) the concentration of *Urticaceae* exceed the 80 PG/m^3 established by Negrini et al. as the critical value for symptomatology.

In aerobiological studies, it is important to take into account the release of particles from their source and their transportation and dispersal in air. In respect of pollen release, most plants have a passive mechanism of pollen liberation and the pollen grains are liberated by the energy of external agents, usually wind or falling raindrops. In the case of the *Urticaceae* family, pollen liberation involves an explosive mechanism. *Urticaceae* stamens are normally bent, but when

temperature and humidity conditions are suitable, they rise to the upright position and release their pollen grains. The pollen release, transportation and dispersal in the air, are closely linked with atmospheric phenomena. There have been several studies of the influence of meteorological parameters on the pollen concentration of the *Urticaceae* family. Most of these studies have indicated that the most influential parameters are temperature, humidity and rain (Corden & Millington, 1991; Emberlin & Norris-Hill, 1991; Fornaciari et al, 1992; Trigo et al, 1996; González Minero et al, 1997; Galán et al, 2000; Vega-Maray et al, 2003).

CONCLUSIONS

The length of the seasons and the cumulative counts varied greatly over the five years. Similarly the timing of peak abundance differed. These patterns may be explained partly by the contemporary weather during the seasons and partly by the influence of weather conditions during the pollen formative period which, in the case of *Urticaceae* in Romania, occurs during May and September. The time of maximum counts for *Urticaceae* pollen in Timisoara occurs between July and August months. The average duration of the pollen season of *Urticaceae* in Timisoara was 88,8 days. Interannual differences can be seen in the seasonal behaviour of the pollen, 2003 being the year in which the highest levels of airborne pollen were reached.

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AEROBIOLOGICAL MONITORING OF ALLERGENIC FLORA IN TIMISOARA

MONITORING AEROBIOLOGIC ASUPRA FLOREI ALERGENICE ÎN TIMIŞOARA

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Abstract. *We report here the results of the monitoring of airborne pollen concentrations throughout 2000 to 2002 from Timişoara (România). A total of 21 allergenic pollen types were identified of which Ambrosia artemisiifolia pollen showed maximum concentration. Utilizing data on the aerobiological characteristics of allergophytes in urban ecosystem of Timisoara and taking into consideration some allergologic characteristics of their pollens, an allergen index (A.I.) is proposed. On the basis of this index, plants are grouped into strongly allergenic, moderately allergenic, slightly allergenic or of uncertain effect. The index can be used to conduct a rapid survey of a city's phytoallergenic potential. Further studies are needed to correlate climatic, phenological and aerobiological observations in our area.*

Rezumat. *Prezentăm în această lucrare rezultatele monitorizării concentraţiilor de polen aeropurtat din Timişoara, între anii 2000 şi 2002. Am identificat un total de 21 de tipuri de polen alergenic, între care cel provenind de la Ambrosia artemisiifolia a avut cele mai mari concentraţii. Utilizând datele aerobiologice ale alergofitelor din ecosistemul urban al Timişoarei şi unele caracteristici alergologice ale tipurilor polinice, propunem un index alergen. Pe baza acestuia, am grupat plantele în puternic alergenice, moderat alergenice, slab alergenice şi fără efect cert. Studii viitoare vor necesita corelaţii cu observaţii climatice, fenologice şi aerobiologice în arealul studiat.*

Aeroallergens are present as a natural part of the atmosphere, where they occur in the form of dust, aerosols, cellular material, particles as small as 0.01 µm, and can be deposited on the mucous membranes of the eyes, nasal and oral cavity and airways. Aeroallergens include reproductive structures of many seed plants and fungi, as well as certain algae, bacteria and protozoa, which regularly undergo atmospheric transportation. In addition, biogenic debris, including mammalian danders and arthropod emanations, are also aeroallergens (Solomon & Mathews, 1988). Aeroallergens of plants can be derived from pollen of conifers and flowering plants, seeds, leaf and stem detritus and proteolytic enzymes. These allergens are a natural component of the atmosphere either through their biological activity or human activity (Ong et al., 1995).

Pollinosis is the most common allergic disorder. As is well known, the clinical manifestations of pollinosis are determined by a specific hypersensitivity to pollen, especially anemophilous pollens of certain plants, among genetically susceptible individuals (Pacini, 1990). A person can only develop pollinosis when he is exposed to pollen with allergenic properties. The severity of the symptoms depends in part on the

frequency of exposures and on the amount of pollen per exposure. Most exposures will be to pollen present in the air in relatively high concentrations (Driessen & Derksen, 1989). In practice this means that pollinosis is mostly caused by plants that depend on the wind for cross-fertilization: the wind-pollinating species. Due to the progressive increase in the human population of allergic manifestations brought on by pollen allergens, the need to study the phenomenon of pollinosis is becoming increasingly more urgent. In order to improve the quality of life of persons affected by these manifestations, it is useful to assess allergophyte presence and distribution directly in the city and to identify the urban areas particularly dangerous for the onset of pollinosis (Hruska, 2003).

The spectrum of air particles causing allergic rhinitis and asthma is rather well known. There are regional differences both in occurrence and allergenicity of pollen and spores. Due to human activities, we must await slight floral changes within a decade. Therefore, changes of the allergen content of the air should be observed, to react early enough with changes in diagnostic and therapy means whenever a new allergen should appear. If one or the other well known aeroallergen would show a significant trend to disappear, the obvious things will be easily done, but new allergens demand some time for organization of tests and therapeutical solutions (Jager, 1989). With up to 25% of the populations in industrialized countries suffering these diseases, the impact of allergy on society is significant. Of the diseases, allergic rhinitis (hay fever or pollinosis) has the highest incidence with 10–20% of the population suffering from this disorder; 5–10% exhibit asthmatic symptoms while 1–3% experience food allergies (Durham & Church, 2001). Whilst food allergy and eczema are often predominant in infancy, asthma and rhinitis often may not develop until late in childhood or early adulthood. Pollen allergy is also typically a seasonal disease often dependent upon the flowering season of the plant to which an individual is pollen-sensitive (Weerd et al., 2002). The knowledge of the presence, distribution, length and modality of flowering time of spontaneous and cultivated allergenic plants, compared with airborne pollen monitoring in a specific area is necessary for an etiologic diagnosis of pollinosis (Platt-Mills & Solomon, 1993). On a restrictive definition, plant species which are known to cause pollinosis in a substantial part of the population in a large area can be considered as allergenic (Lorenzoni et al., 1998). Plants considered dangerous in terms of the onset of allergies in the human population are those perennials with a phenantesic period lasting over a month or those that flower repeatedly during the same vegetative season. In addition, species considered strongly allergenic for man are those whose pollen provokes allergic reactions that are aggravated by food-related allergic reactions, particularly those from fruits or vegetables, through the phenomenon of cross reactivity (Eriksson 1993; Hruska, 2003).

MATERIALS AND METHODS

In order to calculate the allergen index of a single species, the following parameters were taken into consideration: length of the phenantesic period (after Ciocârlan, 2000), presence of phenomena of cross reactivity and species abundance utilizing data on the aerobiological characteristics. These parameters were assigned numeric values in ascending order which express the potential of a plant species,

through its pollen, to cause allergic manifestations in man. Pollen count was carried out using a volumetric pollen trap (VPPS 2000 Lanzoni). Pollen was sampled during a 3-year (2000-2002) atmospheric pollen-monitoring programme in Timişoara, Romania. Measurements were performed mainly by the volumetric method in order to establish the spatial distribution of pollen in aeroplankton. Daily values expressed as pollen grains/m^3 of air per 24 h (Mandrioli et al., 1998). Airborne pollen concentration was expressed as a Pollen Index (PI = this index is expressed in percentage from annual sum pollen types during sampling period 2000-2002).

RESULTS AND DISCUSSIONS

Monitoring of the pollen counts in the aeroplankton of cities is of relevant medical importance. The number of people allergic to plant aeroallergens has substantially increased in big cities and industrial areas (Nilsson & Persson, 1981). The allergen index value (A.I.) is the sum of the pre-chosen values for each of the partial characteristics outlined above. The parameters adopted were assigned values on an appropriate numeric scale. Table 2 presents calculation of the allergen index for the most common allergophytes in the western Romanian urban ecosystems, utilizing the scales of the proposed parameters from Table 1. Pollen grains of allergenic taxa occur in the atmosphere of Timişoara in large quantities from early February untill late October. It is clear that the Romanian pollen seasons show 3 main parts: tree season (February–April), grass season (May–July), weed season (July–October). Classification of the plant species into groups of trees, grasses and weeds reveals exclusively tree airborne pollen to be found in March and April then in May and June the grass and weed pollen occurred, whereas an absolute predominance of weed pollen was recorded in July, August and September. The generally accepted conclusion is that the participation of arboreal pollen in the pollen fall reflects regional conditions, while the content of pollen of herbaceous plants reflects local ones (Ianovici, 2007). Comparing the allergenic indices obtained with the allergic manifestations of pollinosic patients, the numeric values were subdivided into the following four groups: A.I.up to 2 - uncertain effect; A.I. from 2,5 to 4,5 - species with slightly allergenic pollen; A.I. from 5 to 6 - species with moderately allergenic pollen; A.I. from 6,5 to 7 - species with strongly allergenic pollen.

These allergophytes are prevalently species of the *Poaceae* and *Asteraceae* families, which are becoming ever more abundant in the cities, especially because of the particular urban climate (Palmieri & Siani, 2000; Hruska, 2003). The allergenic flora in Timişoara can be roughly subdivided into two groups of plant species. One includes arboreal and shrub-like exotic species, growing and cultivated in private gardens and public parks. The second group includes perennial or annual spontaneous, mostly herbaceous species, growing anywhere in the urban environment provided where soil characteristics are favourable. Some agrarian species cultivated in peripheral areas are also present. All plants are spread in the urban environment according to their ecological characteristics and grow in the habitats most suited to them. They are mainly synanthropic weeds or ruderal species, whose propagation has been increasing according to the

continual expansion of waste areas. Other species grow in grassed areas, in traffic islands, along rivers and on channel banks, roadsides, and among hedges. The highly allergenic *Ambrosia artemisiifolia* is widely encountered. This leads to the necessity of individual testing with *Ambrosia* pollen and the complete study of this plant, in expansion in our country.

Table 1.

Values of the parameters used in evaluating the allergenicity of plants

Phenanthesic period	Cross reactivity	Abundance - Pollen index
less than one month = 0.5 more than one month = 2	none present = 0 present = 1	rare = 0.5 (0 – 0,99%) present = 1 (1 - 1,99%) rather common = 2 (2 - 4,99%) abundant = 3 (5-10%) very abundant = 4 (>10%)

Table 2.

A.I. calculation for some plants frequently present in urban ecosystem

Pollen type	Phenanthesic Period	Abundance (Pollen index)	Cross reactivity	Allergen index value
strongly allergenic				
Ambrosia	2	4 (19,99%)	1	7
Poaceae	2	4 (16,46%)	1	7
moderately allergenic				
Urtica	2	3 (8,97%)	1	6
Artemisia	2	3 (8,66%)	1	6
Chenopodiaceae/Amaranthaceae	2	2 (4,02%)	1	5
Rumex	2	2 (3,83%)	1	5
Carpinus	2	2 (3,48%)	1	5
Betula	2	2 (3,41%)	1	5
Alnus	2	2 (2,03%)	1	5
slightly allergenic				
Populus	2	2 (4,19%)	0,5	4,5
Taxaceae/Cupressaceae	2	2 (3,26%)	0,5	4,5
Pinaceae	2	2 (3,1%)	0,5	4,5
Salix	2	2 (2,76%)	0,5	4,5
Acer	2	2 (2,73%)	0,5	4,5
Corylus	2	1 (1,08%)	1	4
Ulmus	2	1 (1,04%)	0,5	3,5
Quercus	2	1 (1,17%)	0,5	3,5
Fraxinus	2	1 (1,26%)	0,5	3,5
Tilia	2	1 (1,84%)	0,5	3,5
Morus	0,5	2 (2,06%)	0,5	3
Plantago	2	1 (1,98%)	1	2,5
uncertain effect				
Juglans	0,5	1 (1,91%)	0,5	2
Platanus	0,5	0,5 (0,59%)	0,5	1,5

The flowering time demonstrates the presence of two different floral groups. Most cultivated phanerophytes are flowering at the beginning of spring, whereas the spontaneous plants delay their anthesis in late spring. The anthesis of spontaneous flora, however, can continue later and recur. In some cases there is no temporal overlap between flowering time and aerobiological data of the families. Pollens of *Corylaceae, Betulaceae, Chenopodiaceae/Amaranthaceae, Fagaceae* and *Polygonaceae* are detectable in the air for a period longer than the flowering time of the same species. In cultivated species, anthesis can be influenced by phytopathological treatment and by regular light (Lorenzoni et al., 1998).The numeric increase in pollinosis patients is especially accentuated in

large towns and cities, where studies of allergenic flora are fairly demanding. Selective floristic cartography has helped reduce money and monitoring time employed for study of urban allergophytes. Allergophyte distribution is assessed and urban areas particularly invaded by these species are identified, thus indicating residential zones unsuitable for pollinosic patients. Since the symtomatology of these illnesses varies considerably over the course of a year, it is very useful to indicate the periods of a given pollen's maximum production. Utilizing this data, one can define prevention and treatment measures for people who suffer from allergenic manifestations caused by urban pollens in order to ease the symptomatology of the illness (Hruska, 2003).

The geographic position of an urban ecosystem influences the presence and abundance of allergophytes. A species is usually more abundant in the central part of its areal and thus can be strongly allergenic in the center of its area of distribution and moderately dangerous on the edges of this area. A similar observation can be made about the species capable of occupying different habitats. In fact, a species develops most abundantly in its optimal habitat, and here, as well, the allergenic effects provoked by its pollen will also be most evident. The urban ecosystem hosts a rich reservoir of strongly allergogenic plants. The presence of the latter is continually increasing, as various species are brought into the city accidentally or deliberately by man. As already established, the period of time spent in contact with allergogenic taxa can influence the pathogenesis of pollinosis in people already sensitized to pollens (Ricci et al., 1993). Take, for example, the allergy suffered by urban children, caused by the pollen of *Aesculus hippocastanum*, an ornamental tree often used in urban parks (Popp et al., 1992). City park management can influence the allergic responses of inhabitants, as has been noted in Switzerland (Frei & Leuschner, 2000).

CONCLUSIONS

Airpalynologic values recorded during the years 2000- 2002 show huge differences for our geographic area concerning the incidence of the pollen of some plants with airborne allergen pollen. We notice the abundance of the pollen coming from a species which is adventives in our country's flora: the *Ambrosia artemisiifolia.* Allergenic pollen taxa identified in Timişoara during monitoring throughout 2000–2002 was: *Acer, Alnus, Ambrosia, Artemisia, Betula, Carpinus, Corylus, Chenopodiaceae/Amaranthaceae, Fraxinus,Morus, Quercus, Pinaceae, Plantago, Poaceae, Populus, Rumex, Salix, Taxaceae/Cupressaceae, Tilia, Ulmus, Urtica.* More attention must be paid to these taxa, especially in managing of allergy problems in urban areas. The study of the concentrations of airborne pollen at the beginning of and during the season, the knowledge of peak concentrations and of the year to year variations, together with the phenological data regarding the frequency, distribution in the urban area and course of flowering of the allergenic plants, contribute to the understanding of allergic phenomena.

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CONTRIBUTIONS TO THE PHYTOSOCIOLOGICAL STUDY OF THE MOUNTAIN MEADOWS OF *ARRHENATHERETALIA* R. TX. 1931 FROM NEAGRA BROŞTENILOR HYDROGRAPHIC BASIN

CONTRIBUȚII LA STUDIUL FITOSOCIOLOGIC AL PAJIŞTILOR MONTANE DIN ORDINUL *ARRHENATHERETALIA* R. TX. 1931 DIN BAZINUL HIDROGRAFIC AL NEGREI BROŞTENILOR

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Abstract. *The hydrographic basin of Neagra Broşteni river presents approximately 350 km^2 area and occupies, in its larger part, the central zone of Bistriţa Mountains, a reduced portion of the eastern slope of Călimani Mountains and the Drăgoiasa – Glodu depression (Eastern Carpathians). Geological, pedological and climate characteristics have determined the individualization of meadows depending on vegetation levels: mountain, sub-alpine and alpine meadows. Vegetal associations from the mountain meadows, included in Arrhenatheretalia R. Tx. 1931 order, identified in 2006 – 2007 period in this territory are: Festuco rubrae – Agrostietum capillaris Horvatic 1951, Lolio – Cynosuretum Br.-Bl. et de Leeuw 1936 and Pastinaco – Arrhenatheretum elatioris Passarge 1964. These are analyzed from the floristic elements, bio-forms, ecological and caryological indices perspectives.*

Rezumat. *Bazinul hidrografic al râului Neagra Broşteni prezintă o suprafaţă de aproximativ 350 km^2 şi ocupă, în cea mai mare parte a sa, zona centrală a Munţilor Bistriţei, o mică porţiune din flancul estic al Munţilor Călimani şi ulucul depresiunar Drăgoiasa - Glodu (Carpaţii Orientali). Condiţiile geologice, pedologice şi climatice au determinat individualizarea pajiştilor pe etaje de vegetaţie: etajul montan, subalpin şi alpin. Asociaţiile vegetale de pajişti montane aparţinând ordinului Arrhenatheretalia R. Tx. 1931 identificate in perioada 2006 – 2007 în acest teritoriu sunt următoarele: Festuco rubrae – Agrostietum capillaris Horvatic 1951, Lolio – Cynosuretum Br.-Bl. et de Leeuw 1936 şi Pastinaco – Arrhenatheretum elatioris Passarge 1964. Ele sunt analizate din punct de vedere al geoelementelor, bioformelor, al indicilor ecologici şi cariologici.*

MATERIAL AND METHOD

The phytosociological study has been realized using the classic methods specific to Central Europe Phytosociological School. Meadows vegetation has been characterized through phytocoenological relevées used as sampling method. Each vegetal species has been quantified in field (using Braun – Blanquet scale presenting the abundance – dominance indices from + to 5). Phytosociological relevées have been ordered and grouped in vegetal associations on the basis of characteristic, dominant and differential species [1], [3]. The biological forms and floristic elements for each species are those that have been given by V. Ciocarlan [2] and the values for ecological indices (T–temperature, U–humidity, R–soil pH) have been established by V. Sanda et al. [6] and Popescu et al. [5]. Information regarding the genetic type of

each species have been published by V. Ciocarlan [2] and the diploidy index has been calculated using the formula elaborated by S. Pignatti [4].

RESULTS AND DISCUSSIONS

According to speciality literature [1], [3] these plant communities are subordinated to: **MOLINIO – ARRHENATHERETEA** R. Tx. 1937, ARRHENATHERETALIA R. Tx. 1931, Cynosurion R. Tx. 1947: *Festuco rubrae – Agrostietum capillaris* Horvatic 1951, *Lolio – Cynosuretum* Br.-Bl. et de Leeuw 1936; Arrhenatherion Koch 1926: *Pastinaco – Arrhenatheretum elatioris* Passarge 1964.

Festuco rubrae – Agrostietum capillaris Horvatic 1951 (Table 1, rel. 1-4) includes the red fescue meadows, wide spread in the researched area, covering mountains versants with varied slopes and expositions, between 750 and 1100 m altitude. It is characterized by the dominance of the edifying species *Festuca rubra* and *Agrostis capillaris* that are realizing an average covering degree up to 75 – 80%. In some phytocoenosis, *Holcus lanatus*, *Trifolium pratense*, *Nardus stricta* are characterized by significant abundance – dominance indices (without becoming co-dominant or sub-dominant). 57% of the component species are characteristic to the superior coenotaxa. In the studied areas are also present representative species to Juncetea trifidi, Festuco – Brometea and Trifolio – Geranietea. The floristic elements spectrum points out the fact that in this vegetal association structure prevails the eurasiatic (52%) and european (20%) elements. The life-forms spectrum presents the preponderance of the hemicryptophytes species (82%) followed by geophytes and therophytes (4%) species. Ecological indices spectrum reveals the preponderance of mesophilous, (63%), mesothermophilous (35%) and microthermophilous (25%) species. Most of the component species (55%) are indifferent to soil pH. The caryological spectrum presents the increased proportion of the diploid species (42%). The diploidy index (D.I. = Σ_D / Σ_P) presents a value of 1,07.

Pastinaco – Arrhenatheretum elatioris Passarge 1964 (Table 1, rel. 5-8) includes the tall oat-grass meadows, sporadically spread in the researched area, covering small areas on Neagra Brosteni valley in places characterized by decresed slopes (3-5º) and varied expositions, up to 800 m altitude. It is characterized by the dominance of the edifying species *Arrhenatherum elatius* that are realizing an average covering degree up to 75%. The floristic composition includes preponderantly species characteristic to superior coenotaxa (63%). In the studied areas are also present representative species to Juncetea trifidi and Trifolio – Geranietea. The floristic elements spectrum points out the fact that in this vegetal association structure prevails the eurasiatic (54%), european (20%) and cosmopolite (13%) species. The bio-forms spectrum presents the preponderance of the hemicryptophytes species (76%) followed by geophytes (5%) and hemitherophytes (4%) species. Ecological indices spectrum reveals the preponderance of mesophilous (70%), and meso (29%) or microthermophilous (25%) species.

Most of the component species (60%) are indifferent to soil pH and approximate 32% are specific to weak acid to neutral soils. The caryological spectrum presents the increased proportion of the diploid species (43%). The diploidy index (D.I. = Σ_D / Σ_P) presents a value of 1,33.

Table 1

Vegetal associations from ARRHENATHERETALIA R. Tx. 1931 in Neagra Brostenilor river basin

U	T	R	Association	a				b				c				K
			No. of relevé	1	2	3	4	5	6	7	8	9	10	11	12	
			Plot area (m^2)	100	100	100	100	100	100	100	100	25	25	25	25	
			Altitude (m)	875	900	980	1100	700	750	800	800	1080	680	700		
			Aspect	SE	E	NV	SV	SE	NE	SV	SE	V	SE	-	S	
			Slope (º)	10	4-5	15	10	5	3-4	1-2	5	4-5	10	-	7-8	
			Vegetation covering (%)	100	100	100	90	95	90	95	95	95	100	100	100	
Car. ass.																
3	0	0	Festuca rubra	3	3	2	3	+	-	1	1	+	-	+	+	V
0	0	0	Agrostis capillaris	2	3	3	1	+	+	+	+	+	1	+	+	V
3	3	3	Cynosurus cristatus	+	+	-	+	+	+	+	-	1	2	2	+	V
3	3	4	Arrhenatherum elatius	+	+	+	-	3	4	3	3	-	-	-	-	III
2,5	4	4,5	Lolium perenne	-	-	-	-	-	-	-	-	3	2	2	4	II
Cynosurion																
3,5	0	0	Phleum pratense	+	+	+	-	-	+	-	+	-	-	-	+	III
3	0	0	Leontodon autumnalis	+	+	+	+	+	-	+	-	+	+	+	-	IV
3	2,5	0	Bellis perennis	-	-	-	-	+	+	-	+	+	+	+	-	III
Arrhenatherion et Arrhenatheretalia																
3	2,5	3	Centaurea phrygia	+	1	+	+	-	+	+	-	-	-	+	-	III
0	3	0	Briza media	+	+	+	+	+	-	-	+	-	+	-	-	III
3,5	3	0	Holcus lanatus	+	-	1	-	+	-	+	+	-	-	-	-	III
3	0	0	Leucanthemum vulgare	+	+	+	+	+	-	-	+	+	+	-	+	IV
3	0	0	Achillea millefolium	+	+	-	+	+	+	-	-	+	+	+	+	IV
2	3	3	Thymus pulegioides	+	+	+	+	-	+	-	+	+	-	+	-	IV
2,5	3	0	Knautia arvensis	+	-	-	-	-	+	+	-	-	-	-	-	II
2,5	2	3	Stellaria graminea	+	+	+	+	1	+	-	+	+	-	-	-	IV
3	0	4	Dactylis glomerata	+	+	+	-	+	+	+	-	+	-	-	+	IV
3,5	3	3	Carum carvi	-	+	-	-	+	-	-	-	-	+	+	-	II

3	0	0	Taraxacum officinale	-	+	+	-	+	+	-	-	+	+	-	-	III
3	2,5	3	Campanula patula	-	+	+	-	+	+	-	+	-	-	+	-	III
0	0	0	Plantago lanceolata	-	-	-	+	+	-	-	+	+	+	-	-	III
Deschampsion																	
3	3	0	Stachys officinalis	+	+	+	-	-	+	+	-	-	-	-	+	III
4	0	0	Deschampsia caespitosa	+	+	+	-	+	+	-	-	+	-	-	-	III
Calthion																	
4	3	3	Angelica sylvestris	+	-	+	-	-	-	-	+	-	-	-	-	II
Alopecurion																	
3,5	0	0	Festuca pratensis	+	+	+	-	+	+	-	+	-	-	-	-	III
Molinietalia caeruleae																	
4	0	4,5	Gymnadenia conopsea	+	-	+	+	-	-	-	-	-	-	-	-	II
3,5	2,5	0	Lychnis flos - cuculi	-	-	+	+	-	+	+	+	-	-	-	-	III
3,5	3	4	Colchicum autumnale	-	-	-	-	+	+	+	-	-	-	-	-	III
3	2	4	Linum catharticum	-	-	-	-	+	+	+	-	-	-	-	-	III
Molinio – Arrhenatheretea																	
3	0	0	Trifolium pratense	1	+	+	+	+	-	+	-	-	-	+	+	IV
4,5	3	3,5	Trollius europaeus	+	-	+	-	-	-	-	-	-	+	-	-	II
3,5	0	0	Ranunculus acris	+	-	-	-	-	+	-	-	+	+	-	-	II
0	0	0	Rhinanthus angustifolius	+	-	1	+	-	-	-	-	-	-	-	-	II
0	0	0	Anthoxanthum odoratum	+	+	-	+	+	+	-	+	-	-	-	-	III
3	0	0	Centaurea jacea	+	+	+	-	1	+	-	+	-	-	-	-	III
3	0	0	Rumex acetosa	+	-	-	-	+	+	-	-	-	-	-	-	II
2,5	0	0	Lotus corniculatus	+	+	+	-	+	+	+	-	-	-	-	+	III
3,5	2	2	Alchemilla xanthochlora	1	+	-	-	-	-	-	-	-	+	-	-	II
3	3	0	Prunella vulgaris	+	-	+	-	+	+	+	-	-	+	+	+	IV
3	3	3	Polygala vulgaris	+	+	-	+	+	+	-	-	-	-	-	-	IV

3,5	0	0	Trifolium repens	-	1	+	-	+	+	-	+	+	+	+	+	IV
3	2	0	Viola tricolor	-	+	-	-	-	+	-	-	-	+	+	+	III
3	0	3	Vicia cracca	-	+	+	-	-	+	-	-	-	-	-	-	II
3	0	0	Poa pratensis	-	+	+	-	+	-	-	-	1	1	+	+	III
Juncetea trifidi																
0	0	1,5	Nardus stricta	+	+	-	1	-	+	+	-	-	-	+	-	III
0	2,5	0	Campanula serrata	+	+	+	-	-	+	-	-	-	-	-	-	II
3	1	2,5	Arnica montana	+	-	+	+	-	-	-	-	-	-	-	-	II
4	3	2	Hypericum maculatum	+	+	+	-	-	-	-	+	-	-	-	-	II
2,5	0	0	Carlina acaulis	+	-	+	-	-	+	-	-	-	+	-	-	II
3,5	2	4	Hieracium aurantiacum	-	+	+	-	+	-	-	-	-	-	-	-	II
Trifolio – Geranietea s. l.																
2	3	3	Trifolium ochroleucon	+	+	+	-	-	-	-	-	-	-	-	-	II
3	0	0	Veronica chamaedrys	-	+	-	+	+	-	-	-	-	-	-	-	II
Variae syntaxa																
3	2	2	Cruciata glabra	+	+	+	+	-	-	-	+	-	+	-	-	III
3	3	0	Pteridium aquilinum	+	-	+	-	-	+	-	-	-	-	-	-	II

Species met in 1-2 relevés: Carex pallescens +, I (rel. 1) $U_{3,5}T_3R_3$; Succisa pratensis +, I (rel. 1) $U_4T_{2,5}R_0$; Potentilla recta +, I (rel. 1) $U_{1,5}T_{3,5}R_4$; Trifolium montanum +, I (rel. 1) $U_{2,5}T_2R_4$; Gentianella austriaca +, I (rel. 1) $U_3T_2R_4$; Digitalis grandiflora +,I (rel. 1) $U_3T_3R_3$; Trifolium medium +, I (rel. 1) $U_3T_3R_0$; Gentiana cruciata +, I (rel. 1, 3) $U_3T_3R_4$; Pimpinella saxifraga +, I (rel. 1, 3) $U_{2,5}T_0R_3$; Achillea stricta +, I (rel. 1, 4) $U_{2,5}T_2R_3$; Thalictrum aquilegiifolium +, I (rel. 1, 6) $U_{2,5}T_{2,5}R_4$; Astrantia major +, I (rel. 1, 8) $U_{3,5}T_{2,5}R_{4,5}$; Myosotis scorpioides +, I (rel. 2) $U_5T_3R_0$; Cirsium arvense +, I (rel. 2) $U_0T_0R_0$; Fragaria vesca +, I (rel. 2) $U_3T_{2,5}R_0$; Geum rivale +, I (rel. 2) $U_{4,5}T_0R_{4,5}$; Trifolium campestre +, I (rel. 2, 4) $U_3T_3R_0$; Luzula campestris +, I (rel. 3) $U_3T_0R_3$; Hypochoeris uniflora +, I (rel. 3, 4) $U_3T_{2,5}R_2$; Lathyrus pratensis +, I (rel. 3, 5) $U_{3,5}T_3R_4$; Trisetum flavescens +, I (rel. 5, 8) $U_0T_2R_0$; Equisetum arvense +, I (rel. 5, 9) $U_3T_3R_0$; Heracleum sphondylium +, I (rel. 5, 11) $U_3T_{2,5}R_5$; Euphrasia stricta +, I (rel. 4) $U_3T_3R_0$; Convolvulus arvensis +, I (rel. 6) $U_0T_0R_0$; Pastinaca sativa +, I (rel. 6,8) $U_3T_4R_4$; Filipendula vulgaris +, I (rel. 9, 10) $U_{2,5}T_3R_0$; Hieracium pilosella +, I (rel. 10) $U_2T_0R_2$; Urtica dioica +, I (re. 10) $U_3T_3R_4$; Stellaria media +, I (rel. 10, 11) $U_3T_0R_0$; Juncus effusus +, I (rel. 11) $U_{4,5}T_3R_3$; Potentilla anserina +, I (rel. 11) $U_4T_3R_4$; Plantago media +, I (rel. 9, 11) $U_{2,5}T_0R_{4,5}$; Echium vulgare +, I (rel. 11) $U_2T_3R_4$; Lysimachia nummularia +,I (rel. 12) $U_4T_3R_0$; Cirsium vulgare +, I (rel. 12) $U_3T_3R_0$; Lamium maculatum +, I (rel. 12) $U_{3,5}T_0R_4$.

Place and date of relevées: Neagra Broşteni (rel. 1, 2, 6, 11): 9.07.2007; Drăgoiasa (rel. 3, 9): 10.07.2007; Păltiniş (rel. 4):11.07.2007; Broşteni (rel. 5, 10): 9.07.2007; Budacu (rel. 7, 8): 2.09.2007; Arsurii rivulet (rel. 12): 3.09.2007.

Lolio – Cynosuretum Br.-Bl. et de Leeuw 1936 (Table 1, rel. 9-12) includes the perennial ryegrass and crested dogstail grass meadows, sporadically spread in the researched area, covering flat to weak inclined terrains, between 680 and 1100 m altitude. It is characterized by the dominance of the edifying species *Lolium perenne* and *Cynosurus cristatus* that are realizing an average covering degree up to 80%. The floristic composition includes numerous species characteristic to superior coenotaxa (62%). In the studied areas are also present representative species to Festuco – Brometea. The floristic elements spectrum points out the fact that in this vegetal association structure prevails the eurasiatic (58%) and cosmopolite (16%) elements. The life-forms spectrum presents the preponderance of the hemicryptophytes (74%). Ecological indices spectrum reveals the presence and preponderance of mesophilous (63%), indifferent to temperature (46%) and mesothermophilous (33%) species. Most of the component species (63%) are indifferent to soil pH. The caryological spectrum presents the approximate equal proportions between diploid (42%) and polyploid species (38%). The diploidy index (D.I. = Σ_D / Σ_P) presents a value of 1,11.

CONCLUSIONS

- Floristic composition of the analyzed vegetal associations is characterized by an increased similarity degree.

- Phytogeographical analysis points out the fact that these phytocoenosis are specific to Eurasiatic region. The European character is suggested by the significant proportion of European and central European elements.

- Bioforms spectrum analysis reveals the preponderance of hemicryptophytes species, these semi-natural grasslands being edified by perennial gramineae.

- Ecological analysis presents the mesophilous and mesothermophilous character of these meadows.

- Genetic types analysis reveals reduced differences between the number of diploid and polyploid species. The diploidy index (in all three cases) is supraunitary suggesting the middle altitude and the relative stabile ecological conditions background of these phytocoenosis development.

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CONTRIBUTIONS TO KNOWING THE ANATOMY OF THE VEGETATIVE ORGANS OF *HEDERA* L. (*ARALIACEAE*)

CONTRIBUȚII LA CUNOAȘTEREA ANATOMIEI ORGANELOR VEGETATIVE LA *HEDERA* L. (*ARALIACEAE*)

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Abstract. *The researches conducted on the anatomy of the vegetative organs of Hedera helix, H. helix* var. *tres coupe and H. canariensis have revealed the existence of a number of characteristic peculiarities, among which mention should be made of those of the stem epidermis, of the subepidermic cortical collenchyma, and of the assimilatory tissue of the leaf. These peculiarities represent the expression of the adaptations to the different life environment of the species analysed.*

Rezumat. *Cercetările efectuate asupra anatomiei organelor vegetative la Hedera helix, H. helix var. tres coupe şi H. canariensis au relevat existența unor particularități caracteristice, dintre care le menționăm pe cele ale epidermei tulpinii, colenchimului cortical subepidermic şi ale țesutului asimilator al frunzei. Aceste particularități constituie expresia adaptării la mediul de viață diferit al speciilor analizate.*

The *Araliaceae* family, including some 700 species belonging to 55 genera, consists mostly of trees and shrubs. *Hedera* is a genus made up of 15 species of climbing, or ground-creeping evergreen woody plants in the family *Araliaceae*, native to the Atlantic Islands, western, central and southern Europe, northwestern Africa and across central-southern Asia east to Japan. *Hedera helix* L., the ivy (*Araliaceae*, *Araliales*, *Asteridae*, *Rosopsida*, *Angiospermae*, *Spermatophyta*) (Ehrendorfer, 1999) is the best-known temperate species. The species included in the genus *Hedera* are important as ornamental, medicinal, ecological plants, while, in some cases, *Hedera helix* can become an invasise species.

MATERIAL AND METHODS

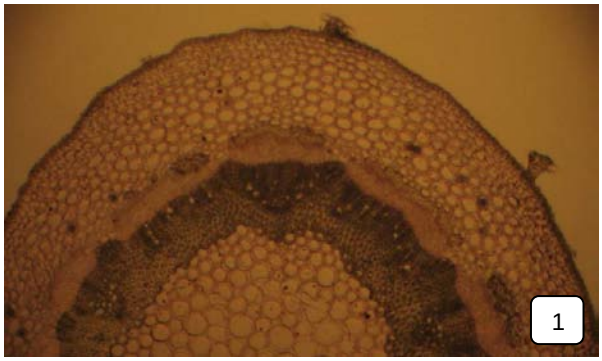
The vegetable material used consisted of vegetative organs sampled from the spontaneous species *Hedera helix* and from *H. helix*. var. *tres coupe* and *H. canariensis*, all plants cultivated for ornamental purposes. *Hedera canariensis* is native to the Canary Islands, Portugal, the Azores, and North Africa. The material was analysed in cross-sections made across the young stems and leaves. The sections were treated with Javel water and coloured with Geneva reagent, analysed under the optical microscope, and microphotographed with a Canon digital camera.

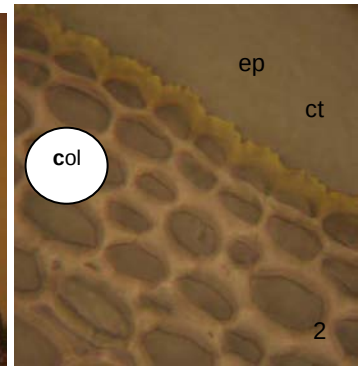
RESULTS AND DISCUSSIONS

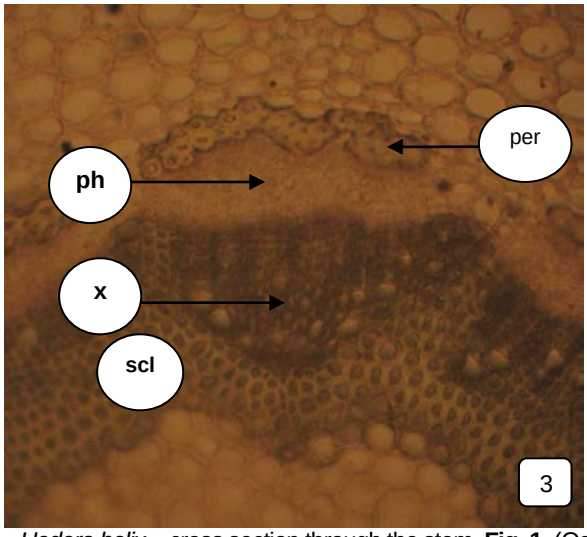
The anatomy of the stem. On the outside, the young stem is delimited by a one-layer epidermis, made up of small cells. The cuticle covering the epidermis is

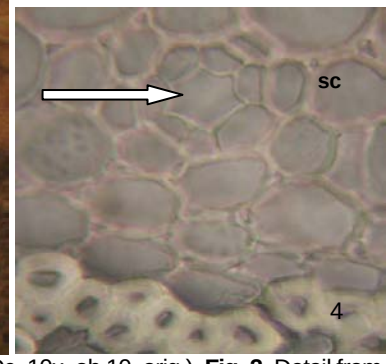
thick in *H. helix* (fig. 2), and thinner in the ornamental species (fig. 6, 8), a peculiarity determined by the different environment of the species under analysis. In all the species, the cuticle displays transverse crests. The epidermis exhibits multi-cell tectorial hairs (fig.1). The multi-layered cortex is differentiated into the external and the internal cortex. The outer cortex is collenchymatous, and made up of 3 to 5 strata of cells, in *H. helix* having more evident thickening of the cell walls (fig. 2). In *H. helix*. var. *tres coupe*, the collenchima is reduced, being made up of 2 to 3 strata of cells (fig. 5, 6). In *H. helix*, the collenchyma becomes sclerous, a process that can also be noticed in the stem and petiole of other dicotyledonous (Duchaigne, 1955). The inner cortex, made up of bigger cells than those in the outer cortex (fig. 1, 5, 7), has thickened cell walls in *H. helix*, and thin walls in H. *helix*. var. *tres coupe* and *H. canariensis*. Within that area, druses can be noticed, more frequently in *H. helix* and H. *helix*. var. *tres coupe*. In all species near the central cylinder of the inner cortex can be found secretory ducts with a polygonal lumen, delimited by secretory cells (fig. 4); secretory ducts are formed in a schizogeneous manner (Carr & Carr, 1970; Fahn, 1979) and are characteristic of the *Araliaceae* (Metcalfe & Chalk, 1950; Carlquist,1988, Kolalite and all., 2003). These structures are traditionally regarded as a character of great diagnostic importance for this family (Takhtajan 1987). The central cylinder is delimited by a fragmented sclerenchymatous pericycle (fig. 3, 4, 5), which does not occur in *H. canariensis* (fig. 7). The vascular bundles belong to the open collateral type, and have various sizes. The intrafascicular cambium is roundly linked to the interfascicular one, and differentiated in the parenchyma of the primary medullar radii, thus constituting a continuous cambial ring, which will generate secondary vascular tissues. In the internal and lateral regions, the vascular bundles are accompanied by a sclerenchymatous tissue (fig. 1, 3, 5, 7). The cell walls of the sclerenchyma are more thickened in *H. helix* and H. *helix*. var. *tres coupe*, and thinner in *H. canariensis*. Certain vascular bundle of *H. canariensis* lack the xylem (Fig. 7). The pith of the stem is made up of isodiametric cells, which have slightly thicker walls in *H. helix*. In the medulla, secretory canals can be noticed in H. *helix*. var. *tres coupe* and in *H. canariensis* (fig. 9, 10) and, sometimes, druses.

The petiole. It is of a polystellic type, each vascular bundle being surrounded by its own endodermis (fig. 12). The one-layered epidermis, which lies outside, has a structure similar to that of the stem. Under the epidermis there is a three-to five-layered collenchyma, the walls of which are heavily thickened. Very much as in the case of the stem, the collenchyma is better developed in *H. helix* and *H. canariensis*. Under the collenchyma there lies a parenchyma that contains oxaliferous cells (fig. 12). The vascular bundles lie in the shape of a circle (fig. 11). On the outside of the vascular bundles, in the parenchyma, there are the secretory ducts (fig. 13), as in the phloem (fig. 13, 14).





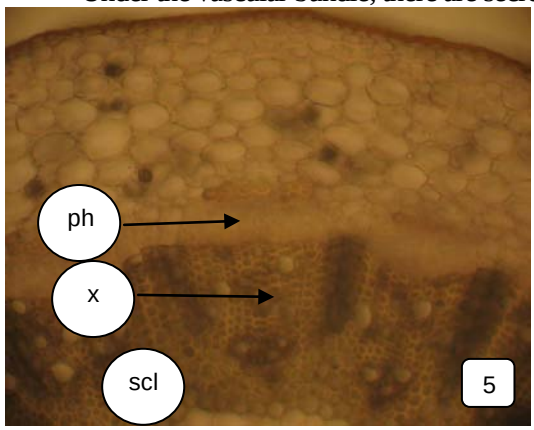


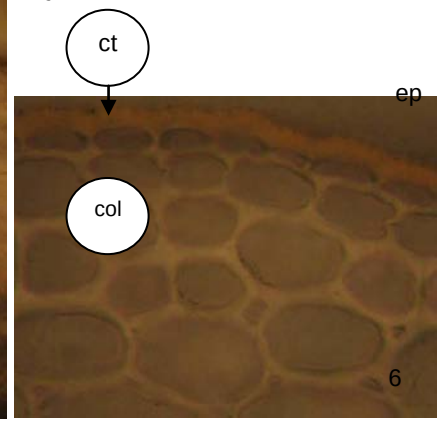


Hedera helix – cross section through the stem. **Fig. 1**. (Oc. 10x, ob.10, orig.). **Fig. 2**. Detail from epidermis and outer cortex: col-collenchym, ct-cuticle, ep-epidermis (oc. 10x, ob 40, orig.). **Fig. 3**. Detail from stel: ph-phloem, per-pericycle, scl-sclerenchym x-xylem, (oc. 10x, ob. 20, orig.). **Fig**. **4**. Secretory duct from cortex (arrow): sc-secretory cels (oc. 10x, ob.40).

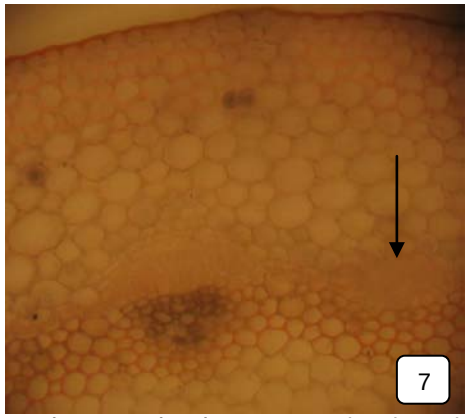
The lamina. Facing the median nervure, on both the adaxial and abaxial sides, all the species display a protuberance. In that region, under the epidermis, there lies a collenchymatous tissue. On the outside, the leaf exhibits a one-layer epidermis, covered by the cuticle, with stomata on the lower one. The mesophyll is differentiated into a palisadic, and a lacunous parenchyma. The cells of the palisadic parenchyma are longer in *H. helix*, and more of less isodiametric in H. *helix*. var. *tres coupe* and in *H. canariensis* (fig. 17, 18). The mesophyll contains numerous oxaliferous cells. The median nervure is made up of a larger collateral fascicle, arc-shaped, which has a xylem oriented towards the adaxial face and the phloem going towards the abaxial face, and, above it, a smaller collateral fascicle, with a reverse orientation of the vascular tissues. Both fascicles exhibit sclerenchyma on the outside region of the phloem (fig. 15), stunted in *H. canariensis*.

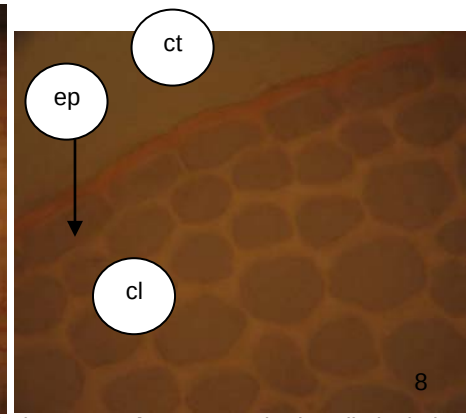
Under the vascular bundle, there are secretory ducts.



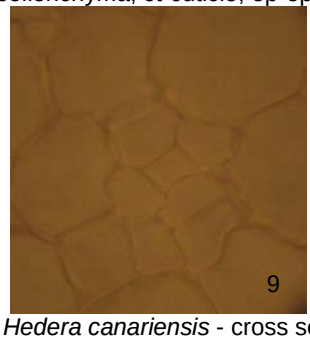


Hedera helix var. *tres coupe* - cross section through the stem. **Fig. 5**. (oc.10x, ob. 20, orig.). **Fig. 6**. Detail from epidermis and outer cortex: col-collenchyma, ct-cuticle, ep-epidermis (oc. 10x, ob 40, orig.).





Hedera canariensis - cross section through the stem. **Fig. 7**. Vascular bundle lack the xylem (arrow) (Oc.10x, ob. 10,orig). **Fig**. **8**. Detail from epidermis and outer cortex: cl-collenchyma, ct-cuticle, ep-epidermis (oc. 10x, ob 40, orig.).



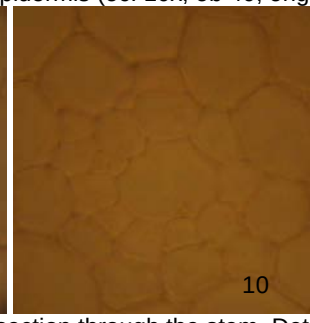
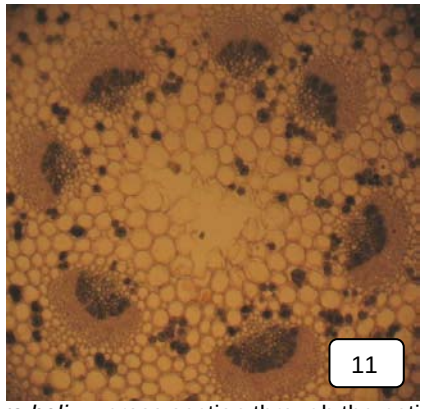
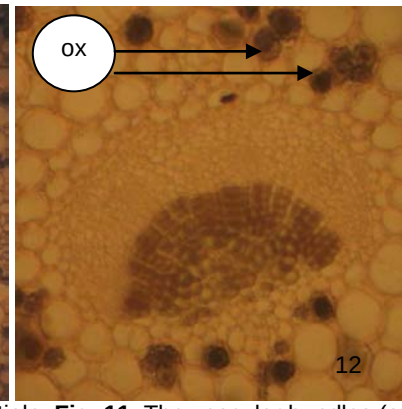
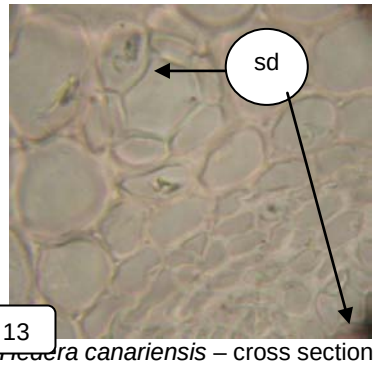


Fig. 9, 10. *Hedera canariensis* - cross section through the stem. Detail from pith: secretory ducts (arrow) (oc. 10x, ob. 40, orig.).

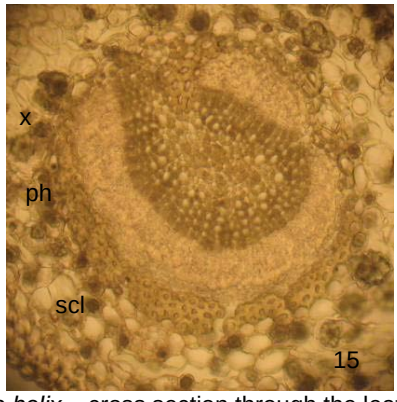


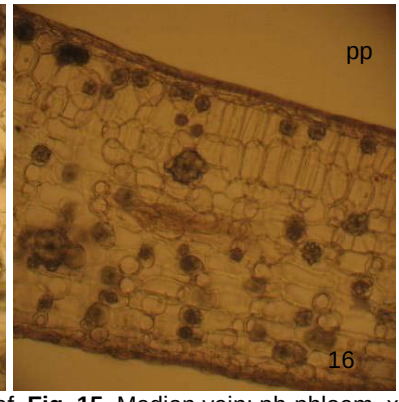


Hedera helix – cross section through the petiole. **Fig. 11**. The vascular bundles (oc. 10x, ob. 10, orig.). **Fig. 12**. Details of vascular bundle: end-endodermis, ox- oxaliferous cells, (oc. 10x, ob. 20, orig.).



Hedera canariensis – cross section through the petiole. Fig. **13**. sd-secretory duct (oc. 10x, ob. 40, orig.), **Fig. 14**. Secretory duct in phloem (arrow)(oc. 10x, ob. 20, orig.).





Hedera helix – cross section through the leaf. **Fig**. **15**. Median vein: ph-phloem, x-xylem, scl-sclerenchyma (oc. 10x, ob. 10, orig.), **Fig. 16.** Lamina: pp-palisadic parenchyma (oc. 10x, ob. 10, orig.).

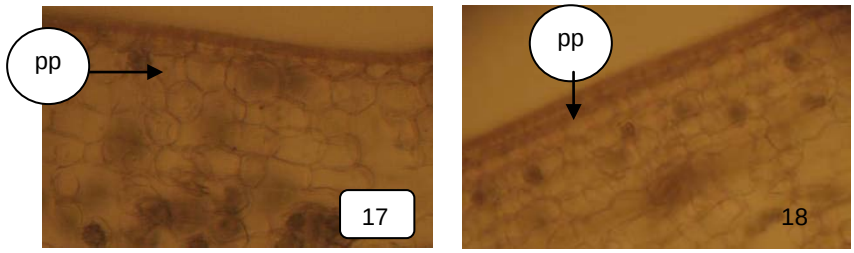


Fig. **17**. *Hedera helix* var. *tres coupe* – cross section through the lamina: pp-palisadic parenchyma (oc. 10x, ob. 20, orig.). Fig. **18**. *Hedera canariensis* – cross section through the lamina: pp-palisadic parenchyma (oc. 10x, ob. 20, orig.).

CONCLUSIONS

The general structure design of the two species and of the variety *tres coupe*, which has been analysed, is similar, and the structural differences are the expression of their adjustment to different environments. Thus, *H. helix*, a spontaneous species as well as a species cultivated outside as an ornamental plant, displays a thicker cuticle and a more developed subepidermal collenchyma, in both the stem, and the petiole and lamina. The sclerenchyma lying on the internal and lateral sides of the vascular bundles in the stem is more developed in *H. helix*, as well as in its variety, representing a species-defining characteristic. The structure of the assimilatory parenchyma also represents the result of the adjustment to a different environment; the palisadic parenchyma is made up of prosenchymatic cells only in the species that vegetates in the outer environment, while the vegetable material cultivated indoors has a palisadic parenchyma made up of shorter cells in *H. helix* var. *tres coupe*, and nearly isodiametric cells in *H. canariensis*.

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SECRETORY GLANDS DIVERSITY OF SOME CARNIVOROUS PLANTS

DIVERSITATEA GLANDELOR SECRETOARE DE LA UNELE PLANTE CARNIVORE

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Abstract. *The secretory glands of the carnivorous plants show a great variety of structures and shapes, being very small (consisting of few cells, in the species belonging to Utricularia genus) or bigger, multilayered (in the species belonging to Drosera, Nepenthes and Pinguicula genus). From structural point of view, the secretory glands are classified in three categories: glands buried in the wall of the pitcher, sessile glands and pedicelate glands of various structures.*

Rezumat. *Glandele secretoare ale plantelor carnivore au o structură şi formă foarte variată, fiind de dimensiuni foarte mici (formate din câteva celule la speciile genului Utricularia) sau mai mari, pluristratificate (la speciile genurilor Drosera, Nepenthes şi Pinguicula). Din punct de vedere structural, ele se împart în 3 categorii: glande cufundate în peretele capcanei, glande sesile şi glande pedicelate cu structuri diferite.*

Carnivorous plants posses both attraction and retaining elements on one hand and formations which digest the prey, in order to let the plant beneficiate the resulted compounds, on the other hand. The process we are talking about is controlled by the digestive glands.

MATERIAL AND METHOD

The material under study is represented by 27 carnivorous plant species, as follows: *Aldrovanda vesiculosa* L. leaves (collected from Ceamurlia, Danube Delta,, Tulcea District), *Dionaea muscipula* Ellis leaves (from a flower shop), leaves of various *Drosera* species (*D. aliciae* Hamlet, *D. binata* Labill, *D. brevifolia* Pursh, *D. burkeana* Planch, *D. capensis* L. With three forms: *D. capensis "Alba"* L., *D. capensis "Narrow Leaf"* L., *D. capensis "Rubra"* L., *D. capillaris* Poir, *D. cuneifolia* Thunb, *D. dielsiana* Exell et Laundon, *D. intermedia* Hayne, *D. lovella* T. N. Bailey, *D. montana* St. Hill and *D. spatulata* Labill) (coming from the collection of "Alexandru Borza" Botanical Gardens of Cluj-Napoca), *Drosera rotundifolia* L. leaves (collected from Natural Park Gradinita Meadow, Suceava district), metamorphosed leaves of various *Nepenthes* species: *N*. x *coccinea* Mast., *N. distillatoria* L., *N. maxima* Reinw ex Nees and *N. northiana* Hook f. (from the collection of the "Alexandru Borza" Botanical Gardens of Cluj-Napoca), *Pinguicula alpina* L. leaves (collected from Ceahlau Mountain, Neamt District), *Pinguicula moranensis* H. B. K. leaves (coming from the collection of „Anastasie Fătu" Botanical Gardens of Iasi), *Sarracenia flava* L. and *Sarracenia purpurea* L. metamorphosed leaves (from a flower shop), *Utricularia vulgaris* metamorphosed leaves (collected from Poienita Lake, Vaslui District).

The material subjected to analysis has been fixed and preserved in 70% ethylic alcohol. The sections were cut with a microtome, then coloured with iodine green and alaun-carmine, mounted in gel and analyzed on a Novex (Holland) light microscope. The light micrographs were performed by means of a Novex (Holland) microscope, using a Canon A95 camera.

RESULTS AND DISCUTIONS

The efficiency of the carnivorous plants is helped by special attraction mechanisms which guide the insects to the region where they are captured. There are various traps producing visual, olfactory, tactile stimulus and offering nectar to the prey. The presence of these attraction mechanisms represents an advantage for the carnivorous plants.

The carnivorous plants presents four capture appliances: adhesive traps, closing traps, pitchers and aspiration traps.

The adhesive traps are represented by pedicelate glands, each of them bearing a mucilage droplet on its top. The pedicel may be unicelled (in *Pinguicula* species- Fig. 1) or multicelled (in *Drosera* species- Fig. 2). Usually, multicelled pedicels are endowed with conductive vessels.

In all *Drosera* species, the upper side of the leaf is covered with pedicelate glands, called tentacles; they have different lengths, the ones positioned at the periphery are long and become shorter and shorter as soon as they occupy the center of the foliar blade. This length difference is associated with another difference regarding the ability of movement: the longer they are, the faster they move. The peripheral tentacles enlarge the capturing area.

In *Pinguicula* species, sessile glands cover both sides of the foliar blade, while pedicelate glands cover only the upper one. Each type bears a glandular head, consisting of 16 cells (in the pedicelate hairs) or fewer (in the sessile hairs) radially disposed. Fenner (1904) considers that, in *Pinguicula* species, the pedicelate glands born from successive divisions of a single epidermal cell, which becomes the reservoir that is connected with other 4-8 cells by plasmodesmatas. Only an elongated cell represents the pedicel, the only cito-histological character that differentiates the pedicelate hairs from the sessile ones.

Following the prey captured by the sticky mucilage secreted by the pedicelate glands, the borders of the foliar blade, adjacent to the capturing region incurve, covering the prey and limiting the space around it; this is a very slowly movement, as a result of the small pressure of the prey or due to the nutritive compounds absorption. Ones the digestive activity completes, the borders of the foliar blade come back to their normal position. This process may take from several hours to several days. By rolling the borders of the foliar blade, the prey touches more and more glands.

Aldrovanda vesiculosa and *Dionaea muscipula* present **closing traps**, their bilobed foliar blade. In *Aldrovanda vesiculosa* each lobe presents two regions: an external one and an internal (central) one (Ashida, 1934, 1935). The external region consists of two layers of cells, while the internal one is thicker- of three layers.

This former constitutes the digestive cavity when the trap closes. The central region presents small glands in the upper epidermis and almost 15 sensitive hairs (on each lobe).

In *Dionaea muscipula* while the external epidermis presents numerous stomata, the internal one presents different histological structures which act for attracting, retaining and digesting elements. The trap of *Dionaea muscipula* is divided into three regions (Juniper şi colab., 1989): The marginal bristles, situated at the border of the lobes. They intercross when the trap closes. The peripheral band bears a few sessile, colourless glands which secrete carbohydrates; each peripheral gland is sheltered in a small concavity, that is why it is not squashed when the trap closes.

The digestive region is represented by the central part of the trap, bordered by the peripheral band. This region is covered by numerous coloured digestive glands (Figs. 3 and 4), bigger than those belonging to the peripheral band. When the trap closes, this region becomes the wall of the new born digestive cavity. *Dionaea muscipula* presents only three sensitive hairs on each foliar lobe.

The pitchers are known as passive traps, based on gravitation, the force that determines the prey to fall into the digestive cavity. Some of the mechanisms which retain the preys into the cavity are, as follows: smooth, slippery superficies, vertical tubes, with narrowed neck that forces the flying insects to descend into the cavity, various structures that do not let the insect to escape.

The pitchers of the plants are divided into the following regions:

- The first region, represented by the lid and the peristome. The nectaries that cover this region form „the attractive area" (Hooker, 1859).
- The second region abounds in digestive glands (Figs. 5 and 6). In *Nepenthes* species the glands are protected by semilune epidermal prolongations, with downward cavity. The prolongations protect the glands from the feet of the insects. In *Sarracenia* species, the epidermal cell bear thick and curved external wall; sometimes, the wall forms downward prominences, which make easier the slippage of the prey. The glands secrete (Figs. 7 and 8) a liquid poor in enzymes, which accumulates in the inferior part of the trap, where the preys are digested.
- The third region has slimy superficies, due to the protheolitical secretions come from the glands belonging to the second region.
- The fourth region is the proper digestive region, where the protheolitical liquid accumulates.

There are active traps, too: aspiration traps belonging to *Utricularia* species. The shape, the dimenssion, the position of the aperture vary from one species to another, being used as diagnosis elements which help us to determine correctly the species.

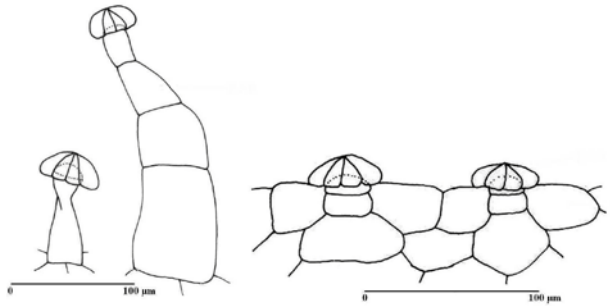

Fig. 1. Pedicelate glands and sessile glands in the leaf of *Pinguicula alpina*

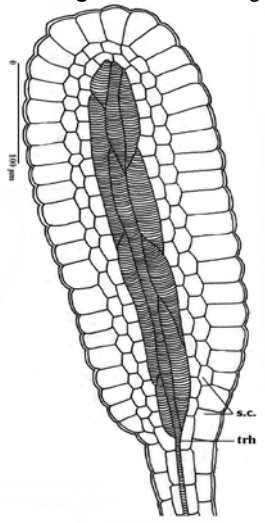

Fig. 2. Pedicelate (tentacular) gland in the leaf of *Drosera Montana* (s.c.=secretory cells; trh=tracheid)

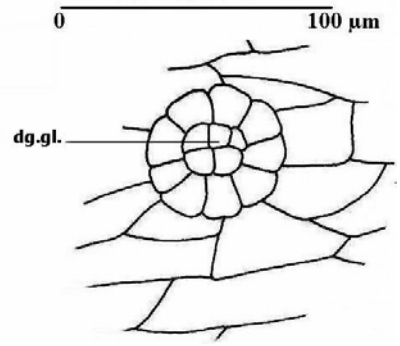

Fig. 3. Sessile gland in the leaf of *Dionaea muscipula* (front side view); dg.gl.=digestive gland

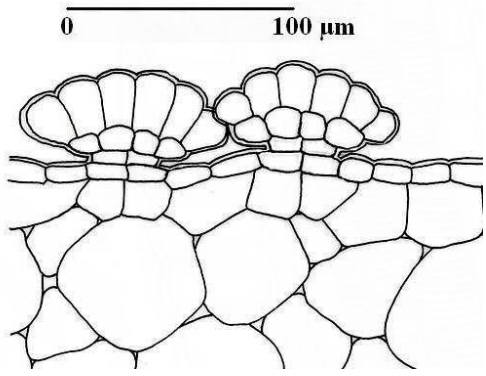

Fig. 4. Sessile gland in the leaf of *Dionaea muscipula* (cross section)

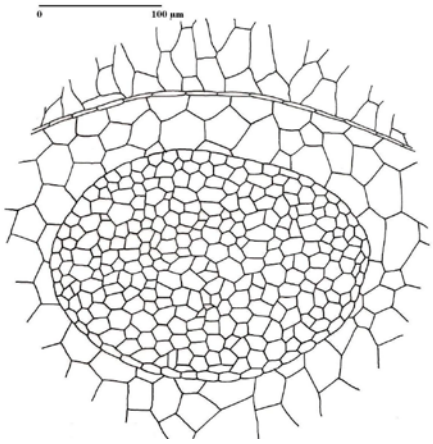

Fig. 5. Sessile gland in the pitcher of *Nepenthes coccinea* (front side view)

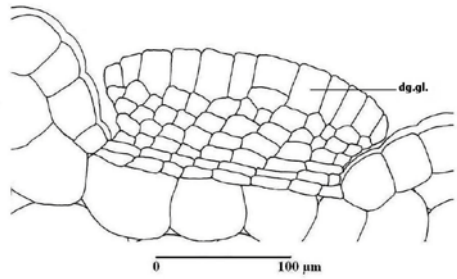

Fig. 6. Sessile gland in the pitcher of *Nepenthes northiana* (cross section); dg.gl.=digestive gland

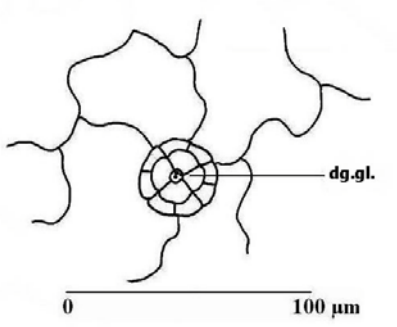

Fig. 7. Sessile gland in the pitcher of *Sarracenia flava* (front side view); dg.gl.=digestive gland

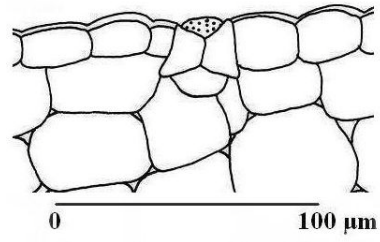

Fig. 8. Sessile gland in the pitcher of *Sarracenia purpurea* (cross section)

The trap of *Utricularia*, a bladder full of water, known as *utriculus*, is one of the most sophisticated structures in the vegetal kingdom. The internal epidermis is covered with typical branched glands. These glands eliminate the water from the bladder and retain the small organisms captured, secrete protheolitical enzymes and absorb the compounds resulted in the digestion.

The digestive cavity of the pitchers always contains digestive liquid, in its inferior part; it comes from the multicelled glands situated in the wall of the pitcher.

The digestive cavity of the closing traps is a temporary cavity, where all the glands are implicated in the digestive process. Adhesive traps do not have a permanent accumulation of digestive liquid; only a few glands are implicated in

the digestion of the prey. The pedicelate glands secrete a slimy liquid which attracts the preys and digest them.

CONCLUSIONS

In carnivorous plants, the secretory glands show a great variety of structures and shapes.

They are classified in three categories: glands buried in the wall of the pitcher, sessile glands and pedicelate glands of various structures.

They are receivers for chemical stimulus, they secrete a liquid rich in protheolitic enzymes and absorb nutritive compounds from the prey's body.

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BIOCHEMICAL AND PHYSIOLOGIC STUDIES ON SALVIA (*SALVIA OFFICINALIS* L)

STUDII FIZIOLOGICE ŞI BIOCHIMICE EFECTUATE LA SALVIA (*Salvia officinalis* L)

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Abstract. *In order to observe the concrete way in which the physiologic and biochemical processes vary in slavia plants, different peculiar and detailed studies were accomplished. Thus, different determinations (the content in chlorophyll and carotene pigments in leaves, in dry substance, water and mineral elements, soluble proteins and glucids) were accomplished in the leaves and shoots of different ages. The sampling of probes was realized in the following manner: the plants were in year II of cultivation in biologic culture. The studies were accomplished in plants form a local population of Salvia officinalis L with Italian origin, that is maintained in collection at VRDS Bacau.*

Rezumat. *Pentru a observa concret modul în care variază procesele fiziologice şi biochimice din plantele de salvia s-a efectuat un studiu amănunţit asupra plantei. Astfel, au fost realizate o serie de determinări (conţinut de clorofilă şi pigmenţi carotenoizi ai frunzelor, conţinutul în substanţă uscată, apă şi elemente minerale, proteine şi glucide solubile,) la frunze şi lăstarii de diferite vârste. Prelevarea probelor s-a realizat astfel: plantele la care au fost realizate aceste determinări se aflau în cultură biologică în anul II. Studiile au fost efectuate pe plante din populaţia locală de Salvia officinalis L de proveniență italiana ce se afla în colecţie la SCDL BACĂU.*

MATERIAL AND METHODS

- The content in water and total dried substance was determined by drying the plants in dry oven, for 24 hours, at a temperature of 105 ^{o}C.
- The titrable acidity was determined by titrating 25 ml of extract with Na OH 0.1 N and was expressed in % of malic acid.
- The carotene pigments were extracted in petrol ether and were spectrophotometrically determined, at a ripple length of 451 nm.
- The anthocianic pigments were extracted in methyl alcohol + 1 % HCl and were spectrophotometrically determined, at a ripple length 540 nm.
- The ascorbic acid was determined in the extract obtained in the oxalic acid 1 %, at a spectrometer in infrared with transformance Fourier.
- The content in soluble glucose was determined according with Fehling methods.
- The content in mineral elements was determined through tissues calcinations at a temperature of 560 ^{o}C and the mineral elements were determined at a spectrometer with plasma inductively coupled, IRIS INTREPRIED, in the solution obtained after dissolving the mineral substances.

- The phonologic observations and the biometrical measurements were realized in the experimental parcels.

RESULTS AND DISCUSSIONS

The variation of chlorophyll contents from salvia leaves, depending on their position on plant

From the data presented in figure 1 result that the chlorophyll pigments quantitatively increased at the leaves situated in the lower part of plants towards the superior ones. So, the content in total chlorophyll varied between 51,65 mg/100g at basal leaves and 128,58 mg/100g at the apical ones, thus realizing an increase of 2,49 times bigger of chlorophyll content. The leaves from the inferior part of plants had a content in chlorophyll 99,19 mg/100g, and the leaves from the superior part a content of 111,79 mg/100g. The content in **chlorophyll a** vary between 35,56 mg/100g in leaves from basal part of plant and 92,02 mg/100g in the superior one, with an increase of 2,59 times. The content in **chlorophyll b** vary similarly, the smallest values were registered in basal leaves: 16,09 mg/100g, of 2,28 times smaller when comparing with the one determined in young leaves.

The variation of carotene pigments content was similar with the one determined in the case of chlorophyll. The content in carotene pigments register an increase at leaves from the basal part of plants (10,90 mg/100g) towards the apical ones (23,56 mg/100g) that represents an increase of 2,17 times.

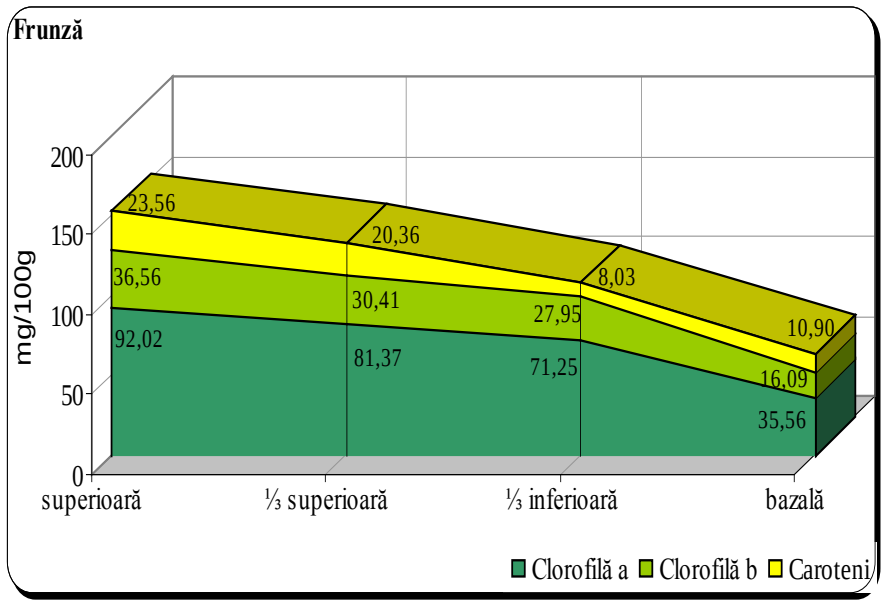

Figure 1 – The variation of content in total a, b chlorophyll and in carotene content at leaves of different ages.

The ratio between the content in chlorophyll a and chlorophyll b from salvia leaves salvia (fig. 2) had the biggest value in case of leaves from superior third (2,68) and the smallest value at the basal ones (2,21). The superior leaves and the one from the inferior third had values almost equal 2,52 respectively 2,55.

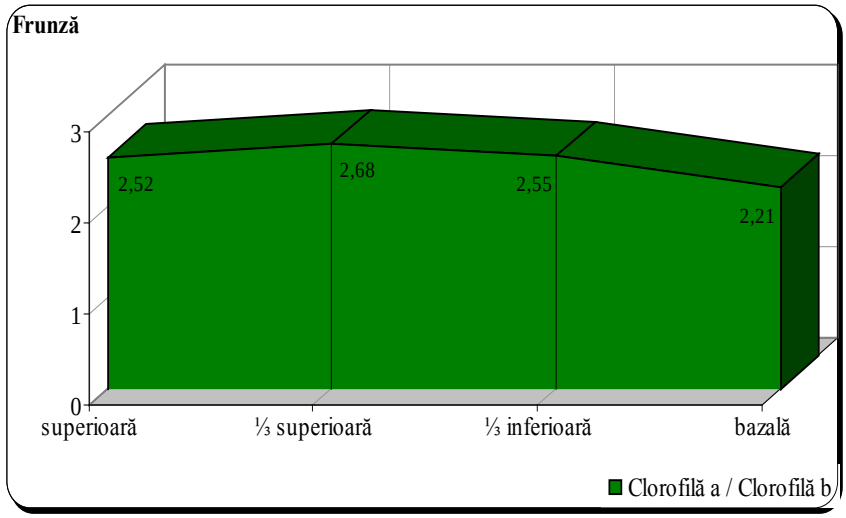

Figure 2 – The variation of ratio chlorophyll a/ chlorophyll b in leaves situated on different locations

The variation of content in total dry substance, water and mineral substances from salvia plants.

The researches proved that the shoots are the organs with the highest content in water 93,3%, 1,05 times bigger than in root and 1,09 times bigger in leaves.

Table 1

The variation of content in total dry substance, water and mineral from leaves and shoots located at different stories of plants and from roots of salvia (%)

Specification	Total dry substance	Water	Mineral elements
Superior leaves	13,68	86,32	1,76
Leaves from the superior third	11,40	88,60	2,57
Leaves from the inferior third	12,35	87,65	2,77
Basal leaves	17,70	82,30	5,35
Superior shoot	6,77	93,23	1,33
Middle superior shoot	6,16	93,84	1,44
Middle inferior shoot	6,85	93,15	1,73
Basal shoot	7,02	92,98	2,02
Root	10,49	89,51	2,60

In what concern the total dry substance the highest content was determined in leaves (13,78 %) and roots (10,49 %), and the smallest content in shoots (6,70 %).

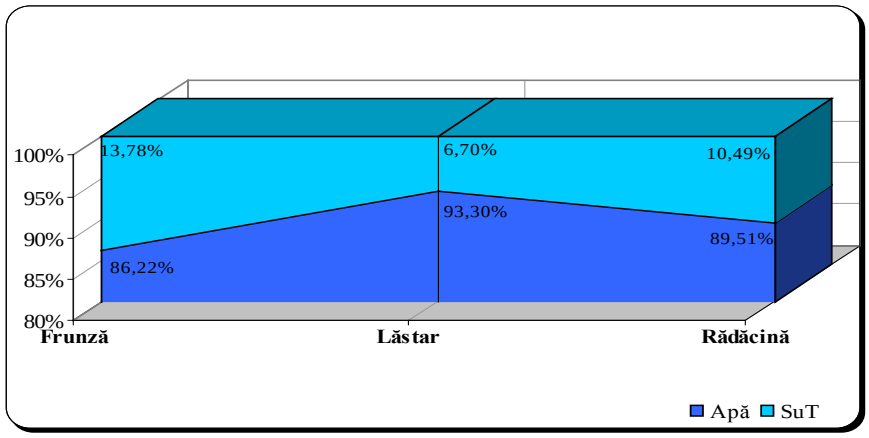

Figure 3 – Comparation between the content in water and total dry substance from leaves, shoots and roots of salvia plants.

The analysis of total dry substance content from leaves of salvia, (figure 3) showed that it vary between 11,40% in the one from superior third and 17,70% at the basal one.

The trend of accumulation of total dry substance followed a descendent curve, from the basal leaves teal the one from the superior third, than it registered an increase toward the younger leaves, situated in top of plants.

The content in water from salvia leaves was in reverse proportion with the one of total dry substance (figure 4).

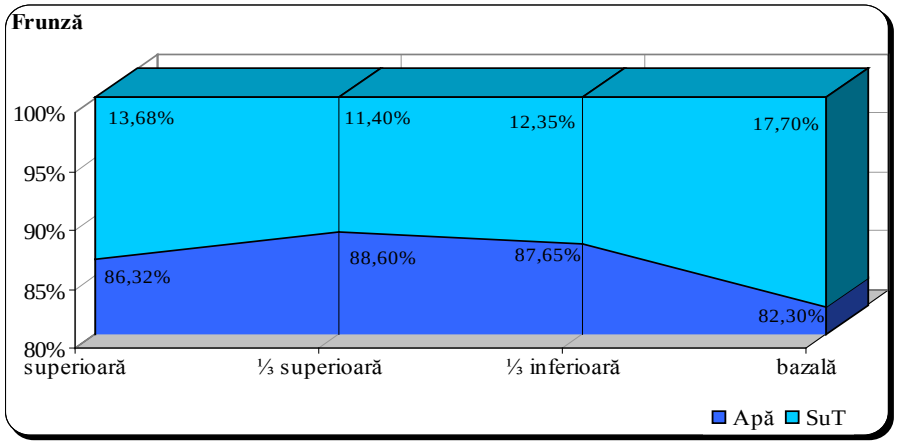

Figure 4 – The variation of content in water and total dry substance in leaves of salvia from different stories of plants.

Thus the content in water vary between 82,30% in case of basal leaves and 88,60% at the one from the superior third.

In the case of leaves, the variation of content in mineral substances presented semnificativ differences, depending on their maturation degree. Thus, the highest content in mineral substances was determined in basal leaves (5,35%), in which their proportion was 1.92 times bigger when comparing with the leaves from the inferior thirds, 2.08 times comparing with the superior thirds, and 3,04 times higher comparting with leaves from apical parts of plants (figure 5).

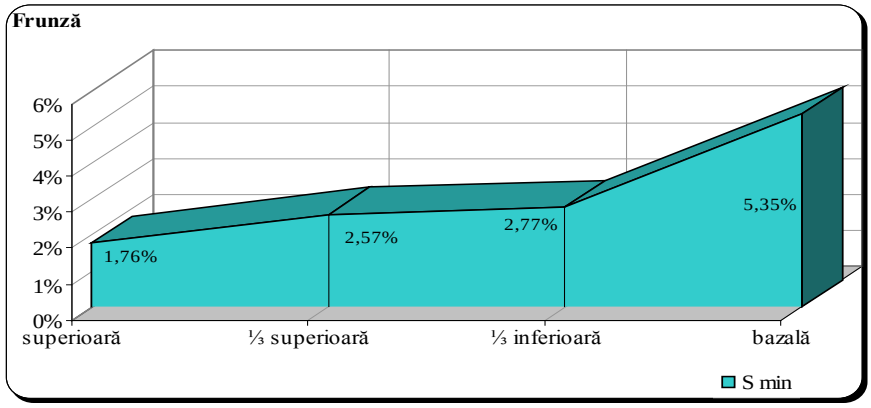

Figure 5- The variation of content in mineral substances in leaves of salvia depending on their position on plant.

Like in case of leaves, the highest accumulations of mineral substances were determined in older shoots situated in the basal part of plants. The variation of content mineral substances vary between 1,33 % at superior shoots and 2,02%.

The intensity of respiration of these leaves was of 323,25 mg CO_2/kg/hour, 1,28 times higher comparing with the leaves from the superior third, 1,30 times higher comparing with the basal leaves and 1,66 times higher comparing with the leaves from the inferior third.

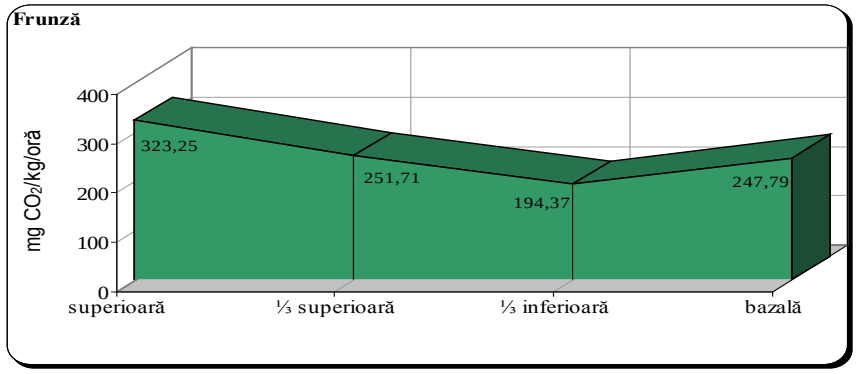

Figure 6 – The variation of respiration in leaves of salvia

Similary results were obtained also in case of intensity of respiration

process of shoots (figure 7). The most intense respiration was observed at shoots from the superior parts of plants: 175,68 mgCO_2/kg/hour. The intensity of this process decreased of 5,32 times at shoots from the superior third, 5,59 times at those from the inferior third and of 2,63 times when comparing with the one from basal area.

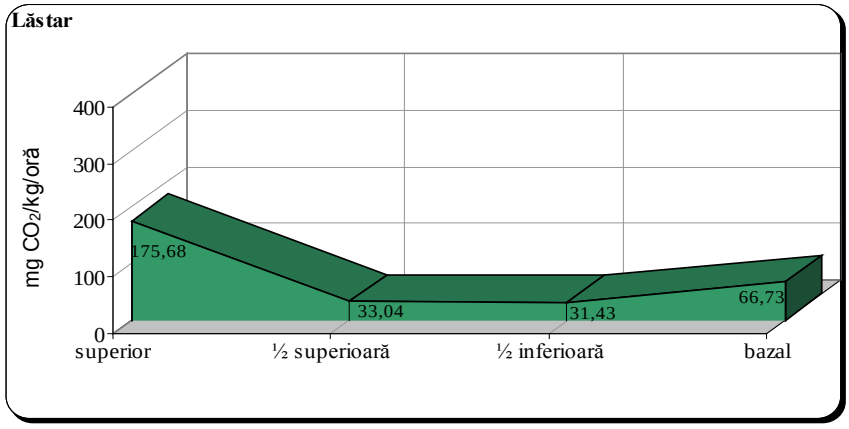

Figure 7- The variation of respiration process of salvia shoots from different stories of *Salvia officinalis* L**.**

The variation of content in soluble glucose in leaves of salvia depending on their position on plant

The content in soluble glucose from salvia leaves had the smallest values in leaves from the superior and inferior third of plants (0,42 respectively 0,44 %) and the highest value in basal leaves (1,12 %). The content in soluble glucoses from the apical leaves was 1,20 times smaller comparing with the one from basal leaves but still registered an increase of 2,21 times comparing with leaves from the superior third and 2,22 times comparing with the one from the inferior third (figure 8)

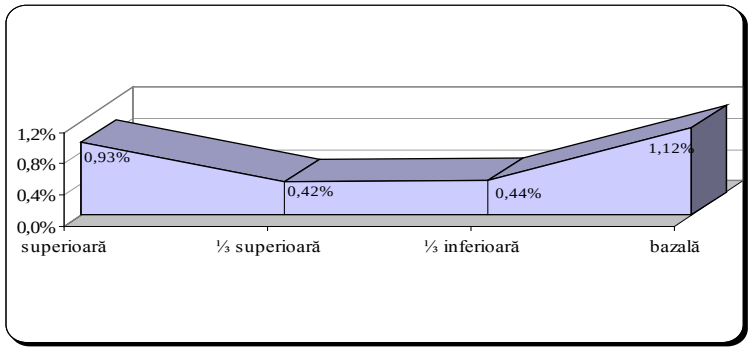

Figure 8 – The variation of soluble glucose content in leaves from different stories of *Salvia officinalis* L plants

The variation of content in soluble protein depending on the age of salvia leaves.

The soluble proteins from leaves of salvia registered a variation relatively small in leaves from different stories of plants. These variations were comprised between 5,68 % in leaves from the inferior third and 7,13 % at the ones from basal part (figure 9.).

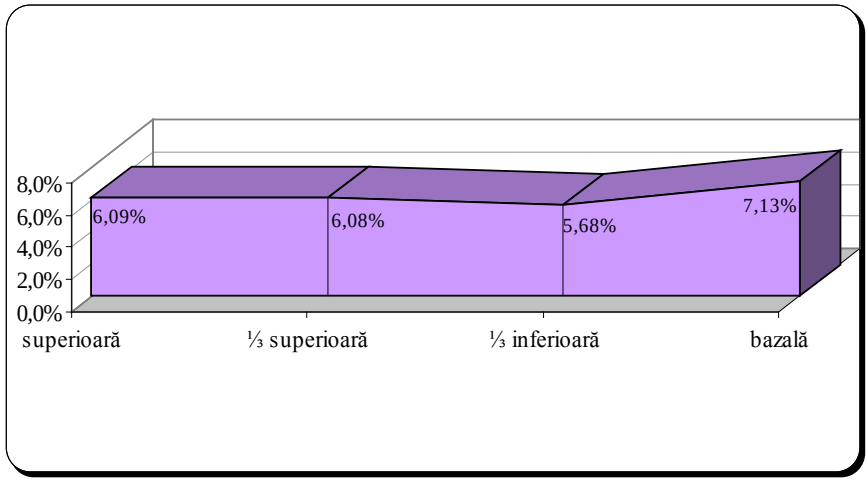

Figure 9. – The variation of content in soluble proteins in leaves from different stories of *Salvia officinalis* L plants.

The differences were even smaller, if we compare the content of soluble proteins from leaves in inferior, superior third and the apical ones. In this case, the content in soluble proteins vary between 5,68 % and 6,09 %.

CONCLUSIONS

1. The ratio between the content in chlorophyll a and chlorophyll b from salvia leaves (figure 2) had the highest value in leaves from the superior third (2,68) and the smallest value at the basal one (2,21). The superior leaves and the one from the inferior third had almost equal values, 2,52 respectively 2,55.

2. The highest content in total dry substance was determined in leaves (13,78 %) and in roots (10,49 %), and the smallest content was determined in shoots (6,70 %).

3. The content in water from salvia leaves were in reverse proportion with the one in total dry substance

4. The highest content in mineral substance was determined in basal leaves (5,35 %), in which their proportion was 1.92 times bigger when comparing with the leaves from the inferior thirds, 2.08 times comparing with the superior thirds, and 3,04 times higher comparing with leaves from apical parts of plants.

5. The intensity of the respiration process of leaves was 3,32 times higher than the respiration of shoots and 1,16 times higher comparing with the roots.

6. The content in soluble glucose from apical leaves was 1,20 times smaller comparing with the one from basal leaves but still registered an increase of 2,21 times comparing with leaves from the superior third and 2,22 times comparing with the one from the inferior third .

7. The content in soluble proteins vary between 5,68 % and 6,09 %.

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VARIATION OF SOME PHYSIOLOGIC PARTICULARITIES OF *FICUS* SORT

VARIAȚIA UNOR PARTICULARITĂȚI FIZIOLOGICE ALE GENULUI *FICUS*

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Abstract. *The floral species cultivated in pots gave harmony, soul and beauty to the closed spaces, inducing a pleasant atmosphere. Our studies were carried out at two species with very near properties face to the ecologic factors (Ficus benjamina and Ficus pumilla). Having in view this aim, the researches were focused on the observation of some important eco-physiological aspects for unfolding the vital processes of the plants such as: total content in assimilated pigments, intensity of the photosynthesis and respiration. After the done researches and observations was find out that between the total content of assimilated pigments and retain capacity of water in leave exists a direct correlation and also an indirect correlation with the apparent photosynthesis intensity.*

Rezumat. *Speciile floricole cultivate în ghivece dau armonie, suflet şi frumusețe spațiilor închise, contribuind la creearea unei atmosfere plăcute. Studiile noastre au fost efectuate pe două specii cu proprietăți apropiate de factorii ecologici (Ficus benjamina şi Ficus pumilla). Având în vedere acest obiectiv, cercetările au urmărit observarea unor importante aspecte eco-fiziologice pentru desfăşurarea proceselor vitale ale plantelor cum ar fi: conținutul total în pigmenți asimilatori, intensitatea fotosintezei şi a respirației. În urma cercetărilor şi observațiilor efectuate s-a stabilit că între conținutul total de pigmenți asimilatori şi capacitatea de reținere a apei în frunze există o corelație directă şi deasemenea o corelație indirectă cu intensitatea fotosintezei aparente.*

Ficus sort have numerous species which assures the décor of the inner spaces, due to the leave aspect but also due to port, providing a clear atmosphere enriched with oxygen.

The main groups of assimilated pigments from superior plants are chlorophyll pigments and carotene pigments.

The researches done till now on those pigments shown a great variability of them, quantitative and even qualitative, induced by their sensibility face to numerous inner factors or from environment.

Photosynthesis and respiration are two vital processes for plants. The intensity of them varies function of the floral species particularities.

MATERIAL AND METHODS

In the present paper we study two species of *Ficus* sort (*Ficus benjamina, Ficus pumilla*), cultivated in pots, in the conditions of didactical greenhouse belonging to U.Ş.A.M.V. Iaşi

Were made two harvestings: June 2007 and July 2007, when plants were in the vegetative grow phase.

From the fresh harvest material was determine the content in assimilated pigments, intensity of apparent photosynthesis and respiration.

Determination of the assimilated pigments content was made with the help of spectro-photometric method, and determination of photosynthesis and respiration intensity was made by Ivanov - Kosivici method.

RESULTS AND DISCUSSIONS

Content in assimilated pigments

Chlorophyll pigments are different as regarding composition and quantity. Chlorophylls are in a quantity of 0.05 – 0.3 g at 100 g fresh leave. This quantity varies due to the soils content in fertilizer substances, environment conditions and due to vegetation stage.

Carotene pigments present a yellow – red colour and could be found together with green pigments. In plants were found a number of 60 carotene pigments from which a role in photosynthesis have carotene and xantophile. The content in carotene and xantophile is different regarding specie and vegetal conditions.

The quantity of assimilated pigments determinate for each specie, in the stage of intense vegetative growth, presents differences between species.

The most important assimilated pigments are “a” chlorophyll, “b” chlorophyll and carotene pigments. Chlorophyll, as the main receiver of sun energy, react by an according adaptation at different conditions of light receiving function of leaf exposure, adaptation showed by differences between the two types (“a” and “b”). The dates from literature show that the ratio between the two chlorophylls is, usually, 3:1.

After the done observations and researches we observe that, the content in total assimilated pigments show differences connected with specie and leaf age (*fig. 1*).

Analysing the obtained results (*fig. 1*), we observe that at *Ficus pumilla* the total quantity of assimilated pigments reported at fresh weight unit had greater values (1.4256 mg/g s. pr.) that at *Ficus benjamina* (1.0310 mg/g s. pr.).

At the studied floral species, the ratio between the two types of chlorophyll is respected, so the quantity of “a” chlorophyll is 2 - 3 times higher that the quantity of “b” chlorophyll. In these situations, a/b and (a + b)/c ratios, present

different values. So, the value of a/b ratio at *Ficus pumilla* (1.65) is higher that at *Ficus benjamina* (0.96). (*fig. 2*)

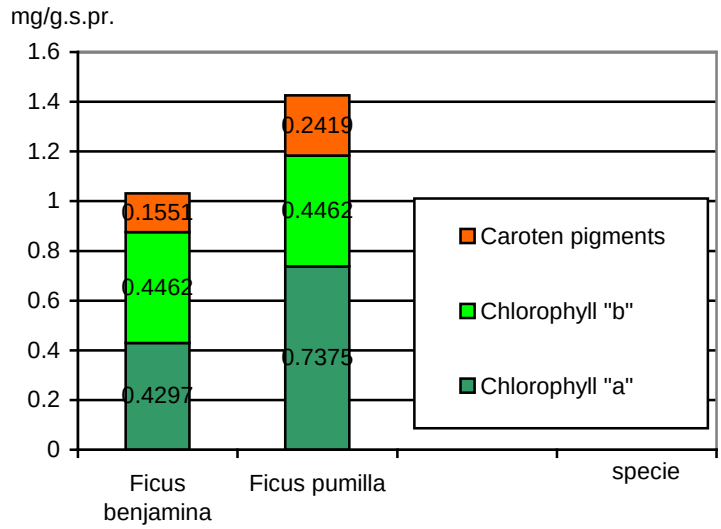

Figure 1. - Variation of assimilated pigments content in leave

The decreasing of the carotene pigments quantity makes that photosynthesis activity to be reduced, due to the decreasing of water quantity in leave (in the stage of relative repose, when wettings are reduced or even interrupted).

The content in assimilated pigments record higher intensities in July at the studied species, due the increased quantity of water from leave, which provide optimal conditions for unfolding of biochemical and physiologic processes in plants (66 – 76 %).

The plants' photosynthesis capacity, is showed by the quantity of chlorophyll pigments, and varies function of intensity of light, temperature and water regime modification. In this way, at *Ficus pumilla* specie (1.1837 mg/g s. pr.) are recorded high quantities of assimilated pigments, which decrease in autumn, due to the decrease of photosynthesis, together with decreasing of light and temperature intensity.

The differences between "a" and "b" chlorophyll are also found in the case of carotene pigments, which play an important role in the protecting system of chlorophyll against photo-oxidation. In those conditions chlorophyll/carotene ratio reaches maximal value at *Ficus benjamina* (5.67) and the minimal value at *Ficus pumilla* (4.89) (*fig. 2*), being well-known the fact that the theoretical ration between green pigments/yellow pigments is 4/1.

Taking in account the role of assimilated pigments in photosynthesis process could tell that if are assured specific ecologic conditions (in protected

spaces), the higher photosynthetic activity is recorded at *Ficus pumilla* specie followed by *Ficus benjamina* specie.

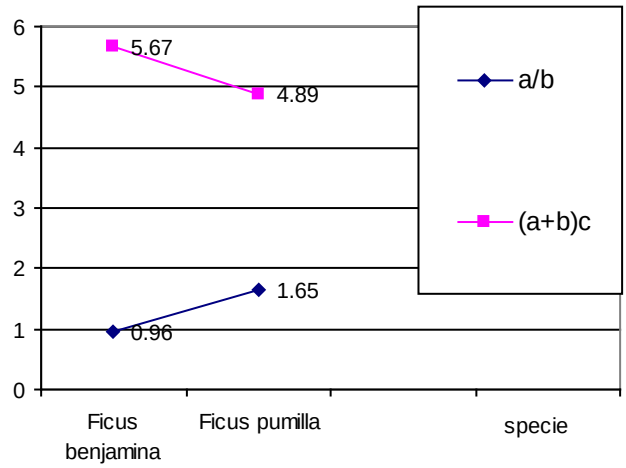

Figure 2. - Variation of ratio between "a" and "b" chlorophyll (a/b) and between chlorophyll and carotene (a+b)/c

Variation of photosynthesis and respiration intensity

Photosynthesis and respiration are two vital processes for plants. Their intensity varies function of the particularities of each floral specie.

From the total quantity of sun energy which fall down at a certain moment on a surface covered with a vegetal cover, only a part of it is adsorbed by plants. Also only a part from the energy adsorbed by plants became active in chloroplasm and only another part is fixed under the form of potential chemical energy. This energy leads to an accumulation of a 5,0 x 10^{16} g quantity of carbon hydrates.

The global photosynthetic efficiency depends by vegetal cover covering degree and photosynthetic action of each plant. Almost half of the energy is in the 400 – 700 nm spectral domain, photosynthetic active. Appreciating that to create a CO_2 molecule is necessary the energy from 8 photons quanta, the photosynthetic fixed energy is theoretical situated at the half of 34 % value. But from this incident light interferes deflexion and re-adsorbed of un-photosynthetic components. So, in ideal conditions for photosynthesis, the value is not greater than 10 %.

Photosynthesis is strongly influenced by the genetic fund of a photosynthesised specie and also by the en-lighting conditions in the period in which the chlorophyll apparatus is formed. Photosynthesis is an unidirectional process, with well known stages, generally characterized as a irreversible process.

In the conditions from the glasshouse in 2007 we observed the intensity variation of apparent photosynthesis and respiration at the end of the annual vegetation cycle of the studied floral species (*fig. 3*).

Generally speaking, the apparent photosynthesis increase rapidly during leaf development and reaches maximum level before ending the entire growth of foliar surface.

From the obtained dates, by us, regarding the variations of the apparent photosynthesis intensity *(fig. 3)*, was observed that at the both studied species the recorded values was the same, 0.32 CO_2/g s. pr./h.

The low value of apparent photosynthesis intensity could be explain with the help of assimilated pigments content on foliar mass unit.

The period of photosynthetic maturity of foliar apparatus and maximum of net photosynthetic intensity are characterized by a stable concentration of compensation.

The values of real photosynthesis (apparent photosynthesis + respiration) differs from specie to specie (*fig. 3*). The greatest value was recorded at *Ficus pumilla* (4.59 CO_2/g s. pr./h), and the lowest one at *Ficus benjamina* (2.22 CO_2/g s. pr./h).

Could be observed that *Ficus pumilla* specie have a much more intensity of respiration in comparison with *Ficus benjamina*, but the ratio apparent intensity/respiration is the lowest one (0.07). So, the apparent photosynthesis tends to be negative, and respiration increase.

Because photosynthesis is one of the most sensitive processes, at lack of water all the damages provoked by these are reflected in the activity of photosynthetic apparatus.

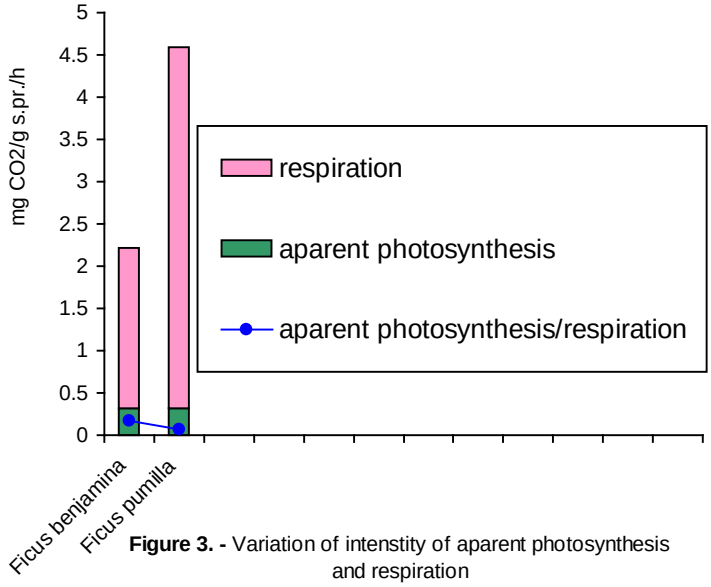

Figure 3. - Variation of intenstity of aparent photosynthesis and respiration

CONCLUSIONS

The total content in assimilated pigments of the studied species have a positive correlation with maintain capacity of high quantities of water in leave, which will be able to satisfy in an optimal way the unfolding of physiologic processes.

The value of "a" chlorophyll/"b" chlorophyll ratio at *Ficus pumilla* (1.65) is greater that at *Ficus benjamina* (0.96).

The chlorophylls/carotenes ratio reaches the maximal value at *Ficus benjamina* (5.67) and the minimal one at *Ficus pumilla* (4.89).

The two studied species of Ficus had the same value of the apparent photosynthesis intensity, 0.32 CO_2/g s. pr./h.

The values of the real photosynthesis differs from specie to specie, the highest value being recorded at *Ficus pumilla* (4.59 CO_2/g s. pr./h).

At *Ficus pumilla* respiration intensity is much higher in comparison with *Ficus benjamina*, but the ratio apparent photosynthesis/respiration is lower (0.07 mg CO_2/g s. pr./h).

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EFFECT OF GROWTH MEDIA ON SOME LEAF GAS EXCHANGE PARAMETERS OF HIGHBUSH 'BLUERAY' GROWN IN POTS

DINAMICA UNOR PARAMETRI AI SCHIMBULUI DE GAZE LA FRUNZELE AFINULUI CU TUFĂ ÎNALTĂ SUB INFLUENȚA SUBSTRATULUI DE CREȘTERE

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Abstract: *An experiment was carried out in 2007 with two-year-old blueberry (Vaccinium corymbosum L.) plants cv. Blueray. One year before the trial was started plants were propagated by wood cuttings and in the second year five plants were selected presenting the same leaves number and similar height, size of leaves and were planted in pots on different substrata. Sixteen experimental variants were organized with different percent of peat, waste, sawdust, green manure and distillation residues. Experiments were conducted to elucidate the relationship between different ingredients of the pot substrate on some gas exchange parameters (photosynthesis, transpiration and respiration rate) in dynamic, during the vegetation period, as a means to characterize the best conditions for rapidly and efficiently young plants stabilizing. Photosynthesis rate varied across substrata variants and measurement dates, between -0.52 μmol $m^{-2}s^{-1}$ (October beginning) and 3.82 μmol $m^{-2}s^{-1}$ (July beginning) Transpiration rate generally presented low values with a decreasing dynamic starting from 0.59 mmol H_2O $m^{-2}s^{-1}$ (June beginning). The same trend was noticed for the apparent quantum yield, with higher values for the first decade of July, thereafter values were generally decreased in relation with the used substrate. A significantly decreasing was registered for variant V4 (50% peat + 50% sawdust) at the end of July. At the opposite site there were variants V6 (50% peat+50% green manure), V8 (50% peat+50% distillation residues). In the case of V6 it was registered even a slightly quantum yield increase. Respiration rate values were generally low for the young leaves (around 100 mg CO_2 $kg^{-1}h^{-1}$), excepting V8 possible related at a high metabolic activity, thereafter the values surpassed 200 mg CO_2 $kg^{-1}h^{-1}$ and for the first October decade (leaves less or more senescent) there were noticed significantly differences between variants, with lower values especially at V4 leaves with the cell almost collapsed.*

Rezumat. *Au fost organizate şaisprezece variante folosind plante de afin Vaccinium corymbosum L.) cv. Blueray, în vărstă de doi ani, în vase cu diferite procente de turbă, gunoi de grajd, rumeguş, litieră şi reziduuri de distilarie, cu scopul elucidării relațiilor dintre diferitele ingrediente ale substratului asupra dinamicii parametrilor schimbului de gaze, ca mijloc de a caracteriza cele mai eficiente condiții pentru stabilizarea plantelor tinere. Rata fotosintezei a variat în funcție de substrat şi data determinării: între -0.52 μmol CO_2 $m^{-2}s^{-1}$ (octombrie) şi 3,82 μmol CO_2 $m^{-2}s^{-1}$ (iulie). Rata transpirației a prezentat valori mici, cu o dinamică în scădere începând de la 0.59 mmol H_2O $m^{-2}s^{-1}$ (iunie). Acelaşi trend s-a înregistrat şi pentru "quantum yield", cu valori mari pentru prima decadă a lunii iulie, apoi valorile au scăzut în general, în relație cu substratul utilizat. O scădere semnificativă s-a înregistrat pentru varianta V4 (50% turbă, 50% rumeguş), comparativ cu V6 (50% turbă, 50% litieră), V8 (50% turbă, 50% reziduuri de distilărie). Valorile ratei respirației au fost în general mici pentru frunzele tinere (in jur de 100 mg CO_2 $kg^{-1}h^{-1}$), cu excepția V8 posibil relativ la o activitate metabolică*

mai intensă, apoi valorile au depăşit 200 mg CO_2 $kg^{-1}h^{-1}$. Pentru prima decadă a lunii octombrie (frunze mai mult sau mai puţin senescente) s-au înregistrat diferenţe semnificative în privinţa comportamentului plantelor din diferite variante, cu rate mai mici ale respiraţiei, în special la frunzele V4 cu celulele aproape în colaps.

INTRODUCTION

In Romania, highbush blueberry has been introduced at Bilcesti Research Station and first German and American originated cultivars have been planted in 1968 (Bădescu, 1985). As members of the *Rhododendron* family blueberries are distinguished from other crops, they are calcifuge (lime-avoiding) plants, which show optimum growth in the pH range 4.5 -5.5. There are several reasons for this requirement: the efficiency with which blueberries take Fe is low; consequently, acid conditions are required to increase the quantity of Fe available in soil solution. Additionally, acid conditions also ensure that N is able to exist in the form of ammonium (NH_4^+) which is more readily utilised by blueberries than other N sources, such as nitrate (NO_3^-) (Burzo et al., 2005). Some areas as for instance those on mine spoils soils are mineral soil types, which need to be modified. The nursery industry is searching for methods to decrease the content of nutrients times in effluent from production areas, reduced fertiliser consumption and costs, and maintain a level of available nutrients that does not limit productivity (Scagel, 2005). So, there are preoccupations to study soil characteristics and others treatments effects on different blueberry plant indicators (Sutton and Dick, 1987; Claussen and Lenz, 1999; Szwonek, 2004; Scagel, 2005; Li et al., 2006; Heiberg and Lunde, 2006; Lee et al., 2006; Bryla et.al., 2007). However, little research has been reported on the production of horticultural crops. The aim of the present study was to evaluate effects of different substrata on some blueberry leaves gas exchange parameters, as a potential means of rehabilitation of abandoned surface mine soils, for highbush blueberry culture.

MATERIAL AND METHODS

Two-year-old "Bluecrop" highbush blueberry plants have been planted in 4 -L pots and growth in the outdoor growing area at the Experimentally Tree Fruit Growing Field of the Faculty of Horticulture, U.S.A.M.V.Bucharest starting in June of 2007. Sixteen experimental variants were organized with different percent of peat, waste, sawdust, green manure, and distillation residues (*Table 1*), with five replicates per variant.

Table 1.

Experimental variants

Variants	Substrata composition
1	50.00 % peat, 50.00 % waste
2	66.70 % peat, 33.30 % waste
3	75.00 % peat, 25.00 % waste
4	50.00 % peat, 50.00 % sawdust
5	50.00 % peat; 25.00 % waste; 25.00 % sawdust
6	50.00 % peat, 50.00 % green manure
7	50.00 % peat; 25.00 % waste; 25.00 % green manure
8	50.00 % peat; 50.00 % distillation residues
9	50.00 % peat; 25.00 % waste; 25.00 % distillation residues
10	50.00 % peat; 12.50 % waste; 12.50 % sawdust; 12.50 % green manure; 12.50 % distillation residues
11	50.00 % peat; 12.50 % waste; 25.00 % sawdust; 12.50 % green manure;
12	50.00 % peat; 12.50 % waste; 12.50 % sawdust; 25.00 % green manure;
13	57.10 % peat; 14.30 % waste; 14.30 % sawdust;14.30 % distillation residues
14	57,10 % peat; 14.30 % waste; 28.60 % sawdust
15	57.10 % peat; 14.30 % waste; 14.30 % green manure; 14.30 % distillation residues
16	50.00 % peat; 12.50 % waste; 25.00 % green manure; 12,50 % distillation residues

Gas exchange variables: photosynthesis (A: µmol $m^{-2}s^{-1}$), transpiration (E: mmol H_2O $m^{-2}s^{-1}$), respiration rate (mg CO_2 $kg^{-1}h^{-1}$), water use efficiency (WUE) (A/E) and quantum yield

(A/PPFD ratio) have been determined. Photosynthesis and transpiration rate were recorded in dynamics using an infrared gas analyzer (IRGA; LCA-4, Analytical development Company - ADC- Ltd. U.K.), a portable photosynthesis system. Water use efficiency (WUE) was calculated by dividing the photosynthetic rate (A) by the transpiration rate (E) of the leaf portions (Sinclair et al., 1984). The first determination period of gas exchange was recorded on July 2, at 32 days after transplantation on different substrata (32 DAT), the second one on July 30 (60 DAT), the third on September 10 (112 DAT) and the last one on October 2 (124 DAT). Measurements were taken between 0900 and 1100 h, chamber air temperature was not controlled during the measurements, so generally ranged between 28 and 33 ^{o} C and photosynthetic photon flux density (PPFD) was corresponding with naturally conditions. Values presented are the means of five leaves from five plants per sampling period. Respiration rate has been measured three times, July 2 (32 DAT), September 7 (99 DAT) and October 11 (133 DAT) using a CO_2 analyzer (Ricken) taking mean leaves samples from the mid portion of the one-year old branches and results were expressed as mg CO_2 $kg^{-1}h^{-1}$.

RESULTS AND DISCUSSIONS

As regard as photosynthesis rate it can observe that values are generally low (ranging between 3.82 µmol $m^{-2}s^{-1}$ June beginning and -0.52 µmol $m^{-2}s^{-1}$ at the senescent phase) (*Fig.1*) and it has to be considered that plants grown in the experiment carried out were only two years old, the obtained data being first of all in relation with plants age and especially leaves age. Also, it can be noticed a large variability from one to another variant in function of the substrata.

There will be mentioned that in the case of our experiment the limiting factors such as high temperatures, and high light especially during July induced decreases of photosynthesis mainly due to stomata closure, rather than to the direct effect on the capacity of the photosynthetic apparatus as earlier Genty et.al. (1987) showed. Such sudden increase in light intensity, to which the plant is not acclimated (as is the blueberry case), results in an increase in excitation energy in excess (EEE) of that required for photosynthetic metabolism and between typical abiotic stresses conditions that promote an increase in EEE are extremes temperatures (Guidi et al., 2002). Lee et al. (2006) noticed that in the case of water stressed "Rancocas" blueberry leaves photosynthesis rate was 3-5 µmol $m^{-2}s^{-1}$ depending on photosynthetic photon flux density (PPFD) ranged from 0 to 2000 µmol $m^{-2}s^{-1}$, as compared with well watered plants with a maximum CO_2 assimilation rate of 8.8 µmol $m^{-2}s^{-1}$. At the same cultivar, apparent quantum yields appeared to be similar in well watered and water stressed plants, while dark respiration rate were higher in the case of stressed plants (Kim et.al., 2004)

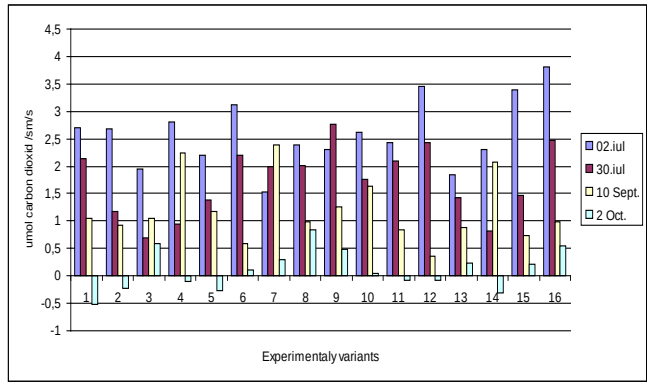

Fig.1. Dynamics of blueberry leaves photosynthesis rate (µmol $m^{-2}s^{-1}$)

Transpiration rate generally presented low values with a decreasing dynamic starting from 0.59 mmol H_2O $m^{-2}s^{-1}$ (June beginning) in the case of younger leaves without waxes, following a values decreasing as leaves became nature (*Fig.2.*).

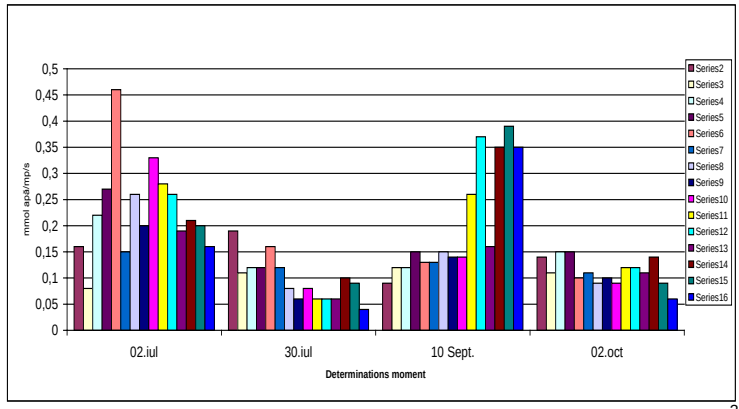

Fig.2. Dinamics of the blueberry leaves transpiration rate (mmol H_2O m^{-2} s^{-1})

The same trend was noticed for the apparent quantum yield and water use efficiency, with higher values for the first decade on July, thereafter values were generally decreased in relation with leaves age and the used substrate. A significantly decreasing of QY was registered for variant V4 (of about tree times) at the end of July. At the opposite site there were variants V6 and V8 where values are almost the same (*Table 2*). Thereafter, QY values decreased significantly for the majority of the variants, excepting V3, V8 (for instance 124 DAT), corresponding with higher values of water use efficiency too. Respiration rate values were generally low for the young leaves (around 100 mg CO_2 $kg^{-1}h^{-1}$), excepting V8 possible related at a high metabolic activity, thereafter the values surpassed 200 mg CO_2 $kg^{-1}h^{-1}$ and for the first October decade (leaves less or more senescent) there were noticed significantly differences between variants, with lower values especially at V4 leaves with the cell almost collapsed (*Fig. 3*).

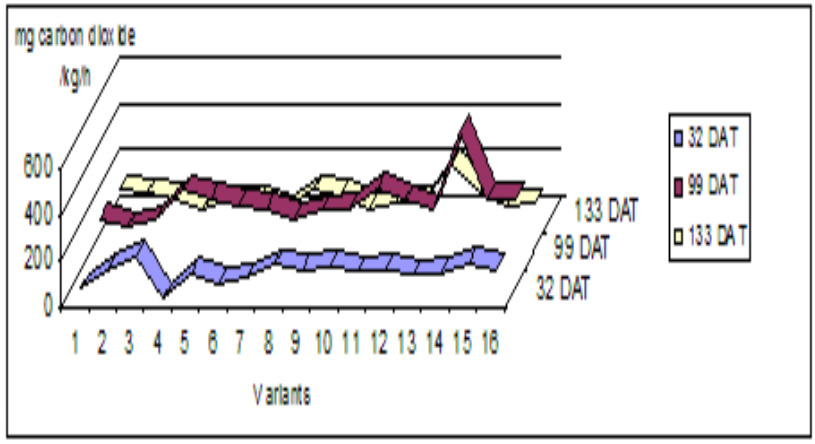

Fig.3. Dynamics of blueberry leaves respiration rate

Recently, Li et al.(2006) also confirmed earlier research, which showed that *Vaccinium* spp. planted in mineral soil of pH above 5.5 typically respond to the addition

of elemental S and organic material with increased growth and yield. On the other hand, Heiberd and Lunde (2006) concluded that highbush blueberry plants are not very sensitive to ingredients in the growth substrate and the plants grow well in containers. Scagel (2005) showed that colonization with ericoid mycorrhizal fungi was typically higher when plants were grown with organic fertilizers and inoculation with EMF may not only improve productivity and quality of nursery plants, it also may reduce the amount of fertilizer used during nursery production.

Table 2.

Dynamics of some blueberry leaves physiological indicators (Quantum yield - QY – A/PPFD; Water use efficiency – WUE- A/E) at different days number after trnsplantation on different substrata (DAT)

Det. Date Variant	32 DAT		60 DAT		112 DAT		124 DAT	
Indicator	QY	WUE	QY	WUE	QY	WUE	QY	WUE
1	0.0027	11,7827	0,0020	15,2857	0,0008	5,7778	-0,0029	-3,4667
2	0,0028	16,8125	0,0013	6,2105	0,0007	10,2222	-0,0002	-1,5714
3	0.0018	24,375	0,0007	6,2727	0,0008	8,6667	***0,0005***	**5,2727**
4	0.0029	12,7727	0,0009	7,9167	0,0017	18,75	-8,4E-05	-0,6667
5	0.0022	8,1111	0,0014	11,5	0,0009	7,8667	-0,0002	-1,7333
6	0.0032	6,8043	0,0028	13,6875	0,0004	4,5386	7,16E-05	1
7	0.0014	10,2	0,0024	16,5833	0,0018	18,3846	0,0002	2,6364
8	0.0023	9,1538	0,0021	25,125	0,0008	6,6	***0,0006***	**9,4444**
9	0.0023	11,55	0,0028	46	0,0010	9	0,0004	4,9
10	0.0027	7,9394	0,0019	22	0,0016	11,7143	4,25E-05	0,5556
11	0.0026	8,6786	0,0023	34,8333	0,0007	3,1923	-8,4E-05	-0,6667
12	0.0036	13,3077	0,0021	40,5	0,0003	0,9459	-7,8E-05	-0,75
13	0.0017	9,6842	0,0014	23,8333	0,0005	5,5	0,0002	2,0909
14	0.0020	11	0,0007	8,1	0,0014	5,9143	-0,0003	-2,2143
15	0.0035	17	0,0014	16,2222	0,0005	1,8718	0,0002	2,3333
16	0.0037	23,875	0,0022	62	0,0007	2,8286	0,0005	9

CONCLUSIONS

1. Blueberry leaves photosynthesis rate varied across substrata variants and measurement dates, between -0.52 μmol $m^{-2}s^{-1}$ (124 DAT) and 3,82 μmol $m^{-2}s^{-1}$ (32 DAT).

2. Transpiration rate generally presented low values related to this specie leaves specifically characteristics, with a decreasing dynamic starting from 0.59 mmol H_2O $m^{-2}s^{-1}$ on June beginning (young leaves without waxes).

3. The same trend was noticed for the apparent quantum yield and water use efficiency, with higher values for the first decade of July, thereafter values were generally decreased in relation with leaves age, the used substrate and the summer 2007 specifically climatic conditions. High values have been registered for V3, V8 (50% peat + 50% green

manure or distillation residues), as compared with lower values for V4 (50% peat+50% sawdust).

4. Respiration rate values were generally low for the young leaves (around 100 mg CO_2 $kg^{-1}h^{-1}$), excepting V8 (possible related at a high metabolic activity). Thereafter values surpassed 200 mg CO_2 $kg^{-1}h^{-1}$ and for the first October decade there were noticed significantly differences between variants, with lower values especially at V4 leaves with the cell almost collapsed.

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STUDY OF ASSIMILATORY PIGMENTS FROM APPLE TREE LEAVES

STUDIUL PIGMENȚILOR ASIMILATORI DIN FRUNZELE DE MĂR

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Abstract. *In this paper are presented results of determination of assimilation pigments in apple leaves, in seasonal dynamic. We also calculated the correlation between rate of photosynthesis and chlorophyll a and b. The researches were carried out at I.C.D.P. Pitesti-Maracineni between 2001-2005, with the following types of apple trees Idared, Golden Delicious and Jonathan.*

Rezumat. *În lucrarea noastră sunt prezentate rezultate ale determinării cantității de pigmenți asimilatori din frunze, în dinamică sezonieră. Am calculat corelațiile dintre intensitatea fotosintezei şi cantitatea de clorofilă a şi b. Cercetările au fost efectuate la ICDP Pitesti Mărăcineni între anii 2001-2006, al următoarele soiuri de măr: Idared, Golden Delicious şi Jonathan.*

The chlorophyll content in leaves and intensity of photosynthesis wasn't correlated in all described cases in profile literature. Hoza (1995) observed to plums, Stanley cultivar, a positive correlation for these parameters (r=0,84). The chlorophyll content in leaves differ with phenophase, specie, cultivar, intensity of the light etc (Burzo et all, 1999). Dynamic determinations to vegetative period show that the high value of chlorophyll content is in end of growth leaf period. Hoza's researches (1995) specify the high chlorophyll content from plums tree is in the middle of July: 295,69 mg/100 g fresh weight, to Stanley cultivar.

To plum tree, Paul-Badescu (1996) shows that dynamics of assimilatory pigments record in interval May-beginning of the June a great rise, the chlorophyll a and b content doubling, after that moment these values are bee-keeper for entire summer until beginning of September. The carotenoids pigments generally present a parallel dynamic with green pigments, but with smaller values.

MATERIAL AND METHODS

Physiological researches have taken to I.C.D.P. Piteşti-Mărăcineni between 2001-2006 with following types of apple trees Idared, Golden Delicious and Jonathan. The investigations of chlorophyll and carotenoids pigments were performed spectrophotometrically, in 80% acetone, to 663 nm, 645 nm and 440 nm wavelength. The results are expressed in mg/g dry matter. The statistic interpretation was made with SPSS 13,0 for Windows programme. We used Duncan test for variance analyse and Pearson correlation coefficient for establish the correlation between rate of photosynthesis and chlorophyll content.

RESULTS AND DISCUSSIONS

In figure 1 are represented seasonal dynamic of assimilatory pigments to Idared, Golden Delicious and Jonathan apple cultivars. In July registered the higher value of chlorophyll a content for all apple cultivars. The quantity of chlorophyll b vary between 1,2 mg/g d.m. in August and 1,5 mg/g d.m. in September. The carotenoid pigments present following seasonal dynamic: the value increase in July, and next months the quantity of carotenoid pigments is all around the same mean value.

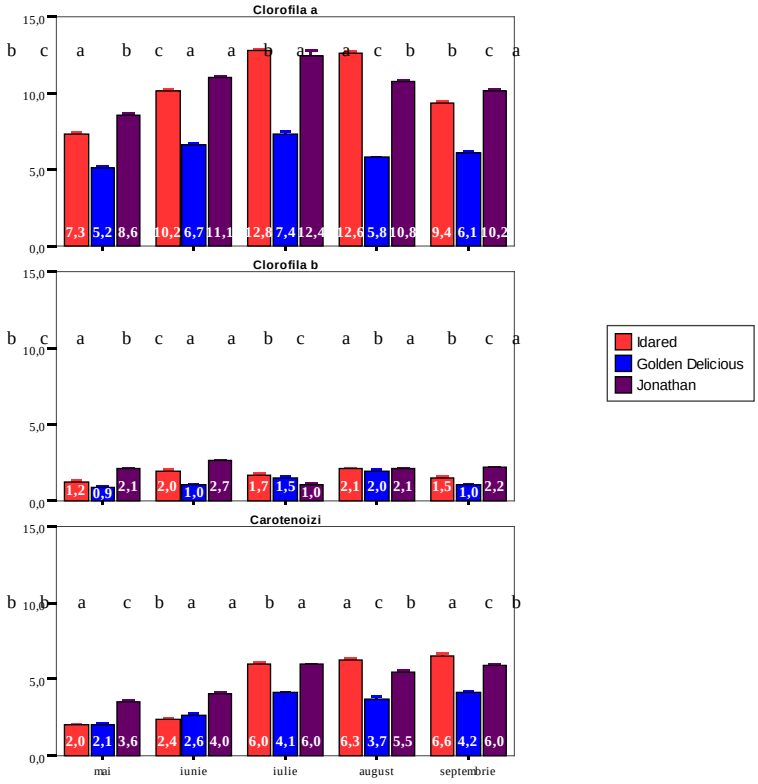

Fig. 1. Determination of assimilatory pigments from leaves (mg/g d.m.) to Idared, Goden Delicious and Jonathan apple cultivars

In figure 2, 3 and 4 are represented correlation coefficients, trendline and the equation for these lines between rate of photosynthesis and quantity of pigments.

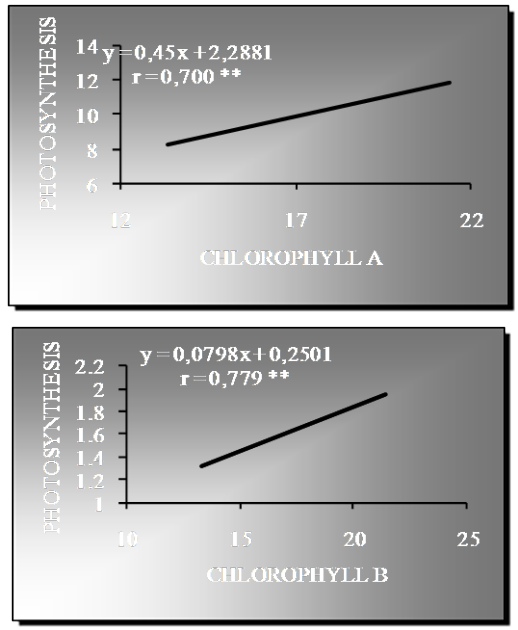

Fig. 2. Correlation between rate of photosynthesis and quantity of chlorophyll a and b to Idared apple cultivar (**. Correlation is significant for p<0,01)

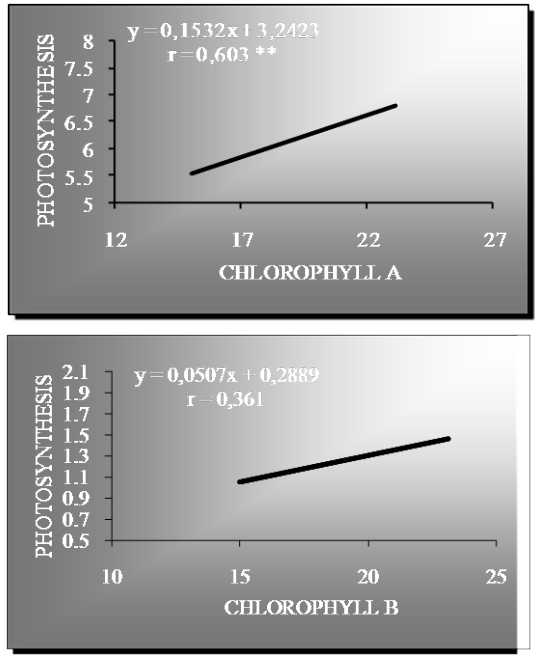

Fig. 3. Correlation between rate of photosynthesis and quantity of chlorophyll a and b to Golden Delicious apple cultivar (**. Correlation is significant for p<0,01)

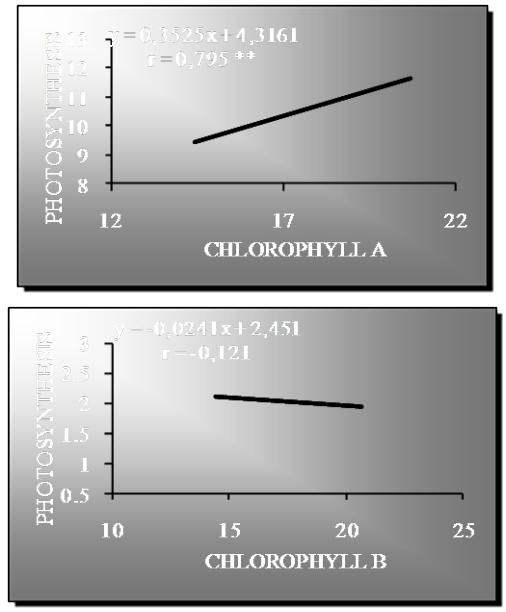

Fig. 4. Correlation between rate of photosynthesis and quantity of chlorophyll a and b to Jonathan apple cultivar (**. Correlation is significant for p<0,01)

CONCLUSIONS

The major value for chlorophyll a content registered in July; the quantity of chlorophyll b increase in spring, became maxim in summer months and these values easily decrease; the carotenoid pigments present following seasonal dynamic: the value increase in July, and next months the quantity of carotenoid pigments are constant.

Between rate of photosynthesis and quantity of chlorophyll are establish positive significant correlations for all apple cultivars; chlorophyll b are significant correlated with photosynthesis only for Idared cultivar.

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THE EFFECT OF COORDINATIVE COMPOUNDS OF COBALT WITH MONOETHANOLAMINE ON PHYSIOLOGICAL INDICATORS OF *PHASEOLUS VULGARIS*

EFECTUL COMPUŞILOR COMPLECŞI AI COBALTULUI CU MONOETANOLAMINA ASUPRA INDICATORILOR FIZIOLOGICI LA *PHASEOLUS VULGARIS*

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Abstract. *The present paper has as main objective testing the influence of some complex compounds of cobalt with monoetanolamina, obtained at the Chemistry Department of State University in the Republic of Moldova, on the seed germination capacity, biomass accumulation and biosynthesis capacity of assimilating pigments in Phaseolus vulgaris. These could eventually demonstrate their positive effects on physiological processes in plants. 16 complex compounds were tested, the results proved that a same stimulating effect on the studied indexes exists.*

Rezumat. *Lucrarea de fata a avut ca scop testarea influentei unor compusi complecsi ai cobaltului cu monoetanolamina, obtinuti la Facultatea de Chimie a Universitatii se Stat din Moldova, asupra capacitatii de germinare a semintelor, acumularii de biomasa si capacitatii de biosinteza a pigmentilor asimilatori la Phaseolus vulgaris pentru evidentierea eventualelor efecte benefice ale acestora asupra proceselor fiziologice la plante. Au fost testati 16 compusi complecsi iar rezultatele au demonstrat un efect stimulator a acestora asupra indicatorilor studiati.*

Cobalt, a transition element, is an essential component of several enzymes and co-enzymes. It has been shown to affect growth and metabolism of plants, in different degrees, depending on the concentration and status of cobalt in rhizosphere and soil. The distribution of cobalt in plants is entirely species-dependent. The uptake is controlled by different mechanisms in different species. In higher plants, absorption of Co^{2+} by roots involves active transport. Transport through the cortical cells is operated by both passive diffusion and active process. In the xylem, the metal is mainly transported by the transpirational flow. Distribution through the sieve tubes is acropetal by complexing with organic compounds. The lower mobility of Co^{2+} in plants restricts its transport to leaves from stems.

Cobalt is not found at the active site of any respiratory chain enzymes. Two sites of action of Co^{2+} are found in mitochondrial respiration since it induces different responses toward different substrates like α-keto glutarate and succinate.

Exogenously added metal causes morphological damage in plastids and changes in the chlorophyll contents. It also inhibits starch grain differentiation and alters the structure and number of chloroplasts per unit area of leaf. Co^{2+} reduces the export of photoassimilates and dark fixation of CO_2. Low concentration of Co^{2+} in medium stimulates growth from simple algae to complex higher plants. Relatively higher concentrations are toxic. A similar relationship is seen with crop yield when the metal is used in the form of fertilizer, pre-seeding, and pre-sowing chemicals. Toxic effect of cobalt on morphology includes leaf fall, inhibition of greening, discolored veins, premature leaf closure, and reduced shoot weight.

Being a component of vitamin B_{12} and cobamide coenzyme, Co^{2+} helps in the fixation of molecular nitrogen in root nodules of leguminous plants.

The beneficial effects of cobalt include retardation of senescence of leaf, increase in drought resistance in seeds, regulation of alkaloid accumulation in medicinal plants, and inhibition of ethylene biosynthesis. The aim of this paper is testing the biological effect of some coordinative compounds of cobalt with monoetanolamina, obtained at the Chemistry departament of State University in the Republic of Moldova, on *Phaseolus vulgaris* specie.

MATERIAL AND METHODS

Phaseolus vulgaris L. seeds were cultivated on filter paper dampened by 0.1 % coordinative compound solution. Control samples were cultivated on demineralisated dampened filter paper. The germination capacity was evaluated at 11 days and was determined in percentage according to the control. This one is considered to be 100%. Vegetative mass was determined at 21 day–old plants by weighing 10 random selected plants. Dry material was determined using the same material as vegetative mass by repetitive drying at 105°C for two hours until a constant weight was obtain, calculated with the formula

S.U. ((m4-m1) / (m3-m2)) x 100%

where: m1- empty capsule mass at 105 °C;m2 – empty capsule mass at room temperature; m3- capsule mass with fresh material at room temperature ,m4- capsule mass after drying at 105°C.

Assimilatory pigments were determined using a spectrophotometrical method. The vegetal samples extract was obtained by extraction with 85% acetone and filtered. The readings was made with UV-VIS spectrophotometer using E_{662}, E_{664} and $E_{440,5}$.

The quantity of assimilatory pigments was calculated by using the following formula:

chlorophyll *a* (mg) = (E_{662} · 9,78) – (E_{664} · 0,99);

chlorophyll *b* (mg) = (E_{664} · 21,4) – (E_{662} · 4,65);

carotenoids (mg) = ($E_{440,5}$ · 4,69) – (clorofilele *a* + *b* · 0,267).

The results were related to dry substance

RESULTS AND DISCUTIONS

The seed germination is a complex process starting when exogenous factors like humidity, light, temperature are favorable and endogenous dormancies factors are eliminated. In our experiments the seeds was cultivated in the climatic room at constant temperature (25°C) and dark conditions, therefore the only variable factor was humidity. The optimal

hydration degree of seeds tissue is determined by the absorption capacity and water retention by tissue biocoloids and this process depends on nature of storage substances of seeds endosperm. The bean seeds have a high protein content of endosperm and require plenty of water for hydration.

In table no.1 experimental data are related. We can observe a weak diminution of germination seed capacity at almost all experimental variants. The water availability decrease cut out for osmotic pressure increasing and ionic concentration of solution. This fact can elongate the germination period. Exceptions were variants 1, 2 and 4. Nevertheless, the obtained value does not suggest a toxic or cytostatic action of studied substances bat rather a slowing of the germination process, by their action on the unleashing factors of germination. This conclusion was confirmed by the fact that, on some variants with a lower germination percent the biomass accumulation was bigger than the witness sample's.

Table no. 1.

The germination capacity of *Phaseolus vulgaris L.*seeds in presence of coordinative compounds of cobalt with monoethanolamine

Coordinative compound	Germ seed (%)	Biomass (g)	Dray subst %	Chl *a* (mg/g d.s.)	Chl *b* (mg/g d. s.)	Carotenoids (mg/g d. s.)
1,2,3-$[Co(etm)_3]\cdot 3H_2O$ (**1**)	105	38.82	7.3726	2.41	0.75	0.56
1,2,3-$[Co(etm)_3]\cdot 5H_2O$ (**2**)	103	37.25	7.1836	2.16	0.70	0.56
1,2,6-$[Co(etm)_3]\cdot 5H_2O$ (**3**)	100	34.29	7.1799	1.96	0.62	0.48
1,2,6-$[Co(etm)_3]\cdot 3H_2O$ (**4**)	102	35.87	7.2018	2.04	0.66	0.51
$[Co(Hetm)_3](HSO_4)(SO_4)\cdot H_2O$ (**5**)	94	31.68	7.7391	2.25	0.77	0.61
$[Co(Hetm)_3][Co(etm)_3](NO_3)_3$ (**6**)	98	38.54	6.4283	2.26	0.78	0.55
$[Co(Hetm)_3][Co(etm)_3](CH_3COO)_3\cdot 7H_2O$ (**7**)	95	27.39	8.2831	1.98	0.56	0.36
$\{[Co(Hetm)_3][Co(etm)_3]\}_2(SO_4)_3\cdot 8H_2O$ (**8**)	99	36.65	**8.9837**	**2.32**	0.76	**0.66**
$[Co^{II}\{Co^{III}(etm)_3\}_2]Cl_3\cdot H_3N(CH_2)_2OH\cdot 2H_2O$ (**9**)	97	35.28	5.9364	2.11	0.66	0.42
$[Co^{II}\{Co^{III}(etm)_3\}_2]Br_3\cdot H_3N(CH_2)_2OH\cdot 4H_2O$ **(10)**	98	35.22	6.8926	2.02	0.79	0.48
$[Co^{II}\{Co^{III}(etm)_3\}_2]I_2\cdot 4H_2O$ (**11**)	97	36.01	7.2162	2.13	**0.84**	0.38
$[Co(Hetm)_3]_2(SO_4)_3\cdot 4H_2O$ (**12**)	100	37.01	8.8394	2.24	0.69	0.64
$[Co(Hetm)(etm)_2]NO_3$ (**13**)	96	**41.53**	3.2116	2.29	0.72	0.54
$[Co(Hetm)_2(etm)](NO_3)_2$ (**14**)	96	40.09	3.9114	2.33	0.69	0.52
$[Co(Hetm)_3](NO_3)_3$ (**15**)	98	39.42	4.2861	2.31	0.71	0.51
$[Co(Hetm)_3]Cl_3\cdot 2H_2O$ (**18**)	96	37.28	6.1162	2.19	0.72	0.41
Control	**100**	**36.02**	**7.0127**	**2.18**	**0.72**	**0.54**

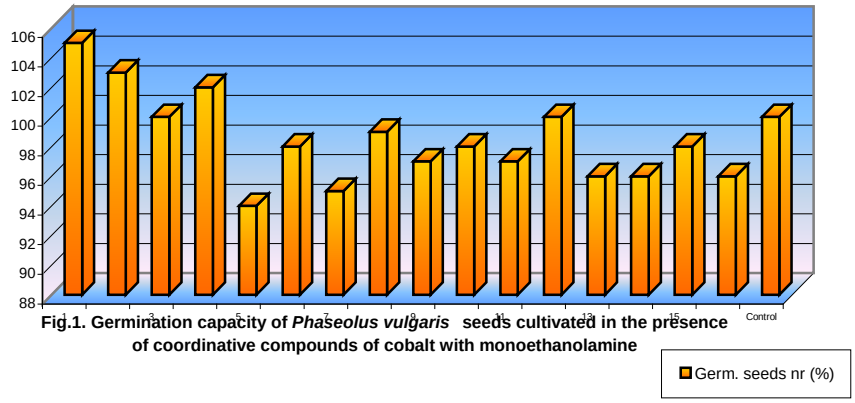

Fig.1. Germination capacity of *Phaseolus vulgaris* seeds cultivated in the presence of coordinative compounds of cobalt with monoethanolamine

The biomass accumulation is a complex process when it is determined by tissues growth (accomplished by cell division) and development processes (represented by qualitative modification and differentiation of new tissue from meristematice cells). If germination process is carried out by storage substances of endosperm, the following growing and development processes are realized based on exogenous mater and energy. Mineral elements necessary for plant nutrition after metabolisation remain in the organism for the rest oh its life. Therefore, dry mater determination of plant tissue offers the possibility to estimate the quantitative implication of mineral element in different metabolic processes.

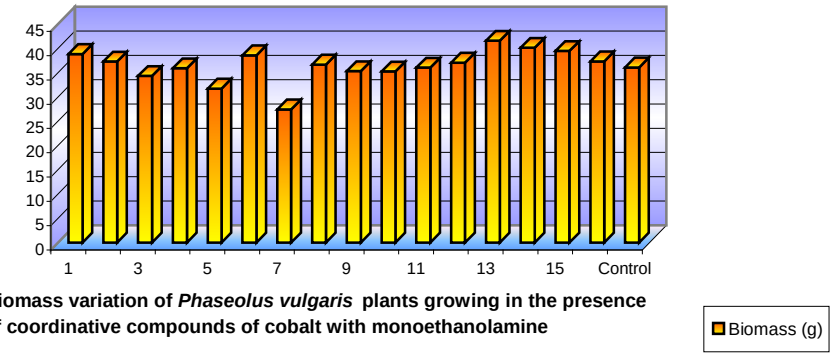

Fig. 2 The biomass variation of *Phaseolus vulgaris* plants growing in the presence of coordinative compounds of cobalt with monoethanolamine

In the case of our experiments, it was measured for ten 21-days old bean seedlings, the biomass and the dry substance content (expressed in %). Regarding the results presented in the table, it can be noted that biomass accumulation took place differently due to outer added substances. Comparing with the Control variant, in the case of variants **6**, **13**, **14**, **15**, **18**, an increased biomass accumulation could be noticed, but a decrease of dry substance. The highest biomass increase (41.53 g comparing with c 36,02 g for Control) was noticed for $[Co(Hetm)(etm)_2]NO_3$ (**13**), but, at the same time for this compound, the lowest

content of dry substance- 3,2116% was noticed comparing to 7.0127% for Control. For experimental variants **1**, **2**, **8** and **12** the biomass accumulation was accompanied by the increase of dry substance content, and for variants **3**, **4**, **5**, **7**, **11**, even if biomass accumulation was lower than for Control, at the same time an increase of dry substance content in tissues was noticed. These differences can be explained by the complex structure of the used substances, by its having different functions in cellular processes. After all, it can be generally noted that a stimulating action at the level of growth and development of vegetal tissues exists. The only variants for which stimulation of any parameters were observed were **9** and **10**.

NO_3^- is the principal form of plant nitrogenous absorption. The nitrogenous need is increased during growing processes, based on cell division and which are not associated with important dry matter accumulation. In variants **6**, **13**, **14** and **15** we observed a higher value of biomass comparing with control variant which means a bigger availability of this anion in plants growing processes.

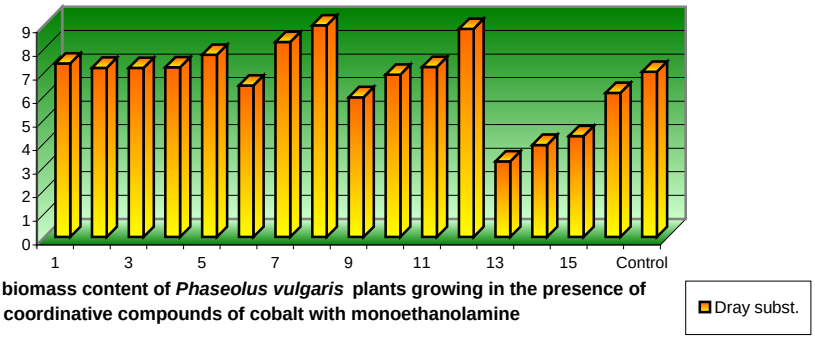

Fig. 3 The dry biomass content of *Phaseolus vulgaris* plants growing in the presence of coordinative compounds of cobalt with monoethanolamine

As much as nitrogenous, sulfur is a plastic element witch is a component part of some amino acids, proteins and vitamins. It plays an important role in cells differentiation processes and it is associated with dry matter accumulation.

In our experiments we observed a variation of assimilating pigments quantity in function of the experimental variant used.

The highest value of chlorophyll *a* was observed at compound no. **8** (2,32 mg/g s.u. compared with 2,18 mg/g d. s. in the control case), and for chlorophyll *b* – on compound no. **11** (0,84 mg/g s.u. compared with 0,72 mg/g s.u. . in the witness case). It is notable the fact that substances which have in their composition SO_4^{2-} have a stronger stimulating effect upon the assimilator pigments biosynthesis then the compounds with NO_3^-, even if in scientific literature there are many references of the role of nitrogen in the biosynthesis role of chlorophylls. The stimulating effect of treatment variants 5, 8, 12 on carotenoid biosynthesis is very important, because they have a protector role against UV radiations therefore their utilization like anti-mutagenic compounds form could be of perspective.

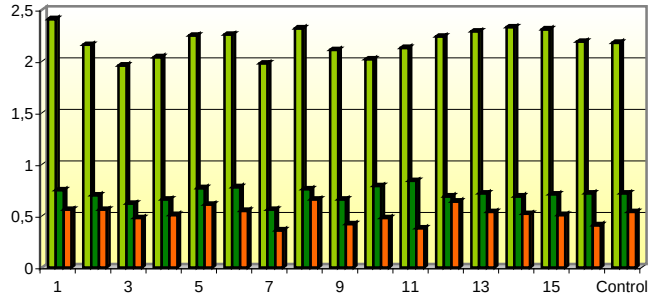

Fig. 4 The assimilatory pigments content of *Phaseolus vulgaris* plants growing in the presence of coordinative compounds of cobalt with monoethanolamine

CONCLUSIONS

1. We can observe a weak diminution of germination seed capacity at almost all experimental variants. An exception were variants 1, 2 and 4. The obtained data showed a slowing of germination process, by their action on the unleashing factors of germination.

2. The majority of the studied substances contributed to the growing of biomass and accumulated dry substance.

3. The biggest increase of biomass (41.53 g according to 36,02 g for the witness sample) was registered at $[Co(Hetm)(etm)_2]NO_3$ compound (**13**). At the same time, the same compound registered the lowest content of dry substance.

4. Substances with SO_4^{2-} anion, had a more powerful stimulating effect on assimilating pigments' synthesis that compounds with NO_3^- anion.

5. $[Co(Hetm)_3](HSO_4)(SO_4)\cdot H_2O$, $\{[Co(Hetm)_3][Co(etm)_3]\}_2(SO_4)_3\cdot 8H_2O$, $[Co(Hetm)_3]_2(SO_4)_3 \cdot 4H_2O$ contributed to an increase of the carotenoids content, thus a better protection effect against UV radiations.

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THE INFLUENCE OF SOME HEAVY METALS ON SEED GERMINATION AND SEEDLING GROWTH AT *RAPHANUS SATIVUS* L.

INFLUENȚA UNOR METALE GRELE ASUPRA GERMINAȚIEI SEMINȚELOR ŞI CREŞTERII PLANTULELOR LA *RAPHANUS SATIVUS* L.

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Abstract.*The paper presents the results of a study concerning the influence of different concentrations of Pb and Cd on some physiological indicators in the dynamics of the process of seed germination and in the incipient phases of seedling growth.The results underline the specific variations of the analysed indicators (water and dry substance content, content of total mineral elements, content of assimilating pigments, cellular liquid concentration, respiration intensity), depending on the nature of metals and their concentrations used for the seed treatments.Regardless to the concentration, Pb, and Cd determine the decrease of respiration intensity,- indicator for metabolic activities - , and water content as well as the increase of the content of assimilating pigments (exception for Cd in concentration of 10ppm).*

Rezumat. *Lucrarea prezintă rezultatele unui studiu referitor la influența concentrațiilor diferite de Pb şi Cd asupra unor indicatori fiziologici în dinamica procesului de germinație a semințelor şi în primele faze de creştere a plantulelor. Rezultatele evidențiază variații specifice ale indicatorilor analizați (conținut de apă şi substanță uscată, conținut în elemente minerale totale, conținut în pigmenți asimilatori, concentrația sucului vacuolar, intensitate respiratorie) în funcție de natura metalelor şi de concentrațiile acestora utilizate pentru tratarea semințelor. Indiferent de concentrație, Pb şi Cd determină scăderea intensității respirației, indicator pentru evidențierea activității metabolice şi a conținutului de apă precum şi creşterea conținutului de pigmenți asimilatori (excepție face Cd în concentrație de 10ppm).*

The influence of heavy metals on plants is presented in the specialty literature by several authors (1, 2, 4, 6, 7, 8, 10, 12). The paper continues the research regarding the effect of the treatment with heavy metals carried out in the previous years at species with phyto-remediation potential from the *Fabaceae* and *Poaceae* families (9, 11).The paper presents the results of a study concerning the influence of the different concentrations of Pb and Cd on some physiological indicators in the dynamics of the process of seed germination and in the incipient phases of seedling growth in *Raphanus sativus.*

MATERIAL AND METHODS

As vegetal material, we used seeds of *Raphanus sativus*. We had five experimental variants: 1 - control – M (with distilled water) and 4 variants of treatment with heavy metals. They were used in form of acetate in the following concentrations: Pb (50ppm – Pb1, 200ppm – Pb2); Cd (1ppm – Cd1 ;10 ppm – Cd2). The duration of the treatment was 3 hours. After the treatment, the seeds were put for germination in Petri plates, on filter paper, in laboratory conditions.

We analysed the following physiological indicators: at intervals of 1 - 10 days: the content of water and dry substance (gravimetrical method) and intensity of the respiration (Warburg method); at intervals of 4 - 10 days: cellular liquid concentration (refractometrical method) and the content of total mineral elements (dry calcination at 450^0 C method). Moreover, at 1o days after the germination we determined the content of assimilating pigments (spectro-photometrical method).

RESULTS AND DISCUSSIONS

The *Brassicaceae* family comprises numerous representatives mentioned in the specialty literature (3,5,8) as plants hyperaccumulator of heavy metals. Among the representatives of this family we chose for study the species *Raphanus sativus.* This species has the facile germination. Marchiol and collab. 2004 find that the *Raphanus sativus* cultivated on the polluted soils with Cd, Cu, Ni and Zn presents the foliar symptoms of toxicity (chlorosis), and the decrease of biomass with 52% comparing to the witness.

The results obtained are presented in figure 1-5.

The water and dry matter content (fig.1). At every investigated experimental variant, the water content has an ascendant evolution during the analyzed period. This fact is according to the cytophysiological and biochemical changes specific to the germination and seedling growth process.

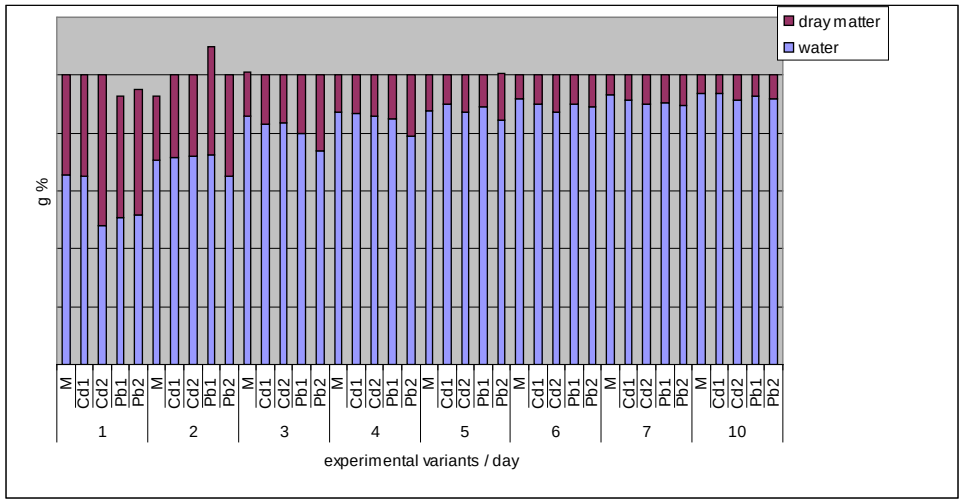

Fig. 1 - The dynamics of the content of water and dry matter

After the first day from the experiment's installing, we ascertain that the water content of the variants treated with Cd 10 ppm and Pb 50 and 200 ppm has the lowest values. This emphasizes the fact that Pb and Cd in the used concentrations slow down the water uptake by the seeds. Within a period of 2-10 days, we ascertain small value differences between the treatment variants.

By comparison with the witness, at the treatment variants, the water content values are generally lower but close to it.

At every experimental variant, the dry matter content decreases from the first day to the 10^{th} day. This reality is due to the fact that the spare substances from the endosperm and cotyledons are hydrolysate, mobilized and used as respiratory sublayer and for the synthesis of new substances necessary for the embryo's nutrition and growth.

The cellular liquid concentration (fig. 2)

At the witness as well as at the treatment variants, the cellular liquid concentration values are smaller on the 4^{th} day and lower on the 10^{th} day. The osmotically active substances from the endosperm and cotyledons' cells also take part in the attainment of the cellular liquid concentration at the first determination. During the germination process and in the incipient stage of the seedling growth, the soluble glucide content decreases, the tissue hydration degree increases and the cellular liquid is diluted.

By comparison with the witness, at the treatment variants the cellular liquid concentration values are inferior to it (1.5-1.65 times smaller than it) on the 4^{th} day and superior (except Cd1) but close to it on the 10^{th} day. We can ascertain an inverted correlation between the cellular liquid concentration and the water content.

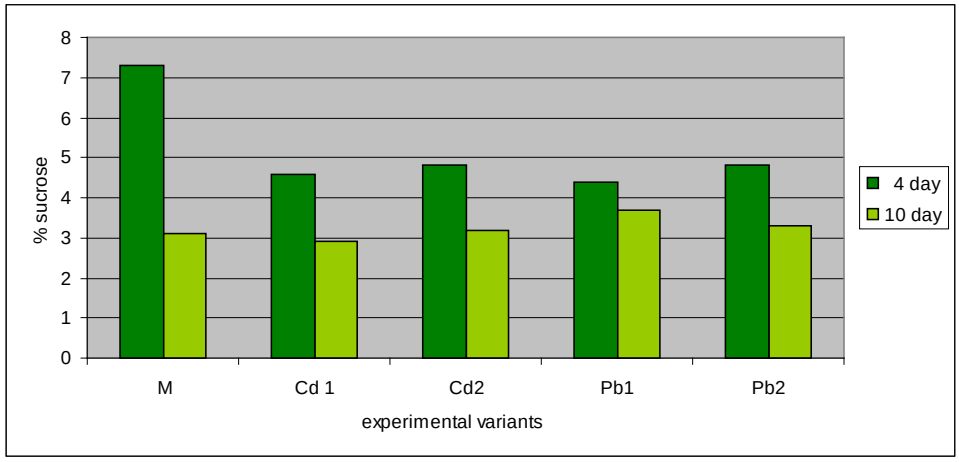

Fig. 2 The dynamics of the concentration of cellular liquid

The total mineral elements contents (fig.3) has values that range between: 4.56 g % and 5.99 g % for the witness and 4.30 g % and 6.69 g % for the treatment variants.

At every experimental variant, the values of the total mineral elements content are lower on the 4th day by comparison with the 10th day. We can ascertain small value variations between the witness and the treatment variants.

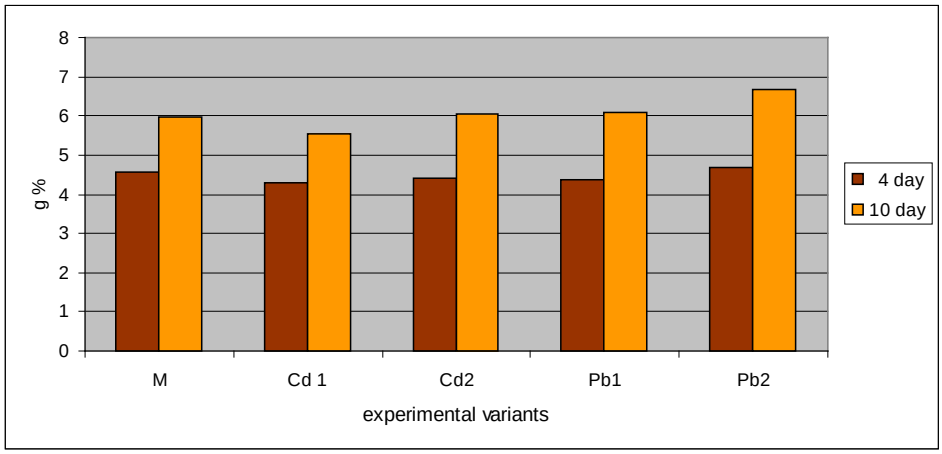

Fig. 3 The dynamics of the content of total mineral elements

From among the **forms of** analyzed **assimilated pigments** there prevails in the quantitative aspect in all experimental variants, chlorophyll a, followed in decreasing order by chlorophyll b and by carotenoidic pigments. An aspect to be noticed is the fact that the treatments with Cd 10 ppm determined the decrease of the content of total assimilating pigments, in comparison with the witness, while the treatments with Cd 1ppm and Pb (50ppm and 200ppm) have opposite effects (fig. 4).

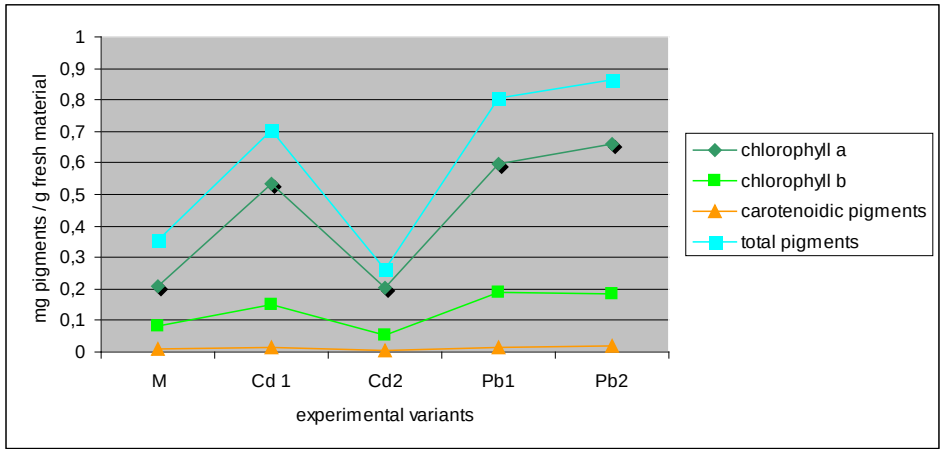

Fig. 4 The content of the assimilating pigments

We can ascertain an increase of the a chlorophyll content - which is more resistant to oxidative stress conditions – at all the experimental variants, more obvious at the Cd2, perhaps as a defence mechanism.Our results for the treatments with Pb and Cd 10 ppm confirm some of the literature data in the field

regarding the positive or negative effects of the two heavy metals used. According to Hernandez and collab. (2000) Pb in a concentration of 200 ppm caused the growth of the chlorophyllian pigment content.

Authors cited by Linger and collab. (2005), find that the Cd interferes with chlorophyll synthesis, assembly of pigment protein complexes and thylakoids, the electron transport chain, Calvin cycle enzymes, sugar transport and consumption, chloroplast replication and oxidative stress.

The **respiration process** generally has a dynamics which is similar at all the experimental variants and its intensity is higher in the first period of time analyzed and diminishes in the second. By comparison with the witness, at the treatment variants, the respiration intensity has (with some exceptions) lower values in the period of time analyzed. These results confirm the ones presented in the specialty literature consulted (2,6,7).Cd is highly reactive, inactivates different enzymatic processes and modifies the cellular redox balance (Jonak şi collab., 2004; Schutzendubel and Polle, 2002) and plants respiration (authors cited by Linger and collab., 2005).

At the Cd 1 variant, the respiration intensity constantly remains at values close to the witness; this emphasizes the fact that Cd in a concentration of 1 ppm does not affect this process.

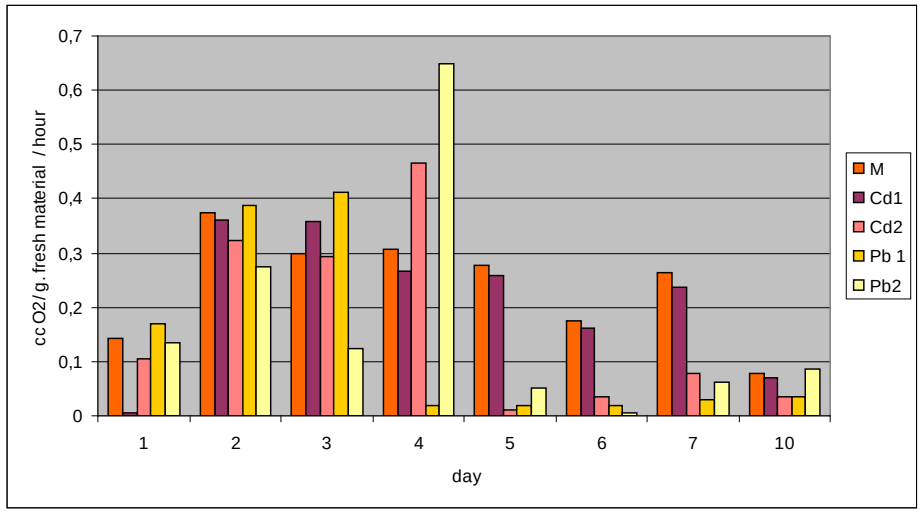

Fig. 5. The dynamics of the intensity of respiration

CONCLUSIONS

We underlined specific variations of the indicators analysed according to the nature of the metals and their concentrations used for the treatment.

The concentration of Pb and Cd used in the treatment determine a easy decrease of respiration intensity - indicator for metabolic activities - and water

content as well as the increase of the content of assimilating pigments (exception for Cd in concentration of 10 ppm).

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RESEARCHES ON THE ECO-PHYSIOLOGICAL REACTION IN GRAPE VINE IN THE 2007 SUMMER

CERCETĂRI PRIVIND REACȚIA ECO-FIZIOLOGICĂ A VIȚEI DE VIE ÎN VARA ANULUI 2007

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Abstract. *The 2007 summer was characterized by very high temperatures in Iassy county, that can modify the eco-physiological reaction in grape vine. The work studies the dynamics of the photosynthetic and flavonoid pigment content in leaves in some vine grape cvs: Feteasca neagra, Feteasca alba, Feteasca regala and Cabernet Sauvignon in order to adapt them to the global warming.*

Rezumat. *Vara anului 2007 a fost caracterizată prin temperaturi foarte înalte în zona Iaşi, care pot modifica reacţia eco-fiziologică la viţa de vie. Lucrarea studiază dinamica pigmenţilor fotosintetici şi flavonoizi în frunze la unele soiuri de viţă de vie: Fetească neagră, Fetească albă, Fetească regală şi Cabernet Sauvignon, în scopul adaptării acestora la încălzirea globală.*

At present, the Earth planet is confronted with the global warming phenomenon, that determines the appearance of extreme climatic conditions (*2*). The variability of the climatic conditions produces catastrophal ecological consequences, but negativelly influences the normal vegetation cycle of cultivated plants (*1*). Different specialists show that extreme climatic conditions affect grape-vine, determining the movement of this culture to the colder zones, but the decrease of the wine quality, too (*3,4*). There have been elaborated principles and technological procedures for the consequencence decreasing the climatic modifications on the grape-vine plantations *(7).* Cultivar choice and acclimation have an important role in the war against the dryness *(5).*

The work studied eco-physiological reaction of some grape-vine cvs. against the climatic conditions induced by global warming in the Viticol Center Iassy, appreciated by the dynamics of the pigment content in leaves, like indicators of the photosynthesis and plant resistance against stress conditions.

MATERIAL AND METHODS

The experiences were made with four grape-vine cvs.: Feteasca neagra, Feteasca alba, Feteasca regala - autochtone cvs. and Cabernet Sauvignon -alochtone cv., cultivated in the Viticol Center Iassy, in the Didactical - Experimental Farm of the University of Agriculture and Veterinary Medicine Iassy, in climatic conditions of 2007 spring-summer seasons. The temperature and precipitations were registered

decadally, but the mean values were refered to the mean values of many years. The pigment analysis in leaves were made in June and July - during grape growth and at the beginning of September - during grape ripening, on the leave under cluster in fertile shoot and on the leave of the same level in sterile shoot. The pigment content in leaves was analysed spectrophotometrically, being appreciated by the capacity of light absorption in acetone pigment extract (1%) in visible (400-700 nm) and UV-A spectrum (370 nm).

RESULTS AND DISCUSSIONS

The analysis of the climatic conditions of temperature and precipitations (tab. 1 and 2) reveals that the 2007 spring and summer had temperatures progressively increasing from March to August, with values higher that the mean value for many years with $+4,6^0$C in July. The monthly precipitations registered a deficit in comparison with the mean value for many years, of - 44,2 mm in July and - 63,4 mm in June. These values created conditions of thermic and hydric stress for grape-vine plants.

Table 1

Values of temperature in 2007 (^{0}C)

	March	**April**	**May**	**June**	**July**	**August**
Minimum	-2.4	1.0	2.8	12.6	11.5	11.0
Maximum	21.8	25.2	33.6	37.4	40.1	38.1
Mean monthly temperature	7.5	11.0	18.6	23.2	25.4	22.4
Mean of 1971-2000 temperature	3.5	10.3	16.1	19.5	20.8	20.0
Difference	**+4.0**	**+0.7**	**+2.5**	**+3.7**	**+4.6**	**+2.4**

Table 2

Values of precipitations in 2007 (mm)

	March	**April**	**May**	**June**	**July**	**August**
Monthly preciptations	33.4	30.6	35.5	34.2	37.6	79.6
Mean precipitations for many years	30.7	50.7	62.7	97.6	81.8	58.0
Difference	**+2.7**	**-20.1**	**-27.2**	**-64.3**	**-44.2**	**+21.6**

The eco-physiological reaction of the four grape-vine cvs was appreciated by pigment content (photosynthetic and flavonoid) in leaves. Chlorophyll *a* 683 can express phothosynthesis intensity in reaction center, but chlorophyll *a* 435 and chlorophyll *b* 453 can express light absorption capacity in photosynthetic systems; flavonoid pigments that absorbe in UV-A (370 nm) can express plant reaction against different stress factors (*6*).

Mean pigment content analysis in leaves, appreciated by the capacity of light absorption of acetone extract (1%) in visible and UV-A spectrums reveals that in June, the alochtone cv. Cabernet Sauvignon has a photosynthesis intensity and a light absorption capacity higher that the studied autochtone cvs. (fig. 1).

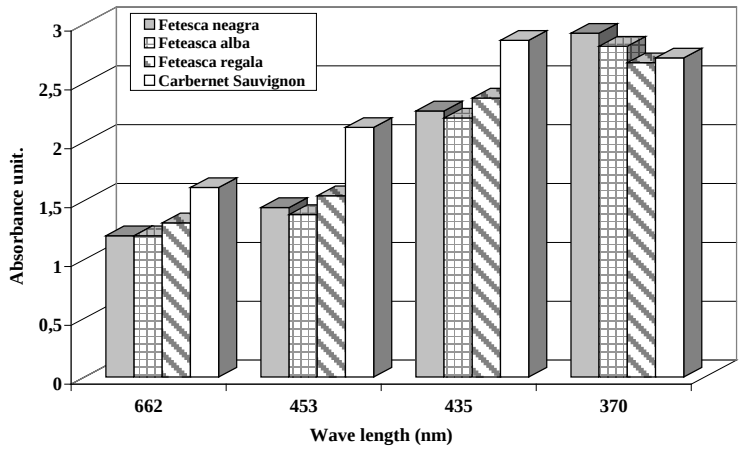

Fig. 1 - Mean pigment content in leaves, appreciated by light absorbtion capacity of acetone extract (1%) in visible and UV-A spectrums, in June

In July it is revealed the increasing capacity of the autochtone cvs. to react against climatic stess conditions, expressed by the very high content of the flavonoid pigments (fig. 2). In September, the very high values of photosynthesis intensity and light absorption in Cabernet Sauvignon cv. and autochtone Feteasca neagra cv. are expressed (fig. 3).

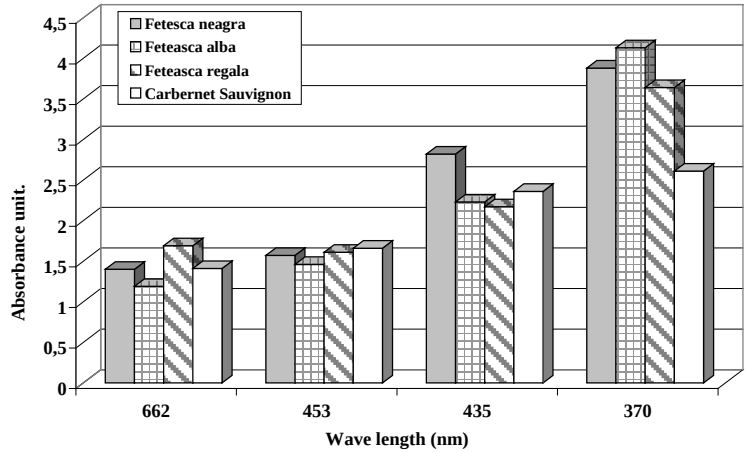

Fig. 2 - Mean pigment content in leaves, appreciated by light absorbtion capacity of acetone extract (1%) in visible and UV-A spectrums, in July

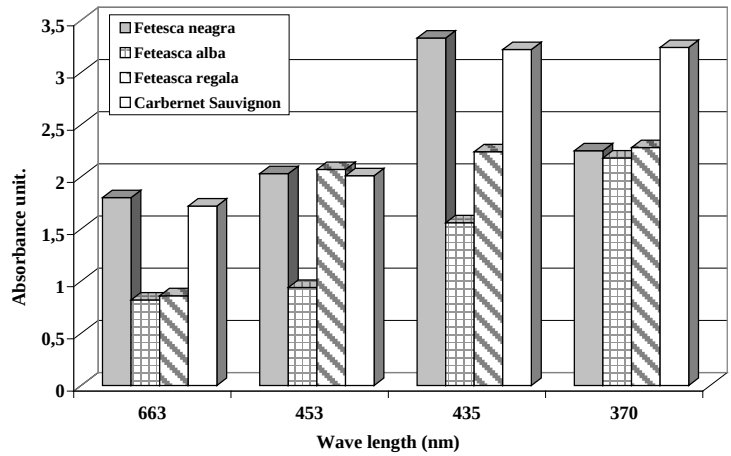

Fig. 3 - Mean pigment content in leaves, appreciated by light absorbtion capacity of acetone extract (1%) in visible and UV-A spectrums, in September

The dynamics of the clorophyll content in the four cvs. ones presents high values in Cabernet Sauvignon and Feteasca neagra cvs. during grape ripening (fig. 4 and 5), but the flavonoid pigment content presents high values in July in autochtone cvs. and in September in Cabernet Sauvignon cv. (fig. 6).

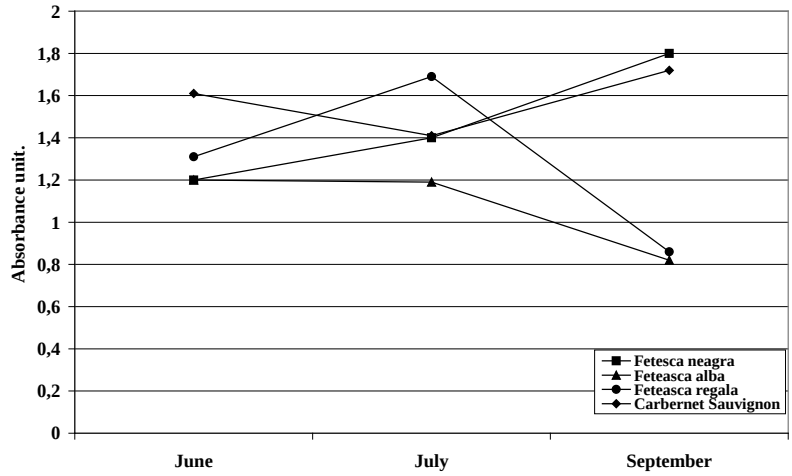

Fig. 4 - Dynamics of the chlorophyll *a* 663 in leaves of the grape-vine cvs.

The results reveal that the four grape-vine cvs. present complex physiolgical mechanisms that assure the reaction to the environmental climatic conditions. The changes of the climatic conditions, induced by global warming need to study these mechanisms in order to cultivation the most adapted cvs. The

Feteasca Neagra cv. present the best photosynthesis and resistance characteristics in the conditions of climate warming in Iassy zone.

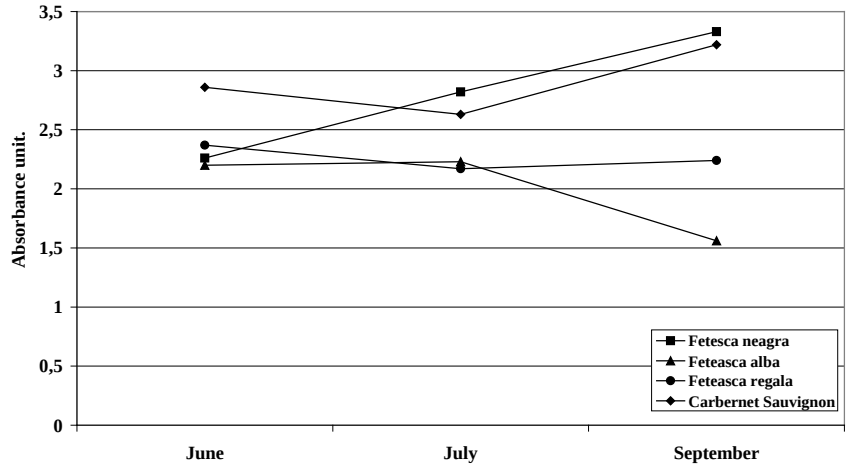

Fig. 5 - Dynamics of the chlorophyll *a* 435 in leaves of the grape-vine cvs.

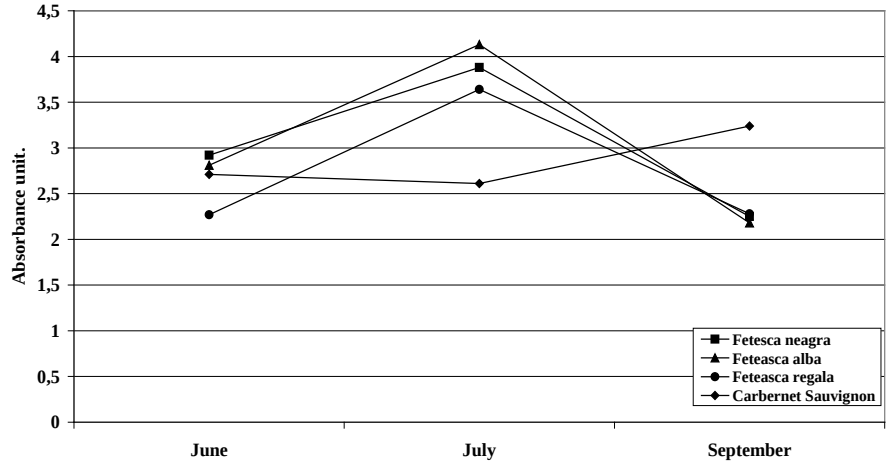

Fig. 6 - Dynamics of the flavonoid pigments in leaves of the grape-vine cvs.

Comparative analysis of the pigment content in leaves of the sterile and fertile shoots reveals that in June and July, photosynthetic pigment content in the autochtone cvs. generally, is higher in fertile shoot leaves than in sterile ones, but Cabernet Sauvignon cv. has an inverse behaviour. These results confirme the role of the under cluster leave, analysed in our study, in the grape and cluster growth in grape-vine, a behaviour manifested in the autochtone cvs., but also reveals other mechanisms, dictated by the different climatic conditions, in Cabernet

Sauvignon cv. In September, the higher pigment content in fertile shoot leaves is maintained only in Feteasca neagra cv., but in all other cvs. the pigment content generally, is higher in the sterile shoot leaves .

CONCLUSIONS

1. Climatic condition in the 2007 spring and summer are characterized by a thermic and hydric stress for grape-vine plant.

2. The physiological reaction in different cvs. is dictated by the ecological conditions from the origine zone.

3. Between autochtone cvs., Feteasca neagra cv. is the most adapted in stress conditions induced by the global warming.

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PHENOTYPIC STABILITY OF SOME CYTOPLASMIC MALE STERILITY INBRED LINES OF CARROT (*DAUCUS CAROTA L.)* IN SOUTH COUNTRY CONDITIONS

STABILITATEA FENOTIPICĂ A UNOR LINII CONSANGVINIZATE DE MORCOV (*DAUCUS CAROTA* L.) ÎN CONDIȚIILE DIN SUDUL ȚĂRII

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Abstract. *The investigation was carried out during 2006 – 2007 years, at ICDLF Vidra, when we studied 10 androsterile inbred linies of carrots (5 brown anther types of male sterility and 5 petaloid type of male sterility) regarding of male sterility stability for used them like matern genitors in F1 comercial hybrids. The studies of the plants has done in blossoming phenophase during these two years of experiments. The petaloid type of male sterility reflection they were been with much more stability comparative with brown anthers types of male sterility. The PMV5 line, petaloid type, was the most stable (98,7% male sterility plants), and the ABMV3 line, brown anther type, was the most unstable (78,6% male sterility plants)*

Rezumat. *In anii 2006 - 2007, la ICDLF Vidra, au fost studiate 10 linii consangvinizate androsterile de morcov (5 androsterile de tip „antere brune" si 5 androsterile de tip „petaloid") sub aspectul stabilitatii caracterului androsterilitate, in vederea utilizarii lor ca genitori materni ai hibizilor F_1 comerciali. Aprecierea plantelor s-a facut pe toata durata fenofazei infloritului, in conditiile de mediu din cei doi ani de experimentare. Liniile androsterile de tip petaloid s-au remarcat ca fiind mult mai stabile comparativ cu liniile androsterile de tip antere brune. Linia PMV5, de tip petaloid, a fost cea mai stabila (98,7% plante androsterile), in timp ce linia ABMV3, de tip antere brune, a fost cea mai instabila (78,6% plante androsterile).*

The heterosis effect were emphasized at carrots early (1943), but the peculiarities of the species concerning the floral biology and the reproductive system were a limitative factor to obtain the F1 comercial hybrids. It was possible after the identification of the androsterile plants, of brown anthers type by Welch and Grimbell in 1947 and the petaloid type by Munger in 1953 (Peterson and Simon, 1986). According as to identify of the male - sterile plants and to establish of genetic determinism for male sterility it was established the methods for obtain the carrot hybrids.

The male-sterility of carrot is nucleocytoplasmic and it is determined of the cytoplasmic factor (S_P type) in interaction with two dominant nuclear genes (M_s), for the petaloid type and of the cytoplasmic factor (S_A type) in interaction with two recessive nuclear genes (ms) in homozygotic state for the brown anthers type (Morelock, 1974).

From the outset it was put the problem of lines stability, in the those conditions, for the male sterility character because the male -sterile lines segregate for the partial fertility and modify the genetic constitution and the economic value of the hybrid seeds (Hansche and Gabelman, 1963; Barbara Michalik, 1978).

In the all conditions of the work, the petaloid male - sterility were more stable like the brown anthers male sterility (Eisa and Wallace, 1969; Chada and Frese, 1981; Gauchene, 1989; Elena Chira, 1998) and this is the reason for they are favorite for breeding, with all the drawbacks (the plants of petaloid type are less visited of the pollinated insects).

Because the carrot male - sterility is genetic determined but in the same time it is influenced by natural conditions, the main objectiv in the breeding program from ICLF Vidra was to identify androsterile sources for obtain inbred lines with more phenotypic stability in the south country conditions and to used them like matern genitors for create the F1 comercial hybrids.

MATERIAL AND METODS

With a view purposed achievement, at ICLF Vidra, in 2006 – 2007 years, the identified androsterile plants of carrots have beed studied for the phenotypic stability of male sterility character during the whole phenophase of blossoming.

The biologic material studied was represented of 6 inbred male- sterile lines (3 of brown anthers type and 3 of petaloid type).

To the opening flowers, from the main or equivalent inflorescences, were marked the male sterile plants of brown anthers type or the petaloid type, the plants were marked and were pollenizated with pollen from male - fertile analogous, in the sight to obtain of seed.

According as opening of the flowers from the superior order inflorescences, the plants were analizated about the flower type. Those who were identified with the fertile flowers (just the existence of one stamen blooming with viable pollen) they were eliminate from selection.

These plants represented the descents of stable homozigote male- sterile lines in the natural conditions from the previous years. The determinations were realised on 300 of seminal plants for each line of brown anthers type and on 250 of seminal plants for each line of brown anthers type.

The dates presented are the average values for those two years of researches. The experimental dates were analysed with the multiple comparisions method (the Duncan test), in the sight of establish the significance of the lines diferences, (Ceapoiu, 1968).

RESULTS AND DISCUSSIONS

Analysing the experimental dates obtained we noticed as in the period of two years of researches (with the temperatures exceeded 33^0C during the phenophases of blossoming) the androsterile linies with brown anthers L ABMV2 and L ABMV5 proved to be stable in the whole period of the blossoming phenophase and they have over 90% male - sterile plants, respectively 92,12 and 91%.

The male - sterile types with brown anthers LABMV1, LABVMV4 and LABMV3 segregated for partial fertility at 4 and 5 order of inflorescences. The

percent of the male- sterile plants was only 78,6% for the LABMV3 line. (Table 1, figure 1).

In the same conditions, the petaloid male- sterile lines were phenotypic stable with the male- sterile plants percents from 98,7% for LPMV5 line to 95,66% for LPMV11 line (Table 2, Figure 2).

The male - sterile lines with over 90% male - sterile plants can be considered stable lines. The brown anthers type of male -sterile line LABMV3 with 78,60% male - sterile plants will be eliminated and the lines LABMV1 and LABMV4 will be studied for descents in the next years.

Table 1

The male - sterile inbred lines of brown anthers type at carrot

No.	Code of mal - sterile line	Male- sterile plants %	Semnification *
1	ABMV2	92,12	a
2	ABMV5	91,00	a
3	ABMV1	85,44	b
4	ABMV4	84,88	b
5	ABMV3	78,60	c

*Variants having the same letters do not differ significantly for the level of P=5%

Fig. 1 – Brown anthers type of flowers at carrot

Fig. 2 – Petaloid type of flowers at carrot

Table 2

The androsterile inbred lines of petaloid type at carrot

No.	The code of male- sterile line	Male- sterile plants %	Semnification
1	PMV5	98,70	a
2	PMV3	97,33	a
3	PMV7	97,00	a
4	PMV30	97,00	a
5	PMV11	95,66	b

**Variants having the same letters do not differ significantly for the level of P=5%

CONCLUSIONS

The study of brown anthers type and petaloid type inbred lines at carrot in 2006 – 2007 period, in conditions from ICDLF Vidra, placed in the south of country proved following conclusions:

The petaloid type of androsterile inbred lines are phenotypical stable for this area, with 95% androsterile plants.

The LABMV2 and LABMV5 were the most phenotypical stable among the brown type of inbred lines, with 90% androsterile plants.

The petaloid type of androsterile lines are more phenotypical stable as the brown anthers type and they will be used like matern genitors to obtain the comercial hybrids of carrots.

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EFFECT OF „IN VITRO" PLANT GROWTH REGULATORS OVER THE MERISTEMATIC AND MITOTIC ACTIVITY AT DIFFERENT GENOTYPES OF *CAPSICUM ANUUM* L.

EFECTELE INDUSE DE HORMONII DE CREŞTERE UTILIZAŢI „*IN VITRO*" ASUPRA ACTIVITĂŢII MITOTICE ŞI MERISTEMATICE LA DIFERITE GENOTIPURI DE *CAPSICUM ANUUM* L.

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Abstract. *The multiplication „in vitro" of pepper genotypes is a tool frequently utilized due to its viability when comparing with classical methods. This viability is due to the high efficiency expressed in the number of regenerated plants but especially due to the possibility of obtaining of plants with a low degree of somaclonal variability, strictly keeping the genetic inheritance of donor plants. The covering of a life stage "in vitro" is generally a stage in which the different environmental factors acts like stressing factors for plants. The effects induced by these factors with synergic activity are located at cellular level through the alteration of meristematic cycle, through the apparition of different types of chromosomal aberrations, through and increase or decrease of prophase index, metaphase index, etc. The present study concentrates on the determination of influence of hormonal formuli utilized in the multiplication of valuable genotypes, over the mitotic and meristematic activities at pepper. The selection of a hormonal formuli that should allow the limitation of this somaclonal variability to a level similar with the level in which the natural variability occur represents an important premise for the "in vitro" multiplication process. The study in root meristematic tips allows the selection in early stages of a hormonal variant that determines the lowest number of chromosomal aberration as well as that allows the support of mitotic activity of meristematic cells.*

Rezumat. *Multiplicarea „in vitro" a genotipurilor valoroase de ardei este o practică des utilizată datorită fiabilităţii acestei metode comparative cu metodele clasice. Această fiabilitate este dată pe de o parte de eficienţa exprimată în numărul de plante generate dar mai ales datorită posibilităţii obţinerii unor plante cu un grad de variabilitate genetică mic, păstrându-se nealterate zestrea genetică a plantelor donor. Parcurgerea unei etape de viaţă "in vitro" este în general o perioadă în care diferiţii factori de mediu acţionează ca factori de stress. Efectele induse de aceşti factori cu acţiune sinergică se regăsesc la nivel celular prin alterarea ciclului meristematic, prin apariţia diferitelor tipuri de aberaţii cromosomiale, prin creşterea sau scăderea indicelui profazic, metafazic etc. Prezentul studiu se concentrază pe determinarea influenţei formulei hormonale utilizate în procesul de multiplicare a genotipurilor valoroase asupra activităţii mitotice şi meristematice la ardei. Selecţionarea unei formule hormonale care să permită limitarea variabilităţii somaclonale la o valoare similară variabilităţii naturale reprezintă o premiză importantă pentru micropropagarea „in vitro". Studiul în meristemele*

radiculare ale plantelor regenerate permite selecţionarea încă din stadii timpurii a variantei hormonale care determină cel mai mic număr de alteraţii cromosomiale precum şi care permite susţinerea activităţii mitotice a celulelor meristematice.

INTRODUCTION

The literature tackled the problem of chromosomal studies that regards the evolution of cells division of *Capsicum* but the studies focused especially toward the following aspects: the influence of different types of mutagen or non-mutagen substances like caffeine (Rosu et al., 2006), or cytogenetical study in inter-varietal crosses (Raghuvanshi, 1991, Mascone, 1992, 1993, 1999), chromosome numbers in wild and semi-domesticated varieties (Pozzobon, 2006), cytogenetic studies of F1 hybrids (Panda, 2004, Pickersgill, 1991, Bapa, 1992), etc and less on the influence of "in vitro" stage.

In what concern cytogenetics, karyotype aspects have been studied in wild and domesticated species (Pickersgill 1971, 1977, 1991, Limaye and Patil 1989, Moscone 1990, 1993, 1999, Bertão 1993, Moscone *et al.* 1993, 1995, 1996, Tong and Bosland 1997, 2003, Ferreira 1998, Park *et al.* 2000). Meiotic behavior evaluation has been performed in wild and domesticated species as well as in some hybrids, aiming at verifying genomic diversification during evolution as well as possible inter-specific phylogenetic relations (Otha 1961, Lippert *et al.* 1966, Shopova 1966a, 1966b, Carluccio and Saccardo 1977, Pickersgill 1971, 1977, 1991, Saccardo and Ramulu 1977, Egawa and Tanaka 1984, Mirkova and Molchova 1985, Kumar *et al.* 1987, Raghuvanshi and Saxena 1991, Moscone 1992, Bapa Rao *et al.* 1992, Lanteri and Pickersgill 1993, Tong and Bosland 1999, Panda *et al.* 2004).

The present study concentrates on the determination of influence of hormonal formuli utilized in the multiplication of valuable genotypes, over the mitotic and meristematic activities at pepper. The selection of a hormonal formuli that should allow the limitation of this somaclonal variability to a level similar with the level in which the natural variability occur represents an important premise for the "in vitro" multiplication process. The study in root meristematic tips allows the selection in early stages of a hormonal variant that determines the lowest number of chromosomal aberration as well as that allows the support of mitotic activity of meristematic cells.

MATERIAL AND METHODS

The biological material is represented from 3 genotypes of pepper (*Capsicum anuum* L.) from Vegetable Research and Development Station Bacau, Romania. The seeds were utilized for the "in vitro" multiplication of these valuable genotypes and the meristematic root tips were excised from the "in vitro" plantlets regenerated on D1-D3 variants, characterized through the presence of BAP and Kinetin alone or in association with BAP- table1.

The control variant is represented by plants germinated "ex vitro" in Petri dishes. The cytogenetic studies were accomplished in meristematic root cells, stained in Carnoy fixing solution for 24 hours at 4^0C then hydrolyzed with HCl for 7 minutes and colored with the basic coloring solution Carr. The root meristems were displayed using squash technique and for each genotype and variant 6000 cells were counted.

Table 1

Experimental variants utilized in the cytogenetic studies at *Capsicum anuum* L.

Components	D0	D1	D2	D3
Macro elements	seeds germinated "ex vitro"	MS, 1962		
Microelements		MS, 1962		
Vitamins		B_5		
BAP		2,0 mg/l	-	1,5 mg/l
Kinetin		-	2 mg/l	-
IAA		-	-	0,5 mg/l
Sucrose		3%	3%	3%
Agar		8 ‰	8 ‰	8 ‰

Chromosome slides were then observed microscopically. Numbers of dividing cells at different levels of mitosis were recorded. Mitotic data were subjected to statistical analysis by calculating the mitotic index (% cells in division per total number of examined cells), prophasic index (% cells in prophases per total number of examined cells), metaphasic index (% cells in metaphases per total number of examined cells), anaphasic index (% cells in anaphase per total number of examined cells) and telophasic index (% cells in telophase per total number of examined cells).

RESULTS AND DISCUSSIONS

The main indexes (mitotic index, prophasic index, metaphasic index, anaphasic index, telophasic index) calculated for each genotype in controls and on hormonal formuli are shown in table 2,3,4.

Table 2

The values of the main cellular indexes monitorised in the root tips of BENDINGO F1genotype

Hormonal variant	Repartition of the main division indexes				
	Mitotic index	Prophasic index	Metaphasic index	Anaphasic index	Telophasic index
Control	29,98	56,01	29,90	7,18	6,89
D1	39,84	47,74	33,21	9,65	9,27
D2	32,27	54,76	54,76	9,07	5,07
D3	32,34	53,89	32,18	7,99	5,92

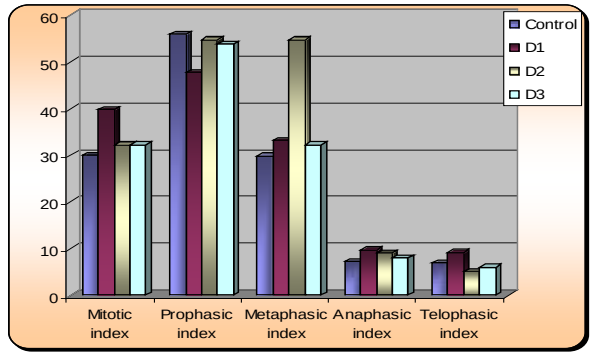

Fig. 1 – Graphical representation of the main indexes observed in root meristematic cells – genotype Bendingo F1

Table 3

The values of the main cellular indexes monitorised in the root tips of FIESTA F1genotype

Hormonal variant	Repartition of the main division indexes				
	Mitotic index	Prophasic index	Metaphasic index	Anaphasic index	Telophasic index
Control	33,78	56,87	13,80	13,36	15,95
D1	40,87	47,00	26,18	15,17	11,64
D2	34,90	50,05	24,89	13,54	11,51
D3	40,16	50,04	27,21	10,74	11,99

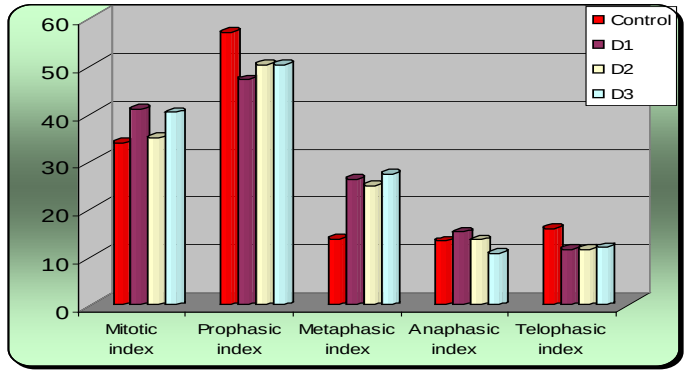

Fig. 2 – Graphical representation of the main indexes observed in root meristematic cells – genotype Fiesta F1

Table 4

The values of the main cellular indexes in the root tips of CERES genotype

Hormonal variant	Repartition of the main division indexes				
	Mitotic index	Prophasic index	Metaphasic index	Anaphasic index	Telophasic index
Control	29,13	51,75	14,34	21,79	12,10
D1	32,09	52,73	14,87	21,44	10,94
D2	28,25	49,96	25,94	17,79	6,29
D3	31,88	55,66	16,10	16,28	11,94

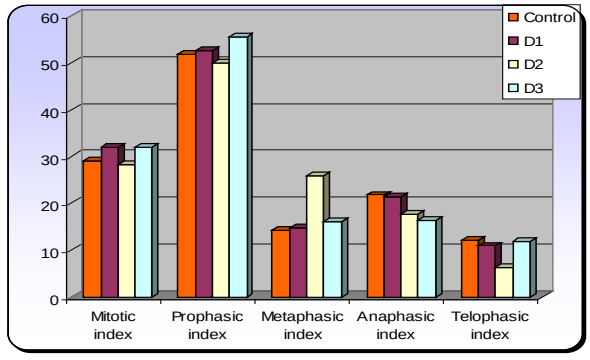

Fig. 3– Graphical representation of the main indexes observed in root meristematic cells – genotype Ceres

As shown in Fig. 1, 2, 3 the exposure to “in vitro” cultivation conditions determined positive modifications of the mitotic index. At all the genotypes utilized in the present study, when comparing with the control variant (seeds germinated “ex vitro”), the frequency of dividing cells is much superior to the control.

The cultivation of the excised pepper explants on different “in vitro” media did not affect the distribution of the cells in the mitosis cycle. At all three genotypes the main numbers of cells were in prophases, then in metaphases, anaphases and telophases. Only at Ceres genotype the anaphasic index was larger then the telophasic one. Due to the fact that this modification in the distribution of cells phases was observed also on the control variant, suggest that is not determined by the cultivation technique but by genetic or other physical factors.

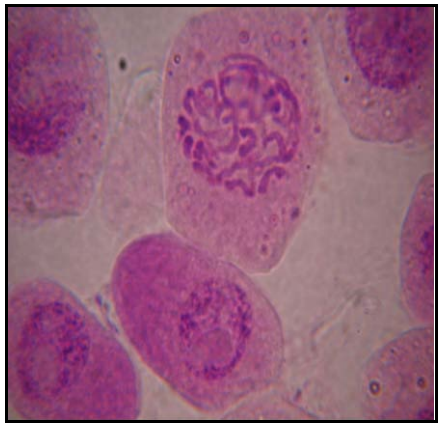

Fig 1 – Cells in interphases and prophases

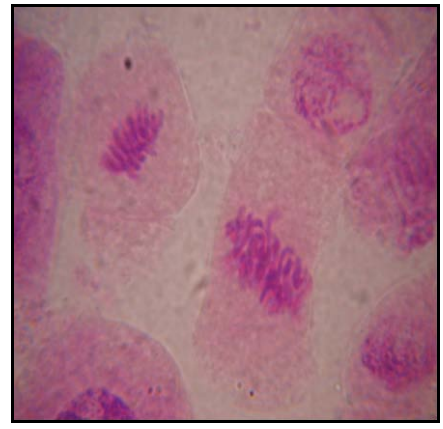

Fig 2 – Cells in metaphases

Fig 3 – Cells in anaphase

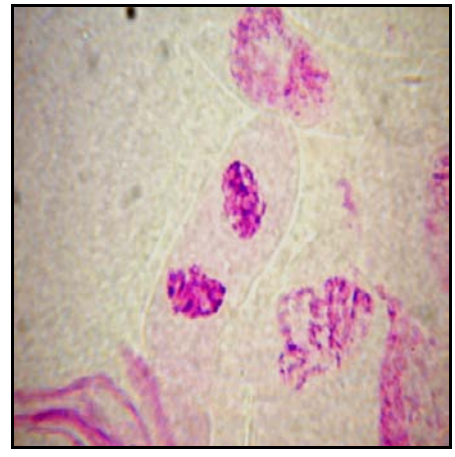

Fig. 4 - Cells in telophase

CONCLUSIONS

The results obtained in our experiment proved that the exposure to “in vitro” cultivation conditions determined positive modifications of the mitotic index. At all the genotypes utilized in the present study, when comparing with the control variant (seeds germinated “ex vitro”), the frequency of dividing cells is much superior to the control.

The cultivation of pepper shoot tips on nutritive medium modified with Kinetin and BAP allows the regeneration of new plants with a stable genetic material that shows little modification in the spectrum of the cells distribution in mitosis. At all three genotypes the main numbers of cells were in prophases, then in metaphases, anaphases and telophases.

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GENETIC DIVERSITY EVALUATION OF SOME AUTOCHTHONOUS GRAPEVINE VARIETIES BY RAPD MARKERS

EVALUAREA DIVERSITATII GENETICE A UNOR SOIURI AUTOHTONE DE VITA DE VIE CU AJUTORUL MARKERILOR RAPD

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Abstract. *The present study was designed to establish the genetic relationships among 11 grapevine varieties grown in two different regions by using RAPD markers. Nine highly polymorphic markers were selected to characterize the native Vitis vinifera L. cultivars, listed in the Romanian Official Catalog of plant varieties. The random primers yielded 111 amplified fragments ranging between 230 and 4041 bp in size. A general characteristic for all obtained RAPD patterns with DNA amplicons was the high degree of variation among cultivars revealed by proportion of polymorphic bands ranging from 78% to 100%. Genetic relationships were established by statistic analysis of RAPD markers using LabImage software and the dendrogram was constructed based on Jaccard's similarity coefficient and UPGMA clustering. The selected RAPD markers proved to be very efficient to discriminate the tested varieties and provide valuable genetic information about Romanian grapevine germplasm. The high level of genetic variation among tested varieties could be attributable to differences among cultivars within geographical areas and also to specificity of Romanian viticulture tradition.*

Rezumat. *Obiectivul acest studiu a fost acela de a utiliza markeri moleculari RAPD în scopul stabilirii relaţiei genetice între 11 soiuri de viţă de vie listate în Catalogul Oficial al soirilor de plante şi care provin din două areale de cultură diferite. Cu primerii selectaţi pentru caracterizarea soiurilor locale de Vitis vinifera L., s-au obţinut 111 fragmente de amplificare a căror mărime a variat între 230 şi 4041 pb. Caracteristica comună pentru toţi markerii testaţi a fost distribuţia foarte diferită a fragmentelor de amplificare în gel, proporţia de benzi polimorfice fiind cuprinsă între 78% şi 100%. Analiza statistică a markerilor RAPD cu programul LabImage şi dendrograma obţinută pe baza coeficientului de similaritate Jaccard, au stat la baza aprecierii relaţiilor genetice între soiurile luate în studiu. Metoda folosită s-a dovedit a fi relativ uşoară şi foarte eficientă pentru evidenţierea diferenţelor dintre soiuri, furnizând informaţii valoroase pentru caracterizarea genetică a germoplasmei viticole româneşti. Variaţia genetică mare între genotipurile testate poate fi atribuită pe de o parte zestrei genetice specifice în arealele geografice din care provin, iar pe de altă parte păstrării în timp a tradiţiei viticole locale.*

Key words: romanian grapevine varieties, RAPD markers, genetic diversity, *Vitis vinifera* sp.

Grapevine is the most important perennial crop worldwide and is today grown throughout the temperate and tropical regions of the world for fresh and dried fruit, juice, and wine production (Oprea and Moldovan. 2007; Sestras. 2004) . The world's collections of grape plant material are estimated to contain about 5000–15.000 cultivars. For the management of germplasm collections one essential aspect is to use only certain and complete characterized cultivars and to avoid any problem arising from synonymous and homonymous cultivar designations. Cultivar identification in grapevine can be very difficult when relying only upon ampelography and botanical characteristics. The use of molecular markers for grapevine identification proved to be a viable alternative or supplement to ampelography (Thomas et al. 1993). PCR-based DNA markers provide a more reliable alternative for cultivar identification, for similarities detection, and for defining genetic relationships among grapevine varieties (Bowers et al. 1993; Sefc et al. 1999). Random Amplified Polymorphic DNA is considered to be a reasonably low-price method and proves to be successful in distinguishing grape varieties (Gogorcena et al. 1993; Grando et al. 1995). Moreover, RAPD technique is fast and easy, since it does not require any prior knowledge of the markers sequences, is capable of detecting high levels of genetic variation and is very efficient in assessments of genetic diversity of grape as well as other taxa.

The present work investigates the genetic relationships among eleven native Romanian varieties with the goal to obtain a genotype-specific profile. In this study RAPD markers were used to detect and evaluate the polymorphism degree of the analyzed grapevine cultivars originated in Podisul Transilvania.

MATERIAL AND METHODS

Plant material: The cultivars (*Vitis vinifera* L.) used in this study are listed in table 1. The eleven varieties analysed were provided by the Research and Development Station for Viticulture and Oenology Blaj and by the University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca.

DNA extraction: Total genomic DNA was extracted from young leaves frozen in liquid nitrogen and grounded to a fine powder, following the protocol of Doyle and Doyle (1990), modified by Cipriani and Morgante (1993).

PCR conditions: RAPD amplification was performed in a reaction volume of 25 µl containing 4 mM $MgCl_2$, 0.4 mM of each dNTP, 0.6 units Taq DNA polymerase, 0.8 µM primer and 100-200 ng genomic DNA. The amplification reactions were carried out in an Abi Prism 7900 HT Real Time PCR (Applied Biosystem) programmed as following: preliminary denaturation of DNA at 94°C for 30 s, 45 cycles of 92°C for 30 s, 36°C for 25 s and 72°C for 74 s, and a final extension step at 72°C for 8 min. The amplification of each genotype-primer combination was repeated twice. The PCR products were separated by gel electrophoresis on a 0.8 % agarose gel, in 1 x TBE buffer during 1 h at 90 V and stained with ethidium bromide (10 mg/ml). The 100 bp DNA Ladder (Promega) was used as a molecular size standard. Photographs of the gels were obtained with a Gene Flash Syngene Bio Imaging.

Scoring and data analysis: The PCR fragments were scored for the presence (1) or absence (0) of equally sized bands revealed in the photographs of gel profiles

(Figure 1) using LabImage software. Only reproducible bands were considered and than the binary character matrix was used for the FreeTree computer program. These data assured the calculation of pairwise genetic distances among cultivars with Jaccard's coefficient. The distance similarity matrix was subjected to a cluster analysis using the unweighted pair-group method with arithmetic averages (UPGMA). The dendrogam was generated using TreeView software.

Table 1

Grapevine cultivars investigated in this study

No	Cultivar	Utility	Berry colour
1	Timpuriu de Cluj	Table grape	White
2	Napoca	Table grape	Black
3	Transilvania	Table grape	Black
4	Cetățuia	Table grape	Black
5	Splendid	Table grape	Red-black
6	Blasius	Wine grape	White
7	Selena	Wine grape	Pink
8	Amurg	Wine grape	Black
9	Brumariu	Wine grape	White
10	Astra	Wine grape	White
11	Radames	Wine grape	Red-grey

RESULTS AND DISCUSSIONS

The eleven Romanian cultivars were subjected to RAPD marker analysis in order to evaluate their degree of genetic variation. As an initial step, a total of 30 arbitrary 10-mer primers (Operon Technologies, Alameda, California) were screened for their ability to amplify the extracted DNA. Only 10 informative primers were selected, on the basis of their ability to produce unambiguous and stable RAPD markers.

These random primers yielded a total of 111 reproducible bands ranging from 230 bp (OPA05) to 4041 bp (OPA19). The number of bands per primer varied from 5 (OPA20) to 23 (OPA05) with an average of 11 bands per primer (table 2). One hundred and six bands (95%) out of the 111 reproducible bands were polymorphic. A general characteristic for all obtained RAPD patterns with DNA amplicons was the high degree of variation among cultivars revealed by proportion of polymorphic bands ranging from 78% to 100%.

According to each template banding patterns, no single primer proved to distinguish all studied varieties. So, primers OPA 02 and OPA 01 could distinguish 9 cultivars out of 11, while with OPA 07 generated specific patterns for 8 cultivars (Fig. 1). The banding patterns obtained with primers OPA04, OPA05, OPA19, OPA20 and OPB04 produced stable RAPD markers, but the level of polymorphism was lower.

Table 2

Amplification products obtained with RAPD primers

Primer	Sequence	No of bands	No of polymorphic bands
OPA01	CAGGCCCTTC	15	15
OPA02	TGCCGAGCTG	13	12
OPA04	AATCGGGCTG	9	7
OPA05	AGGGGTCTTG	23	22
OPA07	GAAACGGGTG	17	17
OPA08	GTGACGTAGG	10	10
OPA10	GTGATCGCAG	12	12
OPA19	CAAACGTCGG	7	7
OPA20	GTTGCGATCC	5	4
OPB04	GGACTGGACT	4	3

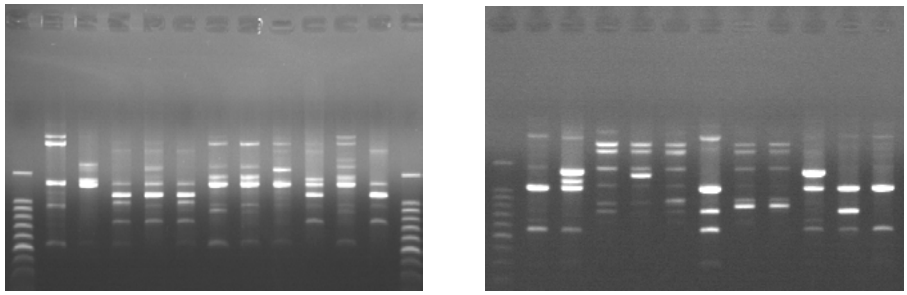

Figure 1. Representative RAPD profiles of the 11 genotypes generated with primer OPA02 (a) and OPA07 (b) The numbers represent: 1-Timpuriu de Cluj; 2-Napoca; 3-Transilvania; 4-Cetatuia; 5-Splendid; 6-Blasius; 7-Selena; 8-Amurg; 9-Brumariu; 10-Astra; 11-Radames

Based on Jaccard's coefficient and UPGMA clustering program, was constructed the dendogram (figure 2), which revealed also the genetic relationship between studied cultivars. The genetic diversity ranged from 0.17 (Napoca and Radames) to 0.71 (Transilvania and Splendid). This dendrogram strongly supports also the relationship among cultivars belonging to a certain region and also illustrates the level of similarity in agreement with at least one common parents used as ascendant (e.g. Amurg and Selena; Splendid and Transilvania). Consistent with other results, our RAPD analysis allowed discrimination among grape cultivars (Ye et al. 1998, Vidal et al. 1999). On the basis of the RAPD profiles, the resulting distance values and the dendrogram, it can be concluded that all the cultivars of our analysis are different to a relatively high degree.

The stability of the dendrogram was also analyzed by the bootstrap method, which provided confidence for the different nodes. A value higher than 50% indicates a most reliable branch of the tree and, in the same time, indicates a certain degree of relatedness or similarity between studied genotypes. Thus, our results proved to be in accordance with cultivars pedigree and demonstrated once again the usefulness of RAPD analysis in assessing the genetic relationships in grape germplasm.

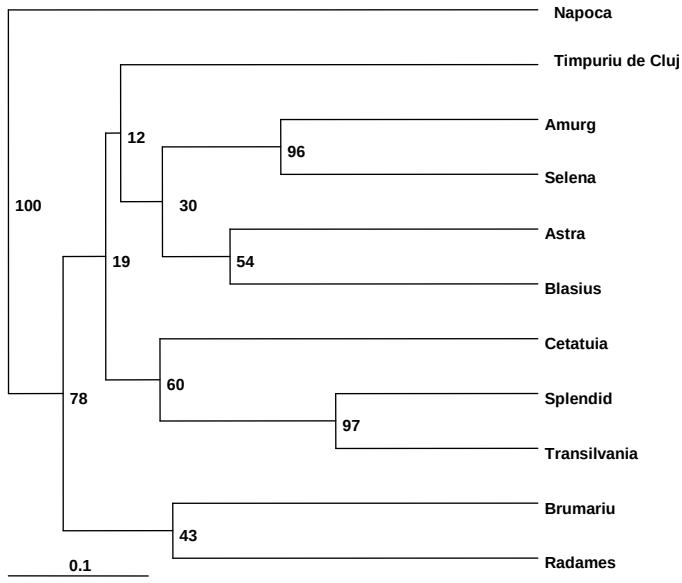

Figure 2. - Neighbor-joining tree of 11 Romanian genotypes. Numbers at the nodes indicate the number of times the grouping occured from 100 bootstrap replication

The RAPD approach, for its high capacity of generating DNA markers, allows a genome scanning limited only by the number of primers involved. Therefore, it seems to be helpful to use these type of markers to evaluate the genetic diversity present in our *Vitis* germplasm collections, and especially to the Romanian cultivars. The ability to differentiate the tested cultivars by RAPD markers suggested that this technique may provide a rapid and inexpensive method for the identification of cultivars indigenous in Romania, even between phenotipically similar cultivars (Ye et al. 1998).

The informative primers identified and tested in our studies will be useful in genetic analysis of grapevine accessions in germplasm holdings. Further, putative species-specific RAPD markers could be converted to sequence characterized amplification regions (SCARs) after sequencing and designing primer pairs to develop robust species specific markers.

CONCLUSIONS

The data obtained in this study provide valuable genetic information, important to reveal the uniqueness of Romanian grapevine varieties and their high degree of polymorphism detected by RAPD markers.

The high level of genetic variation among tested varieties could be attributable to differences among cultivars within geographical areas, significant inter-population distance and the Romanian viticulture tradition.

According to these results, each of the investigated cultivars constitutes an independent source of genetic variation, and a valuable resource of genetic traits for grapevine breeding programs.

Taking into consideration the invaluable importance of national grapevine varieties and of knowledge on their genetic relationships as a basis for biodiversity protection and efficient exploitation, our group will continue working on Romanian grapevine cultivars with primers providing the most polymorphic patterns.

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USE RAPD TECHNIQUE FOR REVEALING MOLECULAR POLYMORPHISM OF SOME GRAPEVINE SOMACLONES

DETERMINAREA POLIMORFISMULUI LA NIVEL MOLECULAR PRIN TEHNICA RAPD A UNOR SOMACLONE DE VIȚĂ DE VIE

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Abstract. *In vitro grapevine regenerated shoots obtained from callus culture were analyzed in order to reveal the molecular polymorphism. Somaclonal variation is so often associated by direct callus or cell suspensions regenerations. The samples were analyzed using RAPD Markers (Random Amplified Polymorphic DNA). Total DNA was extracted using the protocol published by Lodhi et al. (1994) and modified by our research team (Pop R. et al., 2003). For DNA isolation we used regenerated shoot provided by in vitro subcultivated grapevine cultivars such as: Cabernet Sauvignon, Fetească albă, Merlot, Traminer rose and Riesling italian. PCR amplification reactions were carried out using the same 22 arbitrary primers which generated polymorphic bands in case of parental cultivars collected by experimental field. Genetic distances between analyzed samples were calculated based on Jaccard coefficient and the dendrogram was constructed with RAPDistance 1.04 soft. The built dendrogram shows that there are differences at molecular level among somaclones and among grapevine parental cultivars and somaclones.*

Rezumat. *In acest studiu a fost testat heteromorfismul molecular la regeneranții de viță de vie obținuți in vitro prin cultura de calus. Variabilitatea somaclonală este asociată adesea cu regenerarea directă din calus sau din suspensii de celule. Pentru testarea heteromorfismului la nivel molecular probele au fost analizate cu ajutorul markerilor RAPD (Random Amplified Polymorphic DNA). Extracția ADN-ului a fost realizată prin metoda Lodhi şi colab.(1994) modificată de noi (Pop R şi colab., 2003), din regeneranții obținuți prin subcultivări repetate in vitro la soiurile Cabernet Sauvignon, Fetească albă, Merlot, Traminer roz şi Riesling italian. Pentru amplificarea PCR a probelor s-au folosit un număr de 22 de primeri decameri, primeri care au dat benzi polimorfice şi în cazul extracției de ADN din soiurile de viță de vie recoltate din câmp. Distanțele genetice dintre probele analizate au fost calculate pe baza coeficientului Jaccard, iar dendrograma a fost realizată cu ajutorul programului RAPDistance 1.04. Dendrograma obținută relevă faptul că somaclonele obținute se diferențiază la nivel molecular de cultivarele parentale din care au provenit.*

Key words: grapevine, somaclones, molecular polymorphism, RAPD

Somaclonal variation is an important source of variability for *in vitro* cultivated plants. At the present moment, this type of variation is considered an aleatory process which can be successfully use in some of plant breeding strategies. In the last two decades, plant tissue culture proved to be a potential source of genetic variation, and

therefore, a possible mean for selecting new valuable genotypes among the regenerated somaclones exhibiting stable modification of a trait (Popescu et al., 2002).

In the case of grapevine, somaclonal regenerants of different types have been reported with regard to plant morphology. On the basis of ampelographical criteria it has been concluded that *in vitro* regenerated somaclones are very similar, but this has not been proved at the genetic level (Popescu et al., 2002). If morphogenetic changes are not apparent, other plant screening procedures must be applied: comparative biochemicals analysis (e.g. isozyme analysis after protein electrophoresis separation) or cytological studies reffering to changes in number and structure of the chromosomes.

During the last years, especially after the improvement of PCR (Polimerase Chain Reaction) method, molecular techniques became increasingly used in genus *Vitis* for identification of species, cultivars and somaclonal variations (Saiki and all., 1988, cited by Pamfil, 1999). Various molecular techniques (RFLP-Restriction Fragment Length Polymorphism, AFLP- Amplified Fragment Length Polymorphism, RAPD- Random Amplified Polymorphic DNA, microsatellites and ISSR- Inter Simple Sequence Repeats etc.) are used to characterize genetic grapevine diversity. Among these molecular techniques, RAPD is simple, quick, easy to perform and require small amount of DNA for analysis.The major advantage of RAPD is that no prior sequence information is required. These benefits justify the frequent application of the technique in genetic variability studies (Loureiro et al., 1998, cyted by Pamfil, 1999; Pop Rodica et al.,2005, Popescu et al., 2002).

MATERIALS AND METHODS

Grapevine varieties included in this study were collected from Blaj, Recas, Iasi, Valea Calugareasca-Odobesti and were represented of the following cultivars: Feteasca alba, Feteasca regala, Riesling Italian, Traminer, Cabernet Sauvgnion, Muscat Ottonel, Merlot, Cetatuia, Napoca and Timpuriu de Cluj. Somaclonal variation study was performed using plantlets regenerated via callus. In our studies the callus was induced using the plantlets micropropagated *in vitro*.

The morphogenetic callus, obtained from nodal fragments, was subcultured in Murashige-Skoog medium supplemented with different concentrations of TDZ - thidiazuron (N-phenyl-N'-1,2,3,-thidiazol-5-yl urea) in combination with 0,5 mg/l NAA (naftil acetic acid). All the variants of culture media were supplemented with 3% sucrose and 0,75% agar. The pH was adjusted to 5,8 with 0,1 N NaOH solution, before autoclaving at 121^0C, for 20 minutes. We used three variants of culture media: MS– TDZ – 0,5 mg/l TDZ + 0,5 mg/l ANA, MS –TDZ – 1,0 mg/l TDZ+ 0,5 mg/l ANA and MS– TDZ – 2,0 mg/l TDZ+ 0,5 mg/l ANA. The experiment was made in three replications and interpreted as a bifactorial test with: factor A (cultivar) with ten graduations and factor B (culture media) with three graduations. The obtained data were computed according to analysis of variance in bifactorial experiments (Ardelean et al., 2002).

The micropropagated plants were subsequently maintained *in vitro* by periodical transfer to the same variants of culture media in order to obtain enough material for DNA isolation. In this study, we used for genomic DNA isolation leaves harvested from plantlets obtained after 5, 10 and 15 subcultures on fresh culture media. We analyzed somaclones provided from different grapevine cultivars.

Genomic DNA was extracted from *in vitro* plantlets regenerated via callus using a modified version (Pop Rodica et al., 2003) of the protocol publised by Lodhi et al. in 1994. Extraction buffer has the following composition: 100mM Tris-HCl, 20 mM EDTA, pH =8.0, 1.4 M Na Cl, 2% (w/v) CTAB and 2% PVP-40 and 0.2% β-mercaptoethanol. This buffer was also supplemented with 5 mM ascorbic acid and 4 mM DIECA. DNA concentration and the absorbance ratio at A_{260}:A_{280} was quantified in a BioPhotometer Eppendorf. Reaction mixture for PCR in 25 µl volume consisted of 50 ng DNA, 200 µM of each dNTP (Promega), 0,2 µM primer (UBC, Pharmacia Biotech, see table no. 1), 2,5 mM $MgCl_2$, 2,5 mM 10 x Buffer, 1 U Taq DNA Polymerase (Promega), 2% PVP (Sigma),

bidistillated sterile water. Amplification was performed in a Eppendorf Mastercycler Gradient programmed for the following thermal profile: an initial denaturation step – 3 min at 95^{o}C, followed by 45 cycles of 1 min. at 93^{0}C, 1 min. at 34^{0}C, 1 min. at 72^{0}C. A final extension step at 72^{0}C was performed for 10 minutes. Amplification products were separated in 1.4 agarose (Sigma) gel at 55 V for 2.5 h in 0.5 x TBE Buffer and visualized under UV light after staining with ethidium bromide using Alpha Innotech system. For the comparation among results, in agarose gels, after DNA Ladder we loaded in second lane DNA sample provided from *in vivo* plant control (leaves of parental cultivar collected by experimental field) following by DNA samples isolated from each somaclones of the same cultivar. RAPD bands were scored as present (1) or absent (0). The gel image was recorded with AlphaImager 2.200 system. Genetic distances were established using Jaccard's coefficient. The dendrogram was constructed with RAPDistance 1.04 software using Neighbor-Joining method. Table 1 shows the nucleotide sequences of RAPD primers used in DNA amplification of regenerants obtained *in vitro*.

Table 1

Primers used in DNA amplification of regenerants obtained

No	*Primer*	*Sequence (5' – 3')*	*No*	*Primer*	*Sequence (5' – 3')*
1.	UBC 228	GCT GGG CCG A	12.	OPAB 18	CTG GCG TGT C
2.	UBC 245	CGC GTG CCA G	13.	OPE 14	TGC GGC TGA G
3.	UBC 563	CGC CGC TCC T	14.	AB 11	GTG CGC AAT G
4.	UBC 584	GCG GGC AGG A	15.	OPA 04	AAT CGG GCT G
5.	UBC 599	CAA GAA CCG C	16.	OPA 03	AGT CAG CCA C
6.	PB 1	GGT GCG GGA A	17.	OPAL 20	AGG AGT CGG A
7.	PB 3	GTA GAC CCG T	18.	OPX O3	TGG CGC AGT C
8.	PB 4	AAG AGC CCG T	19.	OPA 01	CAG GCC CTT C
9.	PB 5	AAC GCG CAA C	20.	70.08	CTG TAC CCC C
10.	PB 6	CCC GTC AGC A	21.	70.03	ACG GTG CCT G
11.	OPAB 11	GTG CGC AAT G	22.	MIC – 07	TGT CTG GGT G

RESULTS AND DISCUSSIONS

The values of the calculated F test for all of analysed experimental factors were much higher than the theoretical values (25,4>2,04;2,72, 21484,8>3,15;4,98, 22,2>1,81;2,32). That means that the differences between repetitions and variants were statistical assured in experiment shows in Fig 1.

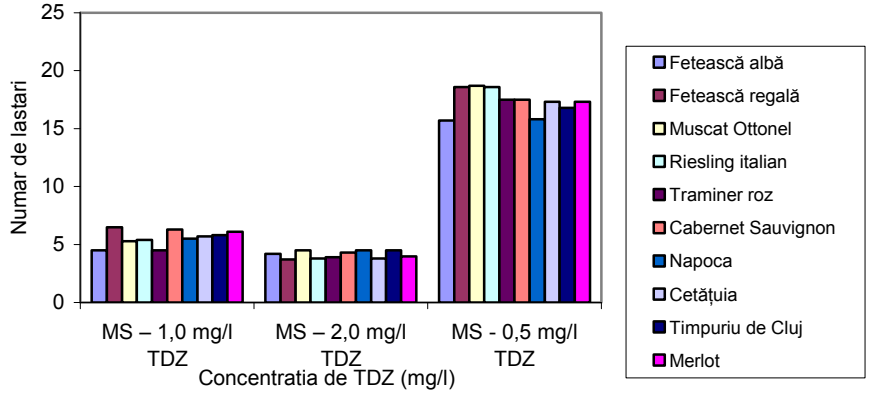


Fig. 1. Number of shoots in the to way experiment (10x3) with cultivars of Vitis vinifera and culture media used in plantlets regeneration from callus

As it can be seen in Fig.1, data obtained by Duncan test shows that the highest mean values of shoots number (18,7) was obtained using MS culture media supplemented with thidiazuron in concentration 0,5 mg/l .

Fig. 2 shows the influence of culture media and cultivars upon the mean length of regenerated shoots after 8 week *in vitro* culture. In this case, F test shows that only culture media generated the differences statistical assured between experimental variants (value of F calculated 954,6>3,15;4,98).

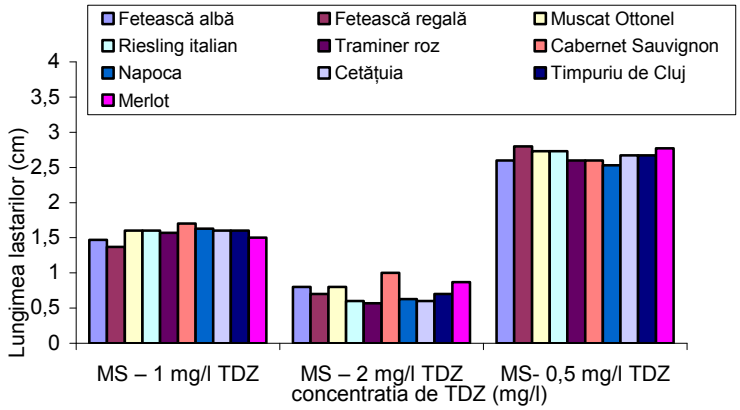


Fig. 2. Length (cm) of shoots in the to way experiment (10x3) with cultivars of Vitis vinifera and culture media used in plantlets regeneration from callus

As it can be seen in this graphic the lowest mean of shoots length was obtained using MS culture media supplemented with thidiazuron in concentration 1,0 mg/l and 2,0 mg/l.

The interaction between these two analysed factors shows that the highest mean of length shoots (2,53-2,80) was obtained when regenerants were provided by Traminer roz cultivar and were subcultivated on MS culture media supplemented with 0,5 mg/l thidiazuron.

Our results suggest that, at phenotypic level, there are not significant differences among plantlets regenerated from morphogenetic calli.

On the other hand, we observed that the somaclonal variation were identified at regenerants obtained after 15 *in vitro* subcultures and for only five analyzed cultivars. Merlot was the cultivar with the high number (5) of somaclones.

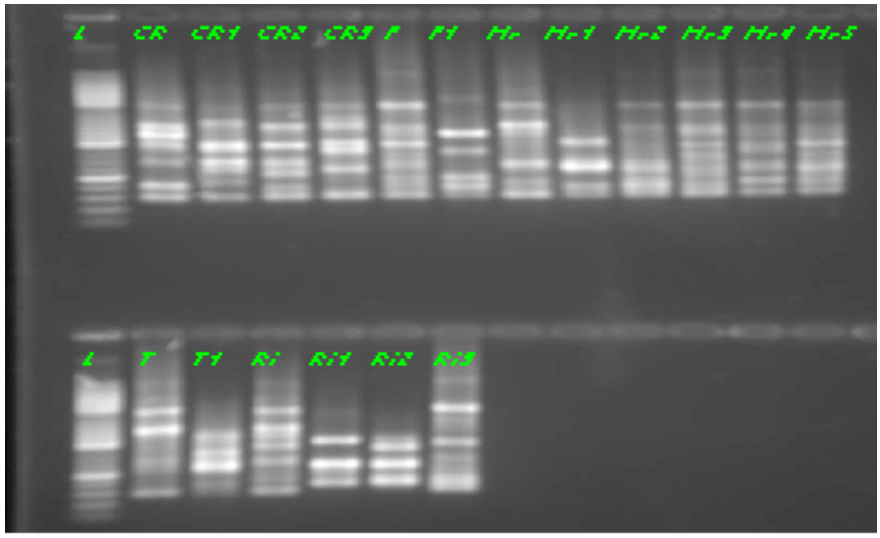
The genetic variability among *in vitro* selected somaclones was analyzed using RAPD molecular marker technique.

DNA fragments generated after PCR amplifications with RAPD primers had the length comprised between 200-2000 bp, respectively 300-1400 bp for the majority.

The primer OPX 03 produced maximum 12 polymorphic bands; primer OPE 14 generated 11 polymorphic bands; OPA 04 and PB 6 primers gave 10 polymorphic bands, PB 1 9 polymorphic bands.

The others primers used generated 6-9 polymorphic bands. An interesting RAPD profile was obtained with primer OPX-03 (Fig.3).

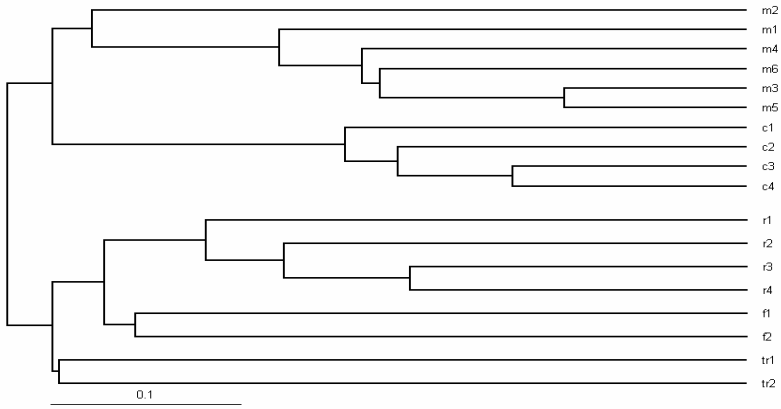
Fig. 3. RAPD profile obtained with primer OPX 03 of parental cultivars(controls) and regeretated somaclones



L- DNA Ladder, CR-parental cultivar Cabernet Sauvignon, CR1, CR2, CR3-somaclones; F-parental cultivar Feteasca albă,F1-somaclone; Mr-parental cultivar Merlot, M1,M2,M3, M4, M5-somaclones; T- parental cultivar Traminer, T1-somaclone; Ri parental cultivar Riesling italian, R1,R2,R3-somaclones.

The agarose gels analysis reveal genetic differences among all of the regenerated grapevine somaclones.

The built dendrogram shows that there are differences at molecular level among somaclones and also grapevine parental cultivars.



Dendrogram shows the genetic reletionship between the parental cultivars (controls) and regenerants obtained in different *in vitro* experimental variants.

Fig.4 Dendrogram of somaclones obtained using Neighbor Joining method

Based on this dendrogram it can be observed that parental cultivar and somaclones provided from this are very closely grouped.

Cabernet Sauvignon and Merlot cultivars were grouped in dendrogram in the same secondary branching closely grouped with regenerated somaclones. This result is in concordance with our *in vivo* preliminary data referring to parental cultivars dendrogram's. This situation is also valuable in case of Fetească albă and Riesling italian cultivars and your's somaclones.

CONCLUSIONS

- Murashige-Skoog culture media supplemented with thidiazuron in concentration 0,5 mg/l can be successfully used of grapevine somaclones induction and previous morphologycal development. In this case, we obtained a lot of neoplantlets, with good caulogenesis development but without radicular system.

- Moderate or high level of TDZ concentration in culture media had the negativ influence upon number and length of grapevine regenerated shoots.

- The grapevine cultivar had not significant influence upon number and length of grapevine regenerated shoots.

- Dendrogram shows the genetic reletionship between the parental cultivar (used as control) and regenerants selected on different experimental variants. Based on this dendrogram we can observe that parental cultivar and somaclones provided from this are very closely grouped.

- The RAPD analysis reveal genetic differences among all of the regenerated grapevine somaclones and it can be considered a valuable tool for revealing molecular polymorphism of some grapevine somaclones.

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BIOLOGICAL EFFECTS INDUCED BY TREATMENT WITH CHEMICAL MUTAGENS AT *PAPAVER SOMNIFERUM* L., IN M_1 GENERATION

EFECTE BIOLOGICE INDUSE DE TRATAMENTUL CU SUBSTANȚE CHIMICE MUTAGENE LA *PAPAVER SOMNIFERUM* L., ÎN GENERAȚIA M_1

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Abstract. *In selection a breeding of plants with medicinal and economic importance, a first step represents obtaining a very diverse biological material, and inducing an individual variability of large amplitude. The agriculture practice has proven that the tendency towards variability, manifested at any species, increases after the intervention with different physical, chemical and biological factors, known under the name of mutagen factors. In the present paper we are restore some biometrical and morpho-anatomical observation regarding to generation M1 of Papaver somniferum. This generation was obtained from treated seeds with three types of chemical mutagen agents, like: colchicine, ethidium bromide and acid 2,4-D, in concentration of 0.01%, 0.02%, 0.03% and 0.04%, each concentration having six hours for action time. Each concentration applied it was considerate like an experimental variant. After the determination of glucids, lipids and brut protein quantities were being remarkable only the variant 0.04%, at others variants establish the values very appropriate with the control, that's why didn't presented in the present paper.*

Rezumat. *În selecția şi ameliorarea plantelor cu importanță medicinală şi economică un prim pas îl constituie obținerea unui material biologic foarte divers, inducerea unei variabilități individuale de largă amplitudine. Practica agricolă a dovedit că tendința spre variabilitate, manifestată la orice specie, creşte în urma intervenției cu diverşi factori fizici, chimici sau biologici, cunoscuți sub numele de factori mutageni. În prezenta lucrare redăm unele observații biometrice şi morfo-anatomice cu privire la generația M1 de Papaver somniferum. Această generație a fost obținută din semințe tratate cu trei tipuri de agenți mutageni chimici, şi anume: colchicină, bromură de etidium şi acidul 2,4-D, în concentrații de 0,01%, 0,02%, 0,03% şi 0,04%, fiecare concentrație având ca timp de acțiune şase ore. Fiecare concentrație aplicată a fost considerată ca variantă experimentală. În urma determinării cantității de glucide, lipide şi proteină brută s-au remarcat modificări cantitative doar la varianta 0,04%, la celelalte variante constatându-se valori foarte apropiate de martor, din acest motiv nefiind prezentate în prezenta lucrare.*

MATERIAL AND METHOD

Biological material it was represented by plants from M1 generation of *Papaver somniferum*, variety *De Botosani*. Plants of M1 generation belonging from the seeds treated with mutagen agents: colchicines, ethidium bromide and 2,4-D acid, in concentration of 0.01%, 0.02%, 0.03% and 0.04%, each having six hours for action time. Used concentrations were considerate experimental variants.

As part of this generation it was being made the biometrical measurements at height plants and the dates were process by statistical method of variance analyses and limited

differences. The quantitative determination of glucides, lipids and brute protein was done to level of roots, stems, leaves, capsule's and seeds.

Quantitative determination of glucides were realised by Bertrand and Borell method, the lipids contents by Soxhlet method, ad brute protein by determining the total nitrogen. The total nitrogen was multiply with 6.25, because, in conventional mode, it is admitted that the medium value of nitrogen content from the protein substances from plants it is 16% (at 1g N corresponding to 100/16 = 6.25g proteins).

RESULTS AND DISCUSSIONS

From dates presented in table 1, it can be observe that, in generation M1, the plant height it was influenced significantly by mutagens used and their concentrations. The biggest height of plants, in M1 generation, indifferent of applied concentrations it was registered at variants treated with ethidium bromide (95.36 cm – 102.19 cm), followed by those treated with colchicines. The smallest medium height of plants was registered to variants treated with 2,4-D (87.79 cm – 94.60 cm).

The higher inhibitory effect on growth process of height was established at variants treated with 2,4-D, followed by those with colchicines. At some others variants was established a growth stimulation, much more superior to control, the maximum height being at 102.19 cm registered to variant 0.03%, ethidium bromide. The standard deviation and the variability coefficient had small values at variants treated with mutagens, comparatively with the control, exception making only the variants treated with 2,4-D.

Table 1

The value of statistical index at plants height after the treatment with mutagen agents

Substances	Concentration	Statistical index		
		$\bar{X} \pm s_{\bar{X}}$	s	s %
Control		90,79 ± 1,0	7,10	7,82
Colchicine	0,01%	89,31 ± 0,95	6,75	7,56
	0,02%	94,06 ± 0,84	5,94	6,32
	0,03%	99,45 ± 0,59	4,23	4,25
	0,04%	88,57 ± 0,97	6,83	7,71
Ethidium bromide	0,01%	98,58 ± 0,34	2,38	2,42
	0,02%	100,89 ± 0,35	2,51	2,48
	0,03%	102,19 ± 0,35	2,53	2,48
	0,04%	95,36 ± 0,31	2,62	2,75
2,4-D acid	0,01%	94,60 ± 0,74	5,24	5,54
	0,02%	89,24 ± 0,97	6,91	7,74
	0,03%	88,38 ± 0,98	6,93	7,85
	0,04%	87,79 ± 1,0	7,07	8,05

The ethidium bromide has determinate a „displace" of variability coefficients in a category of a decrease variability face of control, which could be mean that the modifications registered at respectively variants could be the effect of directly mutagen action.

In function of species, in speciality literature are cited almost the plants growth inhibitions, after the treatment with mutagen agents, and also their stimulation (Floria Fl., 1989).

The plants treated with colchicines had very significantly values of height plants at variant 0.03% and distinguish significantly at 0.02% (tab. 2). Significantly values, but below control were highlight at concentration 0.04% at colchicines and 2,4-D acid. Colchicines and ethidium bromide determine a progressive increasing of height plants once with increasing of mutagen concentration, and the biggest concentration determine a decreasing of plants height.

Table 2

The synthesis of experimental results for plants height after the treatment with mutagen substances

Substances	Variant	Medium (cm)	% face of control	Diferences	Significance
Control		90,8	100,00	0,0	-
Colchicines	0,01%	89,3	98,35	-1,5	-
	0,02%	94,1	103,63	3,3	**
	0,03%	99,5	109,58	8,7	***
	0,04%	88,9	97,58	-2,2	o
		DL5%=1,8	DL1%=2,9	DL0,1%=5,4	
Ethidium bromide	0,01%	98,6	108,59	7,8	***
	0,02%	100,9	111,12	10,1	***
	0,03%	102,2	112,56	11,4	***
	0,04%	95,4	105,07	4,6	**
		DL5%=1,7	DL1%=2,8	DL0,1%=5,2	
2,4-D acid	0,01%	94,6	104,19	3,8	*
	0,02%	89,2	98,24	-1,6	-
	0,03%	88,4	97,36	-2,4	-
	0,04%	87,8	96,70	-3,0	o
		DL5%=2,7	DL1%=4,5	DL0,1%=8,3	

The variants treated with 2,4-D has recording only significantly values face of control, at 0.01% concentration determine a stimulation of height growth an dat concentration of 0.04% a inhibition of plants growth.

Clearly significant effects and very significant of height growth were highlight at variants treated with ethidium bromide, the height growth achieving in direct proportionality with the increasing of mutagen concentration and decreasing at the biggest concentration.

The analyses of glucide content have record a wide quantity of monosaccharide. Thus, the monosaccharide contents from root vary very much, the biggest quantity recording at control variant.

In root, face of control variant, at colchicines variant had increased the soluble and insoluble polysaccharide quantity. The biggest quantity of soluble polysaccharide record to ethidium bromide and that's of insoluble polysaccharide at variant 2,4-D. (fig. 1).

Face of control, in the stem, the monosaccharide content decrease at some other treatment variants. The same phenomenon could be sawing in case of soluble polysaccharide, until the insoluble polysaccharide quantity increase comparing with control variant, and exception making the variant treated with ethidium bromide where, the insoluble polysaccharide quantity it is easy decreased face of control. (fig. 1).

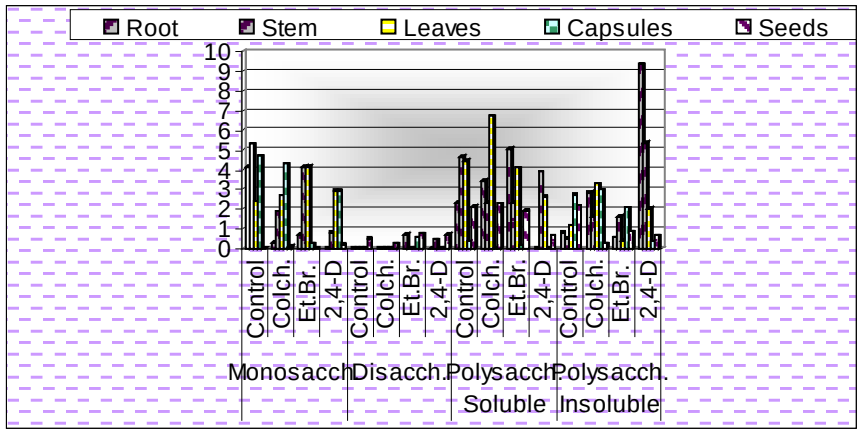

Fig. 1 The medium glucide content (%) at *Papaver somniferum* for all types of treatment

The monosaccharide contents from leaves increase comparing with control. The soluble polysaccharide is in percent of 4.4451% at control and the maximum quantity is record in the leaves of plants treated with colchicines, 6.7243%. At some other two treatment variants it could be establish a decreasing of soluble polysaccharide to control and also to colchicines variant. (fig. 1).

The quantity of insoluble quantity recording an increasing at plant leaves, treated with colchicines, and a decreasing of them at control an dat variants treated with ethidium bromide and 2,4-D acid. (fig. 1).

In capsules predominant are monosaccharide and insoluble polysaccharides. Comparing with control the monosaccharides are in reduced quantities, during the insoluble polysaccharides are in biggest quantities at variant treated with colchicines.

At all variants of treatment and in all organs plants the disaccharide content is reduced approaching to disappearances.

In seeds, the monosaccharide content is smallest at all variants. The soluble polysaccharides are revealed in appreciated quantities at control variant, colchicines and

ethidium bromide and the insoluble are presented in biggest quantities only at control. At variants treated with 2,4-D the glucides content have values very appropriated between them. (fig. 1).

In case of 2,4-D treatment it was registered a very significant content at the root level (6.1734), at this variant recording the maximum content determinates at this vegetative organ (fig. 2). A significant value and biggest from all variants was recorded at leaves level (7.4212).

Comparing the lipids values in each vegetative organs establish a progressive increasing of them at root level for ethidium bromide and 2,4-D treatment. In stem the biggest values were registered at colchicines variants (fig. 2).

At capsules level we could observe that the substances used had an inhibitory effect for lipids accumulation face of control where was recorded the biggest value (11.4972).

After the lipids increasing at capsules level, for each treatment variant, follow a decreasing of them at seeds level, the bigger diminution registering at colchicines treatment (6.4132).

The lipids content variation from one organ to another, the biggest quantity finding in the leaves, followed by stems and capsules (Bodea, 1982), the fact remarkable in our studies.

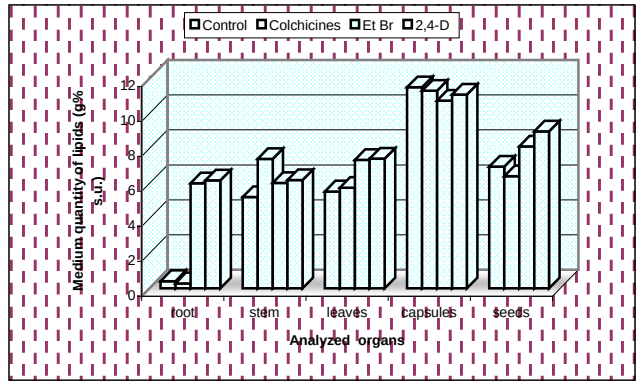

Fig. 2 The lipids content (g% s.u.) from the vegetative organs at all variants of treatment

The brute protein values at leaves (3.3349) are superior face of the stem level (2.6864). In this case the brute proteins accumulate much more at the capsules comparing to seeds where recorded sub unitary values (0.9925) are. (fig. 3).

The protein nitrogen has values between 0.1960 and 0.9921, the biggest values being in root and decreasing in others organs. The medium protein content from vegetative organ sat all variants of treatment applied at *Papaver somniferum* increase in root, stem and leaves and decrease in capsule's and seeds (fig. 3).

The biggest values was registered in roots in case of 2,4-D treatment, followed by those from stem (5.4124), leaves (5.2194) at ethidium bromide variant of treatment.

The control recorded the biggest value in capsules outrun with much more the protein contents from other variants, where their values are more inferior.

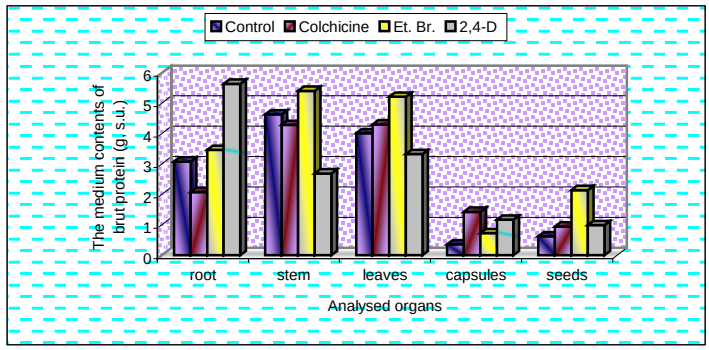

Fig. 3 - The medium content of brut protein from the vegetative organs.

CONCLUSIONS

The strongest inhibitory effect upon the growing height was established at variants treated with 2,4/D, followed by those with colchicines. The strongest inhibitory effect upon the growing height process was establish at variants treated with 2,4-D, followed by those with colchicines. At some others variants it was observed a growing stimulation more superior face of the control.

The standard deviation and the variability coefficient had small values at variants treated with mutagens, comparatively with the control, exception making only the variants treated with 2,4-D. The analyses of glucide content have record a wide quantity of monosaccharide. Thus, the monosaccharide contents from root vary very much, the biggest quantity recording at control variant. In capsules predominant are monosaccharide and insoluble polysaccharides. Comparing with control the monosaccharides are in reduced quantities, during the insoluble polysaccharides are in biggest quantities at variant treated with colchicines. Lipids value obtained in each organ had a progressive increasing at root level for treatments with ethidium bromide and 2,4-D.

The medium protein content from vegetative organ sat all variants of treatment applied at *Papaver somniferum* increase in root, stem and leaves and decrease in capsule's and seeds

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THE VARIABILITY OF THE CAPACITY IN ACTIVE ORIGINS OF SUBTERANEUS ORGANS IN SELECTED FAMILYS BY *GENTIANA LUTEA* L.

VARIABILITATEA CONȚINUTULUI DE PRINCIPII ACTIVE ALE ORGANELOR SUBTERANE ALE FAMILIILOR DE *GENTIANA LUTEA* L. SELECȚIONATE

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Abstract. *Gentiana lutea L is a specie protected by the Romanian laws. The main objective of this study is a research for identifying valuable genotypes and their multiplication for amelioration. Characteristic features of Gentiana lutea L highly influences the amelioration methion and also the saw and seeds production technology (Savatti et al., 2004). That is way we decided to study the phonotypical and genetic variability of the selected families, and in the same time to outline the correlations between the analyzed characters for the improvement of amelioration methods. For herbs it is highly important that all the researches to be based on photochemical studies, so to have a solid ground for the steps done. For this reason this article presents the way we establish the concentration of active principles in ground organs of the selected families.*

Rezumat. *Gentiana lutea L. este o plantă monument al naturii, ocrotită de legile române. Obiectivul principal propus în acest sens este inițierea unor cercetări privind identificarea genotipurilor valoroase şi înmulțirea lor în scopul ameliorării. Particularitățile biologice ale speciei Gentiana lutea L., au influențe majore atât asupra metodei de ameliorare cât şi asupra tehnologiei de cultură şi de producere de sămânță (Savatti et al., 2004). Din această cauză ne-am propus studierea variabilității fenotipice şi genetice a familiilor selecționate, precum şi evidențierea unor corelații între caracterele supuse analizei în vederea îmbunătățirii metodelor de ameliorare.La plantele medicinale este imperios necesar ca toate cercetările efectuate să aibă la bază studii fitochimice, pentru a avea o fundamentare solidă a demersurilor intreprinse. Din acest motiv în articolul de față prezentăm stabilirea gradului de variabilitate a conținutului de principii active din organele subterane la familiile selcționate din cadrul speciei luată în studiu.*

Gentiana grow better and faster in places with cool climate, with enough humidity. *Gentiana lutea* L habitat is characterized by humid summers, rainy springs and not that frosty winters (Huxley, 1992).

The roots and the rhizomes are cylindrical, sometimes longitudinal cloven, with an external area longitudinal striated (roots) and transverse striated (rhizome). The fracture is granulated, not fibrous, and not mealy. The taste is at the beginning sweetish, and then becomes very bitter (Pârvu, 2003).

After some authors (Kohlein, 1991), the specialized products of metabolism, with a phototherapeutic importance are:

- ✓ Bitners glicozides
- ✓ Flavons glicozides
- ✓ alcoloids
- ✓ sugars
- ✓ volatile oil

Some studies outline the fact that the accumulation of gentiopicrin, bitter principles and fenoli is influences by the light intensity, but results are obtained on dark areas as well.

MATERIALS AND METHODS

Thought the period of research, the climate was characterized by a pluviometrical regime, really low and temperatures really high, atmospherical humidity, below 30-35 ^{0} C, thing that determined a drying of plants in proportion of 20%. This unfavorable conditions affected also the results of our experiment, but they demonstrated that the most important role is played by the climatic and soil conditions.

The extraction was realized with alcohol at warm (Ciulei et al., 1995). After the removal of the solvent, the residue recommenced several times with warm water, after this the solution was detected with Saturn salt. The plumb surfeit was removed with calcium carbon, after this the aqueous solution was concentrated at low pressure.

0,20 g roots of powdery gentian was vanquish macro sublimate at 120-140ºC. It was formed a micro sublimate of acicular crystals, yellow and colorless. After we added 1-2 drops of sodium hydroxide 10% (R) we obtained a golden yellow solution. If the gentian micro sublimate (Ciulei et al., 1995).

0,20g root of powdery gentian macerate with 2ml acetate of ethyl and 0,5 ml of water for 30 min, shaking at interval; 5-6 drops evaporated on a watch glass, and the residue was treted with 1-2 drops of concentrated sulfuric acid and some mg of ammonia. The result is a radish solution which goes to indigo (Ciulei et al., 1995).

RESLUTS AND DISCUSSIONS

For determining the variability of the active principles in ground organs of the plant, from the 10th selected families, there were done chemical analysis in the phase of fruits maturation. The analysis reflected the following results:

The results of the analysis showed values more that media, the values being between 0,01-0,03mg and 100g dried texture. The highest values were obtained at G_1 and G_5 families with 0,03mg at 100g dried texture and 0,027m at 100g dried texture. The variability coefficient is s% = 34,12 (see table 2).

The analysis of bitter parameters outline 6 genotypes with high values then the media of experience. The values are situated in the interval between 7700 and 13780, the best performance are met at G_5 and G_9 families, with values between 13780 and 12700.

In table 2 we can see that this character varies, the value of the variability coefficient being s% = 20,17 (table 2), value that give the possibility to select the direction of this character.

Table 1

Variation of the chemical characteristics in subteraneus organs from the 10 studied families of *Gentiana lutea* L. species

Nr. Crt.	Selected Family	Conținut principii active				
		Gentianin (%)	Gentiopicrozide (%)	Bitterness Index	Volatile oil (%)	Sugars (%)
1.	G-1	0,03	2	11400	0,03	27
2.	G-2	0,01	1,9	8520	0,025	35
3.	G-3	0,015	3,5	10350	0,027	29
4.	G4	0,02	3	12450	0,028	31
5.	G-5	0,027	2,8	13780	0,035	37
6.	G-6	0,026	2,3	7700	0,025	32
7.	G-7	0,023	2,7	9170	0,027	34
8.	G-8	0,022	2,1	11790	0,029	29
9.	G-9	0,01	2,6	12700	0,032	33
10.	G-10	0,027	2,2	8100	0,02	22
11.	MEDIA	0,021	2,51	10596	0,0278	30,9

Table 2

The direct genetically parameters (the variation, the standard swerwe) and derived genetically parameters (variety coefficient) calculated for the morphological characters

The Character	The variation s^2	The standard swerve s	The average $\overline{X}$	Variety coefficient s%
Gentianin	$5,1 \times 10^{-5}$	0,007	0,021	34,12
Gentiopicrozid	0,25	0,51	2,51	20,09
Bitterness Index	4566071	2136,83	10596	20,17
Volatil oil	$1,7 \times 10^{-5}$	0,004	0,028	14,86
Sugars	18,99	4,36	30,9	14,11

The values for volatile oil was between 0,035ml at 100g vegetal texture and 0,02ml at 100g vegetal texture. Table 2 presents also the value of the variation of this character $s^2 = 1,7 \times 10^{-5}$

and a variability coefficient s% = 14,86, which is a middle level of variability.

Sugars were identified in the concentration of the *Gentiana lutea* L. texture and are shown in table 1, with values between 37g and 100g of vegetal texture and 22g at 100g of vegetal texture. The variability coefficient of this character was s% = 14,11 (table 2).

CONCLUSIONS

From the dates presented in table 2 column 4 we can draw the conclusion that the *Gentiana lutea* L. selected families presented a high value of the variability coefficient (table 2). This gives the image of an interval of variation, that gives the possibility of development of this character.

The concentration of gentiopicrozida in high limits, the value of the variability coefficient is s% = 20,17 (see table 2). This value outlines a big variability, thing that helps us to write a successful study about the selection under the aspect of growing the concentration of gentiopicrozida

The volatile oil has a variability coefficient of s% = 14,86 (see table 2), from which we can draw the conclusion that the character can be influenced by the selection.

For sugars the variability coefficient s%, is 14,11 (see table 2), being a middle value and in this case being possible of an efficient selection.

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THE VARIATION OF THE VOLATILE OIL CONTENT IN THE PLANTS ORGANS AT THE *ARNICA MONTANA* L. GENOTYPES

VARIAȚIA CONȚINUTULUI DE ULEI VOLATIL ÎN ORGANELE PLANTEI LA GENOTIPURILE DE *ARNICA MONTANA* L.

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Abstract*. Arnica montana L. is spread into Europe and Siberia. In our country, it's common in the whole Carpatian succesion, through hay fields, postures, glades, shrubs, beginning with the mountainous region, throughtout the subalpine region, but rarely in the alpine zone. In this paper, we present a variety analysis of the isolated volatile oil in some selected genotypes of this species. The calculation of the variety coefficient can ffer usefull information about the efficiency of some selection works in case you wish the improvement of some natures. Also, we present throught synthetic tables, the direct genetic parameters: the variation, the standard deviation, the average and the derived genetic parameters as the variety coefficient (Ardelean and Sestraş, 1996).*

Rezumat. *Arnica montana L. este răspândită în Europa şi Siberia. La noi în țară este comună în tot lanțul Carpaților, prin fânețe, pășuni, poieni, tufărişuri, din regiunea montană pînă în cea subalpină, mai rar în zona alpină.În lucrarea de față se prezintă o analiză a variabilității conținutului de ulei volatil izolat în câteva genotipuri selecționate din această specie. Calculul coeficientului de variabilitate poate oferi informatii utile privind eficiența unor lucrări de selecție în cazul în care se dorește îmbunatațirea unor caractere. Deasemenea este prezentată în tabele sintetice parametri genetici direcți: varianța, abaterea standard, media şi parametri genetici derivați cum este coeficientul de variabilitate (Ardelean and Sestras, 1996).*

Regarding *Arnica montana* L., named populary arnica, it's a plant, natures monument, defended by the european laws. Inspide of all this, because of her curative properties, previously described, in this moment the biggest quantity used for therapeutic purpose in our country originates in the spontaneous flora, being picked up by unauthorized people, without any instruction for the conservation of the species. The cultivation of this plant is inexistent because there wasn't yet been studies a cultivation tehnology (Sand et al., 2007).

The flowers contain volatile oil (0,04 – 3,8%), arnidiol, arnisterine, faradiol, astragaline, izocvereitine, carnaubilic alchool, o paraffin, cafeic acid, carotenoizi (xantofil, xantofilepoxidul, zeaxantină). The roats contain volatile oil (0,5-1,5%) cafeic acid, fumaric acid, succinic acid, inulin, timol, timohidrochinonics compunds and metilesteri, 3-etilfenol, sugars etc. (Crăciun et al., 1976).

MATERIAL AND METHODS

The *Arnicae* flos flowers are harvest in june-july, at the beginning of the blissoming, through cuting or breaking the blossom (Pârvu, 1991). The tedding is made at shadow, throught thin layers. The artificial tedding at 40-50ºC.

For this analysis there were used dry blossom of the *Arnica montana* L.. species after the harvest. There was prepared a mixture of flowers, predominating the bulky .

At the end of the vegetation period, there were brought out analysis of this mixture about the content of volatile oil in the generative organs, the flowers.

The byological material used, was the one identified in the two locations, Valea Frumoasei (Alba district) and Masivul Cindrelu (Sibiu district), there were chosen three genotypes of each, for which there have been worked out quantitative analysis towards the extracted volatile oil. The genotypes have been noted this way: G_1, G_2 and G_3 the ones proceeded from Valea Frumoasei (Alba district) and G_4, G_5 and G_6 the ones proceeded from Masivul Cindre (Sibiu district).

After the harvesting, the flowers have been passed through a water flow and layed out to dry at the sun; then, they have been weighed on the ellectronical balance, minced, and then they have been liable to the outdrawing.

At the base of the volatile oil extraction method principle has been the watery vapours technical training helped by a laboratory autfit of type Neo-Clavenger (Ciulei et al., 1995).

There have been weigh 50g of vegetable arnica material that has been put in the distillation baloon, togheter with 700ml water. The balloon has been fit to a distilation gear. The oil purveyance tube, graded in divisions of 0,01ml, just like the inferior part of the separator have filled out with water through the deviation on top of the separator, which, after all closes with a stopper crossed by a drain. Carrying on, there has been left the water flow into the refrigerator and the balloon has been warmed out so that the water, during the boiling, was cracking, there has been stopped the water circulation out of the refrigerator and the vapours have been left to circulate a couple of minutes for washing the refrigerator of the adhesive oil spots. When the refrigerator has warmed out his whole lenght, the water has been left to circulate again, but this time has been turned out the heat source. After about 30 min., the oil coat has glide down into the graded tube, after turning on the emptying tap.

The outdrawing took about 4-5 hours for each sample. After the training, the obtained volatile oil has been measured in millilitres and ascribed to 100g of vegetable tissue. Upon the obtained oil there has been added about 1 ml benzene. The oil togheter with the benzene have been caught carrefully into glassbottle there has been a spatulatop of sodium sulphate anhydrous, used to remove the possible water stamps. With the help of a Pasteur dropper ther has been drown out the volatile oil out of the glassbottle, the benzene has evaporate and the oil has been closed into a vial so that it could be keeped in best conditions until the analysis, without changing properties.

RESULTS AND DISCUSSIONS

The volatile oil drawn out of the blossom samples has got an orange colour, of middle solid consistent and flavoured smell. This one has been related to millilitres oil for 100g vegetable product.

The performed analysis for the content of the flowers species *Arnica montana* L. have noticed a volatile oil content between 1,7-3,5 at 100g of dry tissue.

Table 1

The rezults about the content amount of volatile oil drawn out of the *Arnica montana* L. genotype flowers under investigation

Nr. crt.	Genotype	Content of volatile oïl (ml / 100g vegetable tissue)
		Subterranean organs
1.	G_1	2,8
2.	G_2	3,2
3.	G_3	2,6
4.	G_4	3,5
5.	G_5	3,1
6.	G_6	1,7

At the genotypes of Valea Frumoasei (Alba district) the content is between 2,6 and 3,2 ml oil for 100g vegetables product while that of Masivul Cindrelul (Sibiu district) is between 1,7 and 3,5 ml oil for 100g vegetables product. Out of the pasted results on the first table can be noticed that the chosen genotypes of Masivul Cindrelul (Sibiu district) presents a more pronounced variability. The extreme value has been obtained ot the G_{-4} genotype.

Table 2

The direct genetically parameters (the variation, the standard swerwe) and derived genetically parameters (variety coefficient) calculated for the morphological characters

The Character	The variation s^2	The standard swerve s	The average $\overline{x}$	Variety coefficient s%
The volatile oil content	0,39	0,63	2,81	22,39

Out of the synthetiyed information analysis in the second table, we can observ that the values of the direct genetical parameters are: the variation = 0,39, the standard swervw = 0,63 and he average = 2,81.

In case of the derived genetical parameters there has been calculated the variety coefficient which is equal to 22,36.

CONCLUSIONS

The results of the chemical analysis for the measure of the volatile oil content, have put forward the value of the analysis material and the fact that the moment of the flower harvest was most favourable.

It's distinguished for the volatile oil content the genotype G_4 with 3,5ml/100g plant, content which is determined in the flower. Out of the analysed characters, the volatile oil content of the root has got a high coefficient valve of variety, which proves that there can be succesfully accomplished selection works of this nature.

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REMARKS ABOUT THE CATALASES ACTIVITY IN *CALENDULA OFFICINALIS L.* INFLORESCENCES TREATED WITH CHEMICAL MUTAGEN SUBSTANCES

APRECIERI PRIVIND ACTIVITATEA CATALAZEI IN INFLORESCENTELE DE *CALENDULA OFICINALIS* L. IN URMA TRATAMENTELOR CU SUBSTANȚE CHIMICE MUTAGENE

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Abstract. *The catalase is an endoenzyme present in the chloroplasts and she is involved in the breathing and photosynthesis process. She has the role to decompose the peroxide and it is sensitive to the action of mutagen agents. The catalases activity in Calendula officinalis L. inflorescences can have different values depending on the chemical substances used.*

Rezumat. *Catalaza este o endoenzima, prezentă în cloroplaste şi este implicată in procesele de fotosinteză şi respirație. Are rolul de a descompune apa oxigenată şi este sensibilă la acțiunea agenților chimici. Activitatea catalazei în inflorescentele de Calendula officinalis L. poate avea valori diferite în funcție de substanțele chimice utilizate.*

METHOD AND MATERIAL

Excessive accumulation of substances causes many metabolic disturbances to the plant (Levitt, 1980). There is some evidence that the stress induces the productions of active oxygen species (AOS) (Shalota and Tal., 1998). Active oxygen species include superoxide (O_2^-), hydrogen peroxide (H_2O_2) and hydroxil radical. Thease AOS can seriously disrupt normal metabolism through oxidative damage of lipids, proteins and nucleic acids. The AOS are controlled by an anti oxidative sistem including antioxidants (ascorbate, glutathione etc.) and enzimes such superoxide dismutase (SOD), ascorbate peroxidase (APx), glutatione reductaze (GR) and catalase (CAT).

Despite the pivotal role of catalases in controlling H_2O_2 levels within the cell, little is known of their function during stress condition. In part, this may due to their peroxisomal location, because most studies on oxidative stress in plant are focused an cloroplastic events. Nonetheless the participation of catalase in photorespiration would suggest that catalase activity is a determining factor for the protection of photosynthesizing cell against oxidative stress (Willekens, H., 1995). This is supported by the observations that a barley mutant whit reduced catalase activity is impaired in growth under photorespiratori conditions (Keppler LD.,1987).

The material used in the experiments it was represented by the *Calendula officinalis* L. inflorescences. The chemical substances used in the experiment are: colchicines, 2-4 D acid and ethidium bromide each of them being used in a concentration of 0.01, 0.02, 0.03 and 0.04%. The treatment was made on the top of the vegetation and at the seeds having two different times of action (3 and 6 hours).

The catalases activity in the C*alendula officinalis L*. inflorescences it was determined when the flower was completely opened, and the results were represented in the charts (the readings were made to intervals of a minute for nine minutes). The graphic representations were maked depending on last reading.

For experimentation purpose two grams of vegetable material and 10 milliliters of peroxide were used, each test being done in 3 repetitions, the results being the average of them. The determination of the catalases activity was done through the gasometrical method by means of an appliance of its own modified and improved. The fresh vegetable material has been pestled then it has been placed in the reaction recipient. Some water is poured in the separator funnel and after the liquid is brought into zero position, in the reading device by means of the tap, the pressure unification tap is closed. The separator funnel is closed in a tight way, and the tap is being open in order to put into contact the vegetable material with H_2O_2. In this way, the catalases form of the vegetable material decomposes H_2O_2, setting the oxygen free that pushes the liquid from the reading device.

RESULTS AND DISCUSSIONS

The investigations confirm that, in the case of the treatments made on the top of the vegetation, all the variants have an raised activity relative to the witness. In the colchicines case, the greatest catalytic activity is met at 0,03% concentration and slightly lowed at the 0,02% concentration.

The treatments with etidium bromide show that the catalases activity increased at the same time with the concentration. If we observe the catalytic activity in the case of the 2,4 D acid we can easily notice the fact that she has approach values at 0,02% and 0,04% concentration, and the maximum was recorded at the 0,01%.

Analyzing the catalytic activity (figure 1) in the case of the experiment which the treatment was made on the seeds, we can see that the both methods of treatments (3 and 6 hours) registered smaller values than the case of treatments made on the top of the vegetation. Although, we can notice some differences in the case of colchicines, which on 0,01% concentration and 3 hours treatment catalase activity increased relative to the witness, but the process decreased in response to increased concentrations.

In the case of 6 hours treatments, colchicines induces intense activity at the 0,01% concentrations, decreases at 0,02% and then raise again but don't excel the witness and neither the activity observed at 0,01% concentration.

The treatments with etidium bromide registered ascending values at 0,01% and 0,03% overreaching the witness and the treatments made whit colchicines at three hour time of action. If will shall follow the results obtained in the case of 6 hours time of action treatments, we notice that the etidium bromide induces at the same time with the concentration growth an decreasing activity of this enzyme. In the both cases of treatments made on seeds, 2,4 D acid releases an low activity up to 0,02% and after this the values the catalases activity raise in the same time whit the concentrations.

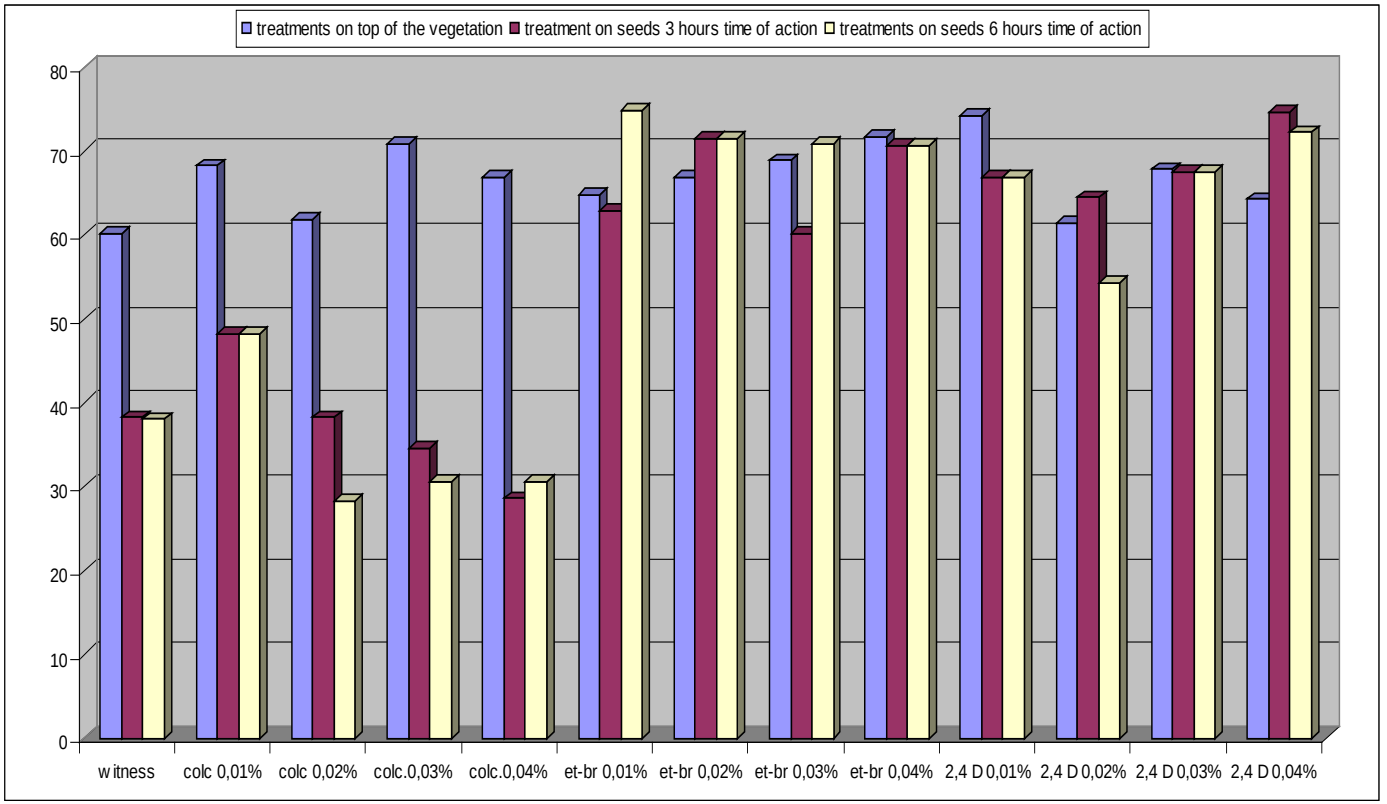

Fig.1 - Catalases activity in *Calendula officinalis L.* inflorescences treated with chemical mutagen substances.

CONCLUSIONS

The catalysis is an enzyme that intensifies in photosynthesis and breathing processes.

This enzyme is also extremely sensitive at the agent chemical action.

Available evidence indicates that the ability to control H_20_2 levels is one of the factor that contribute to resistance against various biotic and abiotic stresses in plants.

Detailed analyses of catalases expression in several plant species have clearly demonstrated that catalase activity are affected by stress conditions.

The investigations confirm that, in the case of the treatments made on the top of the vegetation, all the variants have an raised activity relative to the witness.

In the case of colchicines, which on 0,01% concentration and 3 hours treatment catalase activity increased relative to the witness, but the process decreased in response to increased concentrations.

In the case of 6 hours treatments, colchicines induces intense activity at the 0,01% concentrations, decreases at 0,02% and then raise again but don't excel the witness and neither the activity observed at 0,01% concentration.

Analyzing the catalytic activity in the case of the experiment which the treatment was made on the seeds, we can see that the both methods of treatments (3 and 6 hours) registered smaller values than the case of treatments made on the top of the vegetation.

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UTILZATION OF SPOROPHYTIC COMPATIBILITY FOR ESTABLISHING THE POLLENIZERS FOR 'URIAŞE DE VÂLCEA' HAZELNUT CULTIVAR

UTILIZAREA COMPATIBILITATII SPOROFITICE PENTRU STABILIREA POLENIZATORILOR LA SOIUL DE ALUN 'URIASE DE VALCEA'

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Abstract. *The hazelnut has self-incompatibility and inter-incompatibility pollen. The research work carried out till now allowed to establish that pollen incompatibility in hazelnut cultivars is controlled by a series of alleles of a single sterility gene named "S". The pollen compatibility can be determined with the help of female inflorescences, pollen tester and florescence microscope. The establishing of hazelnut pollenizers on basis of sporophytic compatibility study is important for assuring of high fruit yield, achievement of a correct planting scheme. In this paper it is presented the pollen compatibility determination carried out in the laboratory for 'Uriaşe de Vâlcea' cultivar, this being pollinated with tester pollen from the following cultivars: 'Tonda Gentile delle Langhe' ($S_2\underline{S_7}$), 'Tonda Romana' ($\underline{S_{10}}\underline{S_{20}}$), 'Vâlcea 22' ($S_2\underline{S_{10}}$), 'Butler' ($S_2\underline{S_3}$), 'Ennis' ($\underline{S_1}S_{11}$), 'Segorbe' ($\underline{S_9}S_{23}$), 'Uriaş de Halle' ($S_2\underline{S_5}$). As result of this work it was established that cultivars like: 'Vâlcea 22', 'Butler', 'Ennis' and 'TGDL' can be used as pollenizers for 'Uriaşe de Vâlcea'. Depending on the pollinating compatibility, the hazelnut cultivar 'Uriaşe de Vâlcea' can have $S_{11}\underline{S_{20}}$ allelic formula. The research on this topic will continue in order to confirm the allelic formulas.*

Rezumat. *Alunul prezintă fenomenul de auto-incompatibilitate si inter-incompatibilitate polinică. Cercetările efectuate până în prezent au permis să se stabilească faptul că incompatibilitatea polinică la alun este controlată de o serie de alele ale unei singure gene de sterilitate numită "S". Compatibilitatea poate fi determinată cu ajutorul inflorescentelor femele, a polenului tester si a microscopului cu fluorescentă. Stabilirea polenizatorilor, pe baza studiului compatibilităţii sporofitice, este importantă pentru asigurarea unei productii de fructe ridicate, realizarea unor scheme de plantare corecte si realizarea unor programe de ameliorare.Determinarea compatibilităţii a fost efectuată în laborator, la soiul 'Uriaşe de Vâlcea', acesta fiind polenizat, pe rând, cu polen tester cunoscut din soiurile: 'Tonda Gentile delle Langhe' ($\underline{S_7}S_2$), 'Tonda Romana' ($\underline{S_{10}}\underline{S_{20}}$), 'Vâlcea 22' ($\underline{S_{10}}S_2$), 'Butler' ($\underline{S_3}S_2$), 'Ennis' ($\underline{S_1}S_{11}$), 'Segorbe' ($\underline{S_9}S_{23}$), 'Uriaş de Halle' ($\underline{S_5}S_2$). În urma determinărilor efectuate s-a stabilit că polenizatori buni pentru acest soi pot fi: 'Vâlcea 22', 'Butler', 'Ennis' şi 'TGDL'.În funcţie de compatibilitatea la polenizare a rezultat că soiul românesc 'Uriaşe de Vâlcea' poate avea următoarea formulă alelică $\underline{S_{20}}$ S_{11}. Cercetările vor fi continuate pentru a se putea confirma formula alelică..*

Corylus genus is included into the *Betulaceae* Family, *Fagales* Order. All the *Corylus* species are monoecious and dichogamous. *Corylus avellana* and *Corylus maxima* species contributed substantially to the forming of hazelnut cultivars.

Also, it is known that hazelnut has self-incompatibility and inter-incompatibility pollinating systems.

Studies carried out by Thompson (1979a) and Germain (1981) showed that pollen incompatibility in hazelnut it is controlled by an allelic series of a single sterility gene named "*S*". The system is of sporophytic type because the pollen reaction is determined by the 2 alleles that are present into the anther tissue.

The *S* alleles of a number of hazelnut cultivars have been determined and published by Thompson (1979b), Mehlenbacher and Thompson (1988), Erdogan et al. (2005), etc.

Until now, 26 *S* alleles have been identified for *C. avellana* and over 40 allelic formulas have been emphasized at various cultivars. Compatibility can be determined with the help of female inflorescence, tester pollen and florescence microscope. Hazelnut pollinators' establishing for cultivars on basis of sporophytic compatibility is important for assuring a high fruit yield, achievement of a correct planting scheme and for breeding.

The study of the pollen compatibility has a major importance for the Romanian hazelnut cultivars that were obtained in the last years, for this reason we had in view to establish the allelic formula and the suitable pollinators for 'Uriaşe de Vâlcea', a cultivar with perspectives for spreading into culture due to its large fruits and high productivity.

MATERIAL AND METHODS

For the present study plants of Romanian cultivar 'Uriaşe de Vâlcea' from the national hazelnut collection from SCDP Vâlcea have been used. In February, the catkins (before opening) have been removed from tree branches and the emasculated branches were isolated with paper bags.

In the same time, tester pollen from the pollinators cultivars was harvested: 'Tonda Gentile delle Langhe' (S_2S_7), 'Tonda Romana' ($S_{10}S_{20}$), 'Vâlcea 22' (S_2S_{10}), 'Butler' (S_2S_3), 'Ennis' (S_1S_{11}), 'Segorbe' (S_9S_{23}), 'Uriaş de Halle' (S_2S_5). The pollen was introduced into the refrigerator (at 3°C or 4°C) for storing till pollination time.

When the styles of the female flowers from the isolated and emasculated branches have riched 2 - 6 mm, the glomerules were detached and introduced into the tester pollen and then were leaved on a wet filter paper into a Petri dish. After 16 hours the styles were detached and squashed into a drop of blue aniline (0.1g blue aniline, 0,71g K_3PO_4, 100 ml distilled water), and then observed at the fluorescence microscope (after Mehlenbacher and Thompson, 1988).

In the case of incompatibility, the pollen grain that was germinated is producing short pollen tubes, which cannot penetrate the stigma surface, most of them forming a bulb at the end of the tubes. If pollen compatibility occurs, then the pollen tubes penetrate the stigma surface and a mass of long, parallel and light colored tubes can be observed.

RESULTS AND DISCUSSIONS

Pollinating tests carried out at 'Uriaşe de Vâlcea' with various pollinators and results observed at fluorescence microscope have showed different reactions. The results obtained allowed us to classify the pollination combinations into compatible or incompatible (not compatible). The 'Uriaşe de Vâlcea' *x* 'Segorbe' and 'Uriaşe de Vâlcea' *x* 'Uriaş de Halle' combinations did not show clear results under the microscope and couldn't be included into the compatible or not compatible groups (Table 1).

Table 1

Pollinating scheme of 'Uriaşe de Vâlcea' cultivar and the results obtained

No. crt.	Pollinated cultivar	Pollinator	Results obtained at fluorescence microscope
1	'Uriaşe de Vâlcea'	'Tonda Gentile delle Langhe' (S_2S_7)	+
2	'Uriaşe de Vâlcea'	'Tonda Romana' ($S_{10}S_{20}$)	-
3	'Uriaşe de Vâlcea'	'Vâlcea 22' (S_2S_{10})	+
4	'Uriaşe de Vâlcea'	'Butler' (S_2S_3)	+
5	'Uriaşe de Vâlcea'	'Ennis' (S_1S_{11})	+
6	'Uriaşe de Vâlcea'	'Segorbe' (S_9S_{23})	Not observed
7	'Uriaşe de Vâlcea'	'Uriaş de Halle' (S_2S_5)	Not observed

„+" - compatible
„-" - incompatible
The underlined alleles are dominant or codominant.

'Uriaşe de Vâlcea' hazelnut cultivar has as genitors the cultivars 'Ennis' (S_1S_{11}), where the allelic formula is known, and 'Red Lambert', with unknown allelic formula.

Testing the pollen compatibility of 'Uriaşe de Vâlcea' with 'Ennis' the results obtained confirmed that these are compatible. It seems that 'Uriaşe de Vâlcea' has inherited from 'Ennis' the S_{11} non dominant allele. In the case when S_1 dominant allele is inherited from 'Ennis', no compatibility between these 2 cultivars exist. After testing the crossing 'Uriaşe de Vâlcea' *x* 'Tonda Romana' ($S_{10}S_{20}$) it was established that they are not compatible, so 'Uriaşe de Vâlcea' cultivar can have one of the two allelic formulas: $S_{11}S_{20}$ or $S_{10}S_{11}$. When testing 'Uriaşe de Vâlcea' *x* 'Vâlcea 22' (S_2S_{10}) it was obvious that compatibility exists when 'Uriaşe de Vâlcea' has $S_{11}S_{20}$ allelic formula. If 'Uriaşe de Vâlcea' has $S_{10}S_{11}$ formula, then no compatibility with 'Vâlcea 22' (S_2S_{10}) exists. The last pollen test crosses between 'Uriaşe de Vâlcea' ($S_{20}S_{11}$) and 'Butler' (S_3S_2) and 'Uriaşe de Vâlcea' ($S_{20}S_{11}$) and 'TGDL' (S_7S_2) proved to be compatible (Fig. 1)
.

'Ennis'	*x*	'Red Lambert'	→	'Uriaşe de Vâlcea'
(S_1S_{11})		*(S? S?)*		*(S?S?)*
'Uriaşe de Vâlcea'	*x*	'Ennis'	Compatible →	Allelic proposal for 'Uriaşe de Vâlcea'
(S?S?)		*(S_1S_{11})*		*($S?S_{11}$)*
'Uriaşe de Vâlcea'	*x*	'Tonda Romana'	Incompatible →	Allelic proposal for 'Uriaşe de Vâlcea'
($S?S_{11}$)		*($S_{10}S_{20}$)*		*($S_{11}S_{20}$)* or *($S_{10}S_{11}$)*
'Uriaşe de Vâlcea'	*x*	'Vâlcea 22'	Compatible →	Allelic proposal for 'Uriaşe de Vâlcea'
($S_{11}S_{20}$) or *($S_{10}S_{11}$)*		*(S_2S_{10})*		*($S_{11}S_{20}$)*
			Incompatible →	Allelic proposal for 'Uriaşe de Vâlcea'
				($S_{10}S_{11}$) x (S_2S_{10})
'Uriaşe de Vâlcea'	*x*	'Butler'	Compatible →	Allelic proposal for 'Uriaşe de Vâlcea'
($S_{11}S_{20}$)		*(S_2S_3)*		*($S_{11}S_{20}$)*
'Uriaşe de Vâlcea'	*x*	'TGDL'	Compatible →	Allelic proposal for 'Uriaşe de Vâlcea'
($S_{11}S_{20}$)		*(S_2S_7)*		*($S_{11}S_{20}$)*

Fig.1. Mode of determining of the allelic formula for the 'Uriaşe de Vâlcea' hazelnut cultivar

a) 1 dominant allele (Ex: $S_1 > S_2$)

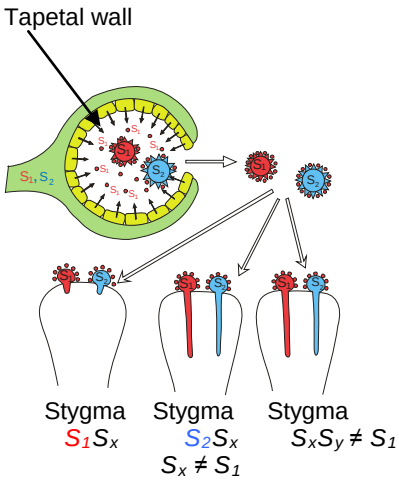

Fig. 2. Anther of a S_1S_2 cultivar with S_1 dominant allele at the level of tapetal wall for producing an incompatibility protein that is fixed on the external wall of the pollen grain.

b) 2 codominant alleles (Ex: $S_5 = S_{15}$)

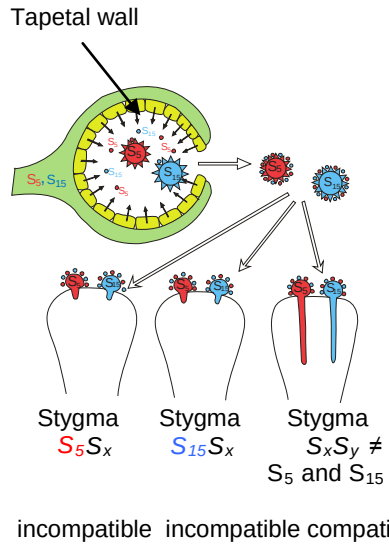

Fig. 3. Anther of a S_5S_{15} cultivar with S_5 and S_{15} codominant alleles at the level of tapetal wall for producing an incompatibility protein that is fixed on the external wall of the pollen grain.

Determinations carried out have respected the cases regarding dominance and codominance mechanisms for sporophytic pollen compatibility (after Germain, 2004).

The emphasize of the sporophytic compatibility of 'Uriaşe de Vâlcea' Romanian hazelnut cultivar and of other cultivars will be continued, in this manner the allelic formulas can be confirmed.

CONCLUSIONS

The establishing of the sporophytic compatibility with the help of fluorescence microscopy is a quick and efficient method for the Romanian hazelnut cultivars.

The cultivar 'Uriaşe de Vâlcea' proved to be compatible at pollination with 'Ennis', Valcea 22, 'Butler' and 'TGDL' and is incompatible with 'Tonda Romana'.

The allelic formula proposed for the hazelnut cultivar 'Uriaşe de Vâlcea' is $S_{11}S_{20}$.

The allelic formula determined based on sporophytic compatibility study can be used for establishing planting schemes (hazelnut cultivars with the right pollinators), that will assure high fruit yields, and also in the breeding work.

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THE VARIATION OF THE EFFICIENCY FOR THE PHENOXYACETIC ACIDS' ESTER FORMATION WITH THE CATALYST'S TYPE AND USED DOSAGE

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Abstract: *The synthesis of the phenoxyacetic acids' esters is an important intermediary step in obtaining the sulfonamide phenoxyacetic compounds with auxinic type growth stimulating action or with herbicide action, considering the used dosage. The efficiency of this esters formation step depends a lot on the used catalyst type, on the catalysis type (homogeneous or heterogeneous) and on the reaction time. This paper proposes to analyze the conditions for completing the procedure in order to reach efficiencies as high as possible in a short time, conditions acceptable from the reagents necessary's point of view and also regarding the intermediary step number in the ester obtaining process, respectively the technological scheme of this process. There were considered three phenoxyacetic acids, mono and double substituted which were put to react with methanol in order to obtain the esters, in homogeneous catalysis, using concentrated sulphuric acid as catalyst, as well as heterogeneous catalysis, using two solid catalysts with acid sulphonic active groups, in three different doses. The obtained results indicated, for all three general reactions, higher efficiencies for the heterogeneous catalysis, for all catalyst's used dosages, as well as a much simplified technological scheme comparing to the homogeneous catalysis.*

Rezumat: *Sinteza esterilor acizilor fenoxiacetici este o etapă intermediară importantă în obținerea compușilor fenoxiacetici sulfonamidați cu acțiune auxinică sau erbicidă, în funcție de doza aplicată. Randamentul reacției de esterificare depinde foarte mult de catalizatorul folosit, de tipul de cataliză (omogenă sau eterogenă) și de timpul de reacție. Această lucrare își propune să analizeze condițiile de reacție necesare pentru a obține randamente mari într-un timp scurt, atât din punctul de vedere al necesarului de reactivi cât și din cel al numărului de etape din schema tehnologică a procesului de esterificare. Au fost studiați trei acizi fenoxiacetici, mono sau disubstituiți, care au fost esterificați cu metanol în cataliză omogenă, folosind acidul sulfuric drept catalizator, și în cataliză eterogenă folosind doi catalizatori solizi cu grupări sulfonice acide, în trei doze diferite. Rezultatele obținute au indicat, pentru toate cele trei reacții generale, randamente mai mari pentru cataliza eterogenă, pentru toate dozele de catalizatori folosite, la fel ca și o schemă tehnologică mult simplificată comparativ cu cataliza omogenă.*

The phenoxy acetic derivatives with sulphonamide groups are used as growth stimulators with auxinic action or herbicides, considering the applied dosage. The general scheme for obtaining these derivatives follows the next steps:

- preparation of R-phenoxy acetic acids from the specified phenols, by condensation with mono-chloro acetic acid;
- preparation of ethyl or methyl esters for the obtained esters;
- preparation of the chloro sulphonic derivatives of the esters;

- condensation with ammonia, substituted amines or other aminic compounds.

Because the esters of the R-phenoxy acetic acids are intermediary compounds used in the synthesis of a large number of derivatives, we conducted studies regarding their preparation process, in heterogeneous catalysis using two different catalysts in three doses, comparing to the same processes conducted in homogeneous catalysis.

MATERIAL AND METHOD

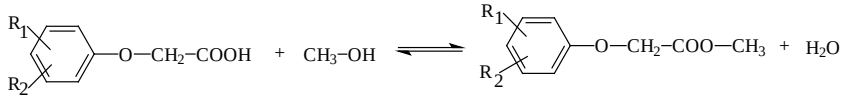
The alcohol used in the process was methanol with 95% volume purity and the considered R-phenoxy acetic acids were: o-chloro-phenoxy acetic acid, o-cresoxy acetic acid and phenyl-1,4-dioxyacetic acid. The catalysts were: sulphuric acid with 98% purity in the homogeneous process, in a ratio of 0.8% moles compared to the organic acid and two ion-changing resins with sulphonic active groups in their molecules: Dowex-50 and Amberlite IR-120, in doses of 3, 5 and 10 g per process in the heterogeneous catalysis.

The process of ester formation for an organic acid with methanol in the presence of a solid macro-porous catalyst takes place in a heterogeneous solid – liquid reaction mixture, with the following steps:

- the diffusion of the acid through the methanol film covering the catalyst particle;
- the diffusion of the acid through the catalyst's pores;
- the absorption of the acid on the resin's active centers and its activation;
- the diffusion of the alcohol through the catalyst's pores;
- the actual chemical reaction;
- the diffusion of the reaction product through the catalyst's pores;
- the diffusion of the reaction product through the methanol film covering the catalyst surface.

The general reaction scheme for obtaining R-phenoxy acetic acids' esters is:

In order to assure a higher efficiency and to increase the reaction's speed, we



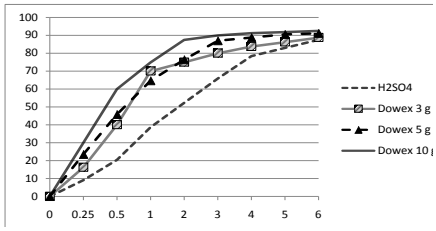
substituted phenoxy acetic acid methanol ester

used a molar ratio between the organic acid and the alcohol of 1 : 30. These reaction conditions were the same for all the ester formation processes, regardless the catalysis type.

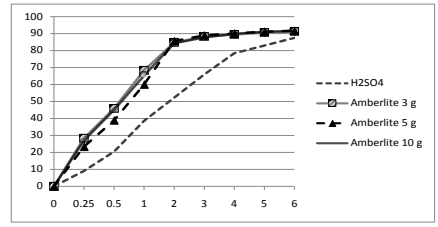
RESULTS AND DISCUSSIONS

Analyzing the data obtained during the kinetic study of the ester formation processes, we observed that the efficiency values for both solid catalysts, after a 6 hours reaction, are quite similar. Still, whilst in the heterogeneous catalysis, after a 3 hour reaction, the efficiency values vary between 85 and 90%, in the homogeneous process, after the same period of time, the efficiency values vary between 50 – 70% (fig. 1 – 3). These differences plead for conducting the ester formation process in heterogeneous catalysis for three hours, when acceptable values for the technique are acquired.

Analyzing the general charts for the ester formation processes in homogeneous and heterogeneous catalysis (fig.4), we observe that in the homogeneous process, there are involve supplementary phases of alkali treatments for removing the reaction mixture's acidity, then a number of washing phases for removing the alkalinity followed by a vacuum distillation.

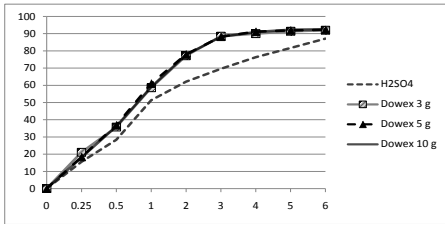


(a)



(b)

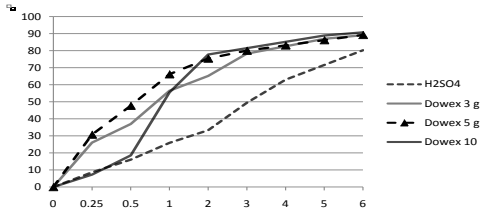
Fig. 1. The variation of the efficiency in time for the ester formation process of the o-chloro phenoxyacetic acid in heterogeneous catalysis using Dowex-50 (a) and Amberlite 150 R (b) comparing to the homogeneous catalysis (H_2SO_4)



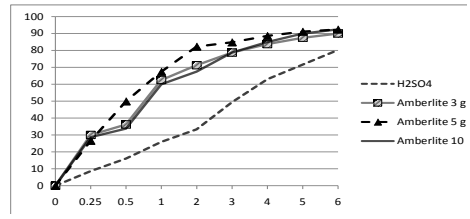
(a)

Fig. 2. The variation of the efficiency in time for the ester formation process of the o-cresoxy phenoxyacetic acid in heterogeneous catalysis using Dowex-50 (a) and Amberlite 150 R (b) comparing to the homogeneous catalysis (H_2SO_4)

Fig. 3. The variation of the efficiency in time for the ester formation process of the phenyl -1,4 – dioxyacetic acid in heterogeneous catalysis using Dowex-50 (a) and Amberlite 150 R (b) comparing to the homogeneous catalysis (H_2SO_4)

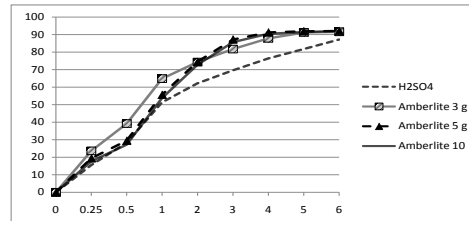


(a)



(b)

This large number of intermediary phases leads to the decrease of the ester formation process's efficiency. For the distilled ester, the efficiency reported to the starting quantity of the organic acid does not exceed 68–70%. In heterogeneous catalysis, the number



b)

of technological phases for the ester separation from the reaction mixture is very small and the whole process offers efficiencies of 84-86% in pure product. Considering all of the above, we recommend the heterogeneous catalysis for the ester formation processes of the R-phenoxy acetic acids, procedure that offers good efficiencies for the technique.

CONCLUSIONS

1. The esters of the R-phenoxy acetic acids are intermediary compounds used in the synthesis of a large number of derivatives with stimulating or herbicidal action.

2. In the heterogeneous catalysis, after a 3 hour reaction, the efficiency values vary between 85 and 90% and in the homogeneous process, after the same period of time, the efficiency values vary between 50 – 70%.

3. In heterogeneous catalysis, the number of technological phases for the ester separation is very small and the process offers efficiencies of 84-86% in distilled ester.

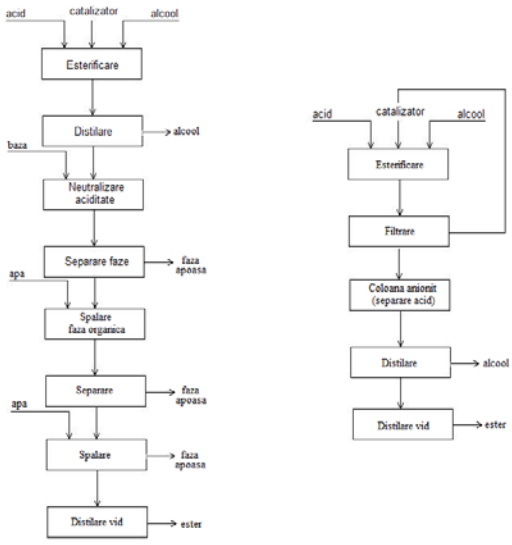


Fig. 4. General technological charts for the ester formation processes' steps in homogeneous (a) and heterogeneous (b) catalysis

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FRACTAL ANALYSIS OF THE MODIFICATIONS INDUCED ON TOMATO PLANT ROOTS BY TWO HEAVY METALS

ANALIZA FRACTALĂ A MODIFICĂRILOR INDUSE DE DOUĂ METALE GRELE RĂDĂCINILOR PLANTELOR DE TOMATE

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Abstract. *Many biological objects like plants, leaves, roots, cells or sub cellular organelles display irregular shapes and discontinuous morphogenetic pattern in connection with their functional diversity and seem impossible to describe them rigorously or quantitatively using Euclidean geometry. Many researchers have studied the complexity of the plant roots but there are few results due the influence of the rizosphere heterogeneity. The main objective of this study was to evaluate the impact of the treatment with cadmium and zinc on root architecture of the tomato plant, using fractal analysis. The seeds of tomatoes (Lycopersicon esculentum), were put into Petri dishes on double filter paper together with their treatment solution of 1% concentration from $ZnSO_4*7H_2O$ and $Cd(CH_3COO)_2*2\ H_2O$,and they were kept here for a week. After that they were planted in pots in the Biophysics Laboratory where they developed in low conditions of temperature (16-20^{0}C). After 6 weeks the measurements on fractal dimensions for tomato roots were performed using HarFA software. Our results showed that Zn produces an increase of lateral roots and their fractal dimensions, but Cd produces a strong decrease of the tomato roots.*

Rezumat. *Numeroase obiecte ca plante, frunze, rădăcini, celule sau organite celulare prezintă forme neregulate şi aspecte morfogenetice discontinue legate de funţionalitatea diversă şi pare imposibilă descrierea lor cu geometria Euclidiană. Complexitatea rădăcinii plantelor a fost studiată de mulţi cercetători dar sunt puţine rezultate datorită influenţei heterogenităţii rizosferei. Obiectivul acestui studiu este de a evalua impactul tratamentului cu cadmiu şi zinc asupra arhitecturii rădăcinii plantelor de tomate. Semințele de tomate (Lycopersicon esculentum) au fost puse în sticle Petri cu hârtie de filtru şi soluţia de tratament de concentraţie de 1% de $ZnSO_4*7H_2O$ and $Cd(CH_3COO)_2*2\ H_2O$ unde au fost ţinute timp de o săptămână. Apoi semințele au fost plantate în ghivece la laboratorul de Biofizică unde s-au dezvoltat în condiţii de temperatură joasă (18-20^{0}C). După 6 săptămâni au fost realizate măsurătorile privind dimensiunea fractală a rădăcinilor folosind programul HarFA. Rezultatele noastre au arătat că Zn produce o creştere a rădăcinilor laterale şi a dimensiunii fractale a acestora pe când Cd produce o puternică reducere a rădăcinii.*

INTRODUCTION

The ontogenetic development of plant root systems involves an increase both in size and in complexity. The complexity of root systems was of great interest for scientists for a long time but there are few results due the influence of the rizosphere heterogeneity.

The principles of fractal geometry seem appropriate for the description of root systems because the repetitive branching of roots leads to a certain degree of self-symmetry and such self-similarity is a fundamental characteristic of fractal objects (1-5), (9), (11).

The character of the distribution of plant roots in the soil is similar with to the fractal nature of the arteries and the veins or of the bronchi in the lung tissues, which uses with highest efficiency a certain volume with minimal cost.

It has been demonstrated that a real plant root is a fractal object; the problem is to choose an efficient method for determining the fractal dimension of larger root systems.

By comparing the fractal dimension of a certain plant to a wide range of external conditions it will be possible to determine how the values of fractal dimension reflect differences among root systems.

The main objective of this study was to evaluate the impact of the treatment with cadmium and zinc on root architecture of the tomato plant, using fractal analysis.

MATERIAL AND METHODS

The seeds of tomatoes (*Lycopersicon esculentum*), were put into Petri dishes on double filter paper together with their treatment solution of 1% concentration from $ZnSO_4*7H_2O$ and $Cd(CH_3COO)_2*2\ H_2O$,and they were kept here for a week.

After that they were planted in pots in the Biophysics Laboratory where they developed in low conditions of temperature (16-20^{0}C). Eshel also used tomato plant to study the root plant system is much used in research After 6 weeks, we performed the measurements on fractal dimensions for tomato roots, using HarFA software.

We sorted the following 3 variants:

1. M – control plants
2. Zn - treatment with $ZnSO_4*7H_2O$
3. Cd - treatment with $Cd(CH_3COO)_2*2\ H_2O$

For analysis, the plants from the soil were extracted, washed and the root were cut from the shoot. Then we make many photos of the root with a Canon camera. These photos were prepared with the COREL PHOTO-PAINT 1 in order to use the HarFA soft to determine the fractal dimension. In HarFA is used a modification of traditional Box Counting method.

By this modification on obtain three fractal dimensions, which characterise properties of black plane DB, black-white border of black object DBW (and this information is the most interesting) and properties of white background DW. The fractal dimension is the slope of the straight line „Black&White" (12).

RESULTS AND DISCUSSIONS

Some roots of the tomato plants treated with the Zn and Cd obtained with a Canon camera are given in figure 1.

From this figure we can see that the tomato plant roots treated with Zn are developed, especially the lateral roots. By contrary, the tomato plant roots treated with Cd are undeveloped, as a consequence, very small.

Fig.1 – Tomato plant roots

The fractal dimension for these plant roots are given in figures 2, 3 and 4.

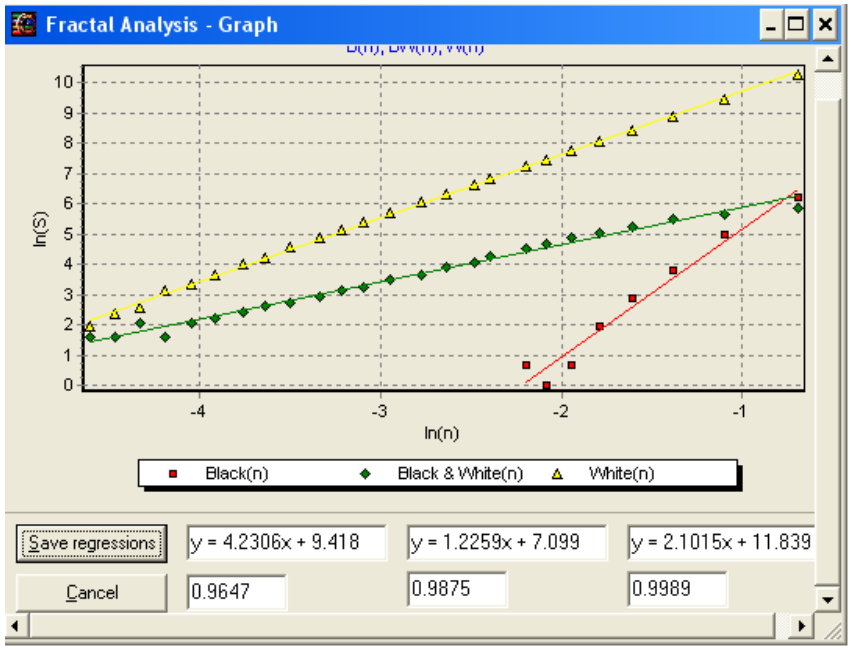

Fig.2 – Fractal dimension for tomato roots (control)

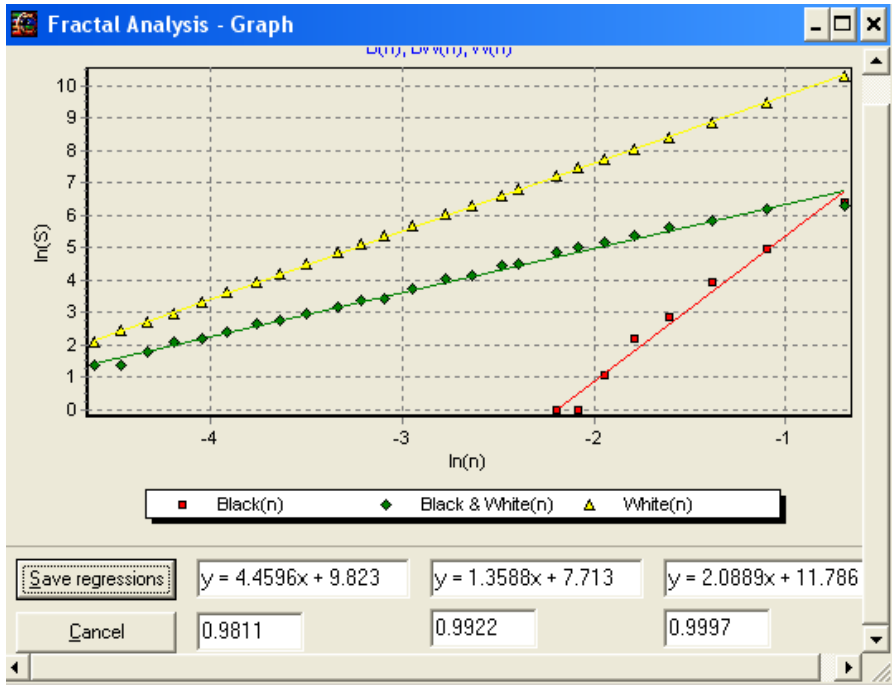

Fig.3 – Fractal dimension for tomato roots (treatment with Zn)

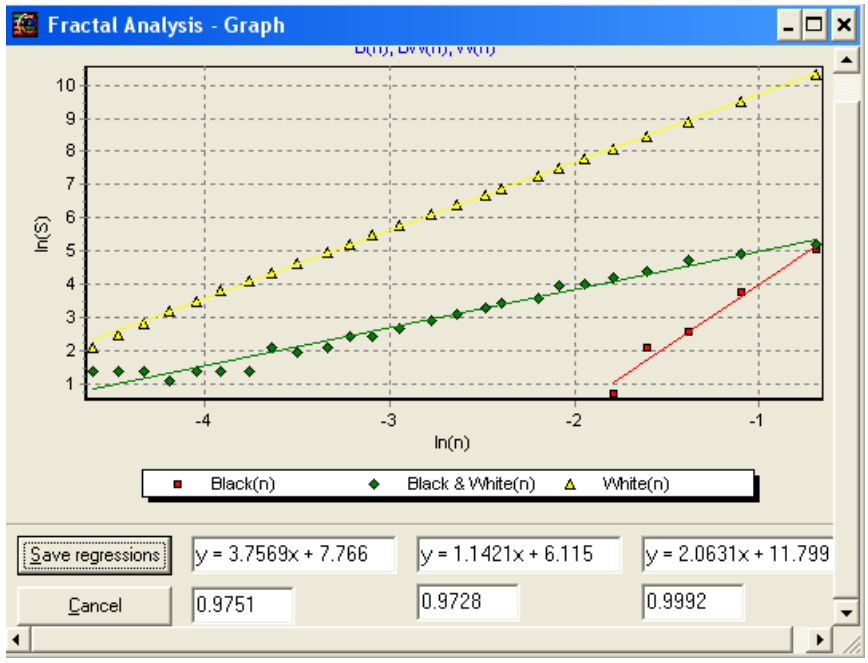

Fig.4 – Fractal dimension for tomato roots (treatment with Cd)

From these diagrams we can see that the fractal dimension for control plant root is 1,2259, it increases for Zn at 1,3588 and decreases for Cd at 1,1421.

These results confirm other experimental results about Zn and Cd effects on plant growth. This means that Zn have not effect the plant growth but it amplifies the root structure by numorous lateral roots. On the other hand Cd reduces both the plant height, the content of photosynthetic pigments and the shape and the structure of plant root (6-8), (10).

CONCLUSIONS

These results showed that the treatment of the tomato plant with these heavy metals modifies the fractal dimension of the roots.

Due the fact that the fractal dimension is a direct measure of the relative degree of complexity of the figure, we can conclude that these chemical compounds influence the root architecture and then modifies the root contribution to the water transport in plant and plant growth.

Therefore, the fractal dimension serves as a quantitative descriptor of the complex nature of the root system architecture.

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DATABASE DESIGN FOR SUPPORTING THE TECHNOLOGY OF SOME FIELD CROPS

PROIECTAREA BAZELOR DE DATE PRIVIND TEHNOLOGIA UNOR CULTURI DE CAMP

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Abstract. *We want to propose in this paper an approach to the design of databases that could be used in advanced agricultural technologies. Nowadays, all these technologies are based on the usage of important volumes of data, organised in databases.*

Rezumat. *Articolul prezinta modul de proiectare corespunzator realizarii bazelor de date in domeniul tehnologiilor unor culturi de camp. In zilele noastre tehnologiile bazate pe un numar important de date se organizeaza in baze de date.*

A database represents a method of storing data on an external support, together with the possibility of retrieving it. The most frequently used database model is entity-relationship model, where data are stored in tables and tables are linked together by relations.

METHOD AND MATERIAL

The implementation of a relational database requires the design of the tables and then the definition of the relations between them. In the process of the table design, we must define the field names and the corresponding data types by which the designer controls what kind of data the user will be allowed to insert into the fields. A well designed database can provide access to updated data. A good and appropriate design is very important in order to reach the goals of the usage of that database.

The optimal design of the database requires the following steps to be respected:

- the identification of the objectives and the way the database will be used;
- the identification of the information that will be contained and the appropriate definition of the tables;
- the definition of the primary keys and unique keys, such that records can be uniquely retrieved;
- the definition of the foreigh or seconary keys and contraints;
- the configuration of the relations between tables;

- redundancy check and elimination;
- the definition of indexes that can speed up the selection operations

RESULTS AND DISCUSSIONS

So for an optimal design it is important to start from achieving a good knowledge about the purpose of the database, the way it will be used and who will be the users. This means among other things, to create and maintain a precise description of the purpose of the database, that will be used and changed if necessary, all along the design process.

Our database was created for storing information required for a succint description of the features of the main cultivated crops (cereals, bean vegetables, oleaginous plants, textile cultures, root crops and tubercular, tabacco, hops, medicinal plants).

During the database design we established the tables which will contain all the important data and characteristics of these crops:

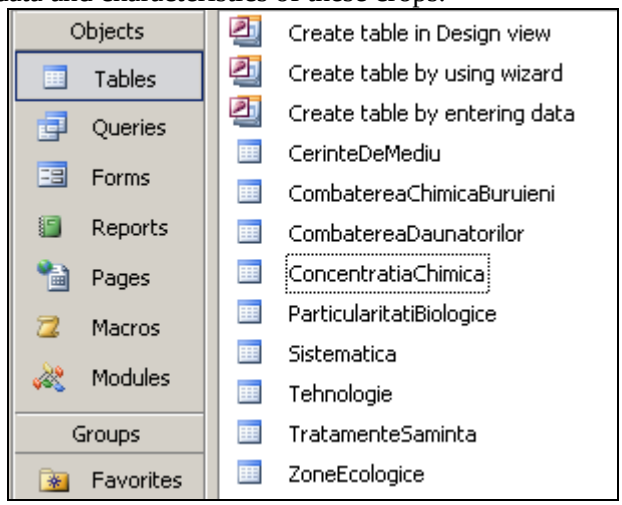


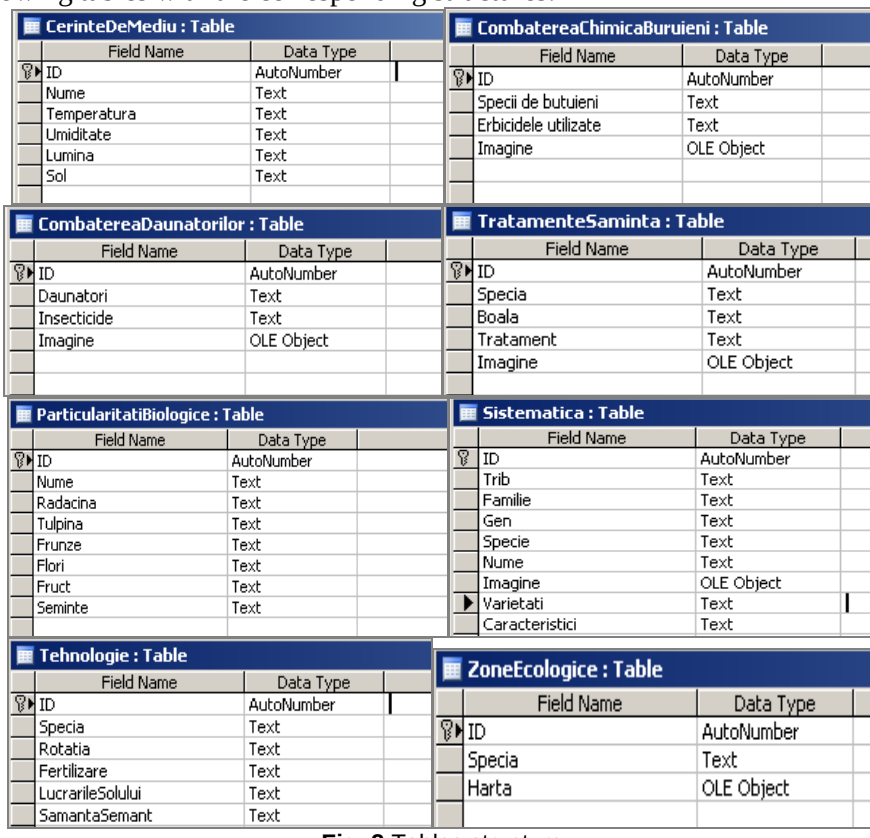
Fig.1 Tables of the Field Crops database

For a complex and complete characterization of each field crop, the issues are approached in this order:

- the importance of the crop;
- the chemical composition of the main product;
- systematical botanics(species, subspecies, varieties), origine, varieties and hybrids cultivated in Romania;
- biological particularities (morphology, vegetation phases);
- climate and soil requirements (ecology);
- culture technology: rotation (previous plants), fertilization (nutrition specifics, fertilizator doses, periods application), soil working, seeds and seeding (seeds quality, treatments against pathogens and diseases, periods, density and depth, seeding tehcniques), crops care (irrigation, pathogens, weeds, diseases and

other specific works), harvesting (optimal moment, methods and techniques) and yield per hectare.

So taking into account all the above mentioned aspects, we defined the following tables with the corresponding structures:



CerinteDeMediu : Table

Field Name	Data Type
ID	AutoNumber
Nume	Text
Temperatura	Text
Umiditate	Text
Lumina	Text
Sol	Text

CombatereaChimicaBuruieni : Table

Field Name	Data Type
ID	AutoNumber
Specii de butuieni	Text
Erbicidele utilizate	Text
Imagine	OLE Object

CombatereaDaunatorilor : Table

Field Name	Data Type
ID	AutoNumber
Daunatori	Text
Insecticide	Text
Imagine	OLE Object

TratamenteSaminta : Table

Field Name	Data Type
ID	AutoNumber
Specia	Text
Boala	Text
Tratament	Text
Imagine	OLE Object

ParticularitatiBiologice : Table

Field Name	Data Type
ID	AutoNumber
Nume	Text
Radacina	Text
Tulpina	Text
Frunze	Text
Flori	Text
Fruct	Text
Seminte	Text

Sistematica : Table

Field Name	Data Type
ID	AutoNumber
Trib	Text
Familie	Text
Gen	Text
Specie	Text
Nume	Text
Imagine	OLE Object
Varietati	Text
Caracteristici	Text

Tehnologie : Table

Field Name	Data Type
ID	AutoNumber
Specia	Text
Rotatia	Text
Fertilizare	Text
LucrarileSolului	Text
SamantaSemant	Text

ZoneEcologice : Table

Field Name	Data Type
ID	AutoNumber
Specia	Text
Harta	OLE Object

Fig. 2 Tables structure

We note that each table contains an ID field with the data type Autonumber which is the primary key. We used this field not for storing useful information, but only to define this unique key. The other fields are most of the of type Text because the data that will be edit inside are usually text. The fields containing images have the type OLE Object. When editing the tables containg image fields, in the corresponding column we will see the application software which created the image.

Forms are used to create the interface between the user and the tables. They allow an improvement of the way and feel and also of the usage, being a simpler but controlled gateway for the user for accessing and updating data in the database. The forms are based on the tables, and the changes done in the form content are updating automatically the tables on which their are based and reciprocally. Also, in the forms we will display the images that in the raw table view are displayed as file names.

Using a form for inserting and updating data have the following benefits:

- Forms allows to present the information as you want, with different field ordering, alignment and positioning.
- Forms can be defined to be similar to the paper document whose content will be inserted in the database. This made the data insert operation more easier and reduces the errors on the inserted data.
- We can design the forms to be user friendly, to focus on important data, indicating the required or facultative fields. It is not necessary that all the table fields to be present in the form.
- The form can contain validation rules on the inserted data, to control and limit incoerent or incorrect data input.

CONCLUSIONS

The present paper is the result of an interdisciplinary team work. Being a useful way for organizing data, the databases were used for storing in an structured manner the specialty information. We created also forms allowing the user to access this information. This way, the user receives the scientific and graphical information, optimising his research and documentation time.

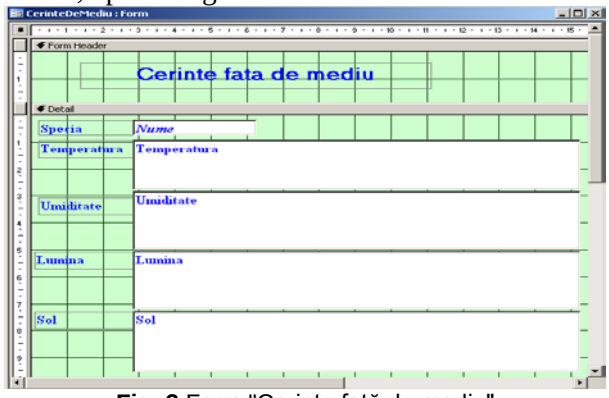


Fig. 3 Form "Cerințe față de mediu"

In the future we intend to develop a web interface for opening this database not only to more specialists that can improve the content, but also to other people that need to apply this information into practice.

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FLOWER SHOP ON THE ROMANIAN INTERNET SPACE

FLORĂRII VIRTUALE ÎN SPAȚIUL ROMÂNESC

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Abstract: *This paper presents a prototipe of a flower shop in the context of being a part of B2C electronic businesses. By an statistic analysis of the data we have obtained from a questionary, one can proove that virtual flower shop could be important on the Romanian online market.*

Rezumat. *Articolul prezinta modul în care apariția şi dezvoltarea rețelei Internet a determinat modificări semnificative în cadrul florariilor în contextul în care acestea ar putea fi considerate parte integrantă a afacerilor electronice de tip B2C. Articolul demostrează printr-o analiza a datelor obținute pe baza unui chestionar importanța florariilor virtuale pe piața on-line romaneasca.*

Late 80's and early 90's [2][3][4] were marked by important modifications in the political, economical and social fields, in Romania but also in the entire world. At that time in Romania, the Internet network makes its appearance in the university domain, being used with the object of research and particularly of communication between people from all over the country and also from all over the world. In Romania, in the last few years, it was noticeable that Internet has become as important and common as the telephone, both for the natural persons and the legal persons. In this context, at this time, as well as in the future, a person or a firm that doesn't have a website will become anonymous, no matter the field of activity.

In the horticulture field, it is important to extend its activities, as much as their nature allows it, in the virtual environment of Romania. Following, we will present a theoretical and practical prototype of a virtual business, of the B2C type, whose activity is the commercialization of flowers.

THE DESCRIPTION OF THE THEORETICAL PROTOTYPE FOR THE VIRTUAL FLOWER SHOP

The virtual business that we propose in this article is a virtual flower shop. The activity object of this virtual flower shop is the commercialization of flowers and their distribution to various clients' addresses. From our point of view, this kind of business can generate large incomes, due to the fact that there are many Romanian people living in other countries who will find our virtual flower shop as the perfect opportunity to send flowers to the dear persons living in Romania. Foreign persons and Romanian customers are also good candidates for buying flowers from our shop, by accessing the web pages with the object of making an order. Behind this virtual shop there is a physical one, which has distribution cars in charge with the assessment of commands to the addresses specified by the clients.

In the elaborating process of the virtual flower shop's theoretical model we identify the actions that will unfold in the virtual application: The administration of the

commercialized products through the virtual shop; The administration of the online clients and the commands' execution in real time; The establishment of a relation between the administrator and clients, through asynchronous communication instruments; There will be created instruments to allow the clients not only to see the commercialized products, but also to obtain pieces of information about the products, in order to compare them; Clients will have the possibility to add each ordered product in their shopping basket and to pay at the end. As well as is any other physical shop, the products are grouped into categories, in order to be found more easily; The customers are provided with a search engine, with the purpose of cutting off the time to locate a certain product in the virtual shop; Other facilities provided to the customers: the creation of users' accounts, the possibility to visualize the state of their order at any time, the proposal of the day, the latest products at promotional prices and the description of the delivery methods.

THE PROJECT AND THE IMPLEMENTATION OF THE VIRTUAL FLOWER SHOP

Following, based on the theoretical model of the virtual flower shop presented earlier, we will briefly describe the way this shop was projected and implemented, using the PHP scripting language. The first step in implementing a virtual flower shop was the creation of a database using MySql Front. This database contains the following tables:

Table 1

Products

pid	pnume	ppret	pimg	pcateg	pdesc	pdesco	pstare	pofera
AutoNumber	text	currency	text	text	memo	memo	number	Number

Table 2

Clients

C_id	c_user	ct_pass	c_email	c_str	c_oras	c_tara
AutoNumber	Text	text	text	text	text	text
	c_codpost	c_nrcard	c_tipcard	dexpcard	email	nume
	number	number	text	Date/time	number	text

Table 3

Shopping Basket

cos_id	cos_clientID	cos_produsID	cos_cantitate
AutoNumber	Number	Number	Number

Table 4

Purchase

Cump_id	Cump_prodid	Cump_cantitate	Cump_clientid	Cump_stare	datacumparari
AutoNumber	Number	number	number	number	timpstamp

The next step was to create the administration section of the virtual flower shop, corresponding to the theoretical model described earlier. In this section, after the authentication, a page which allows the administration of the products will appear on the screen, as shown in Figure1:

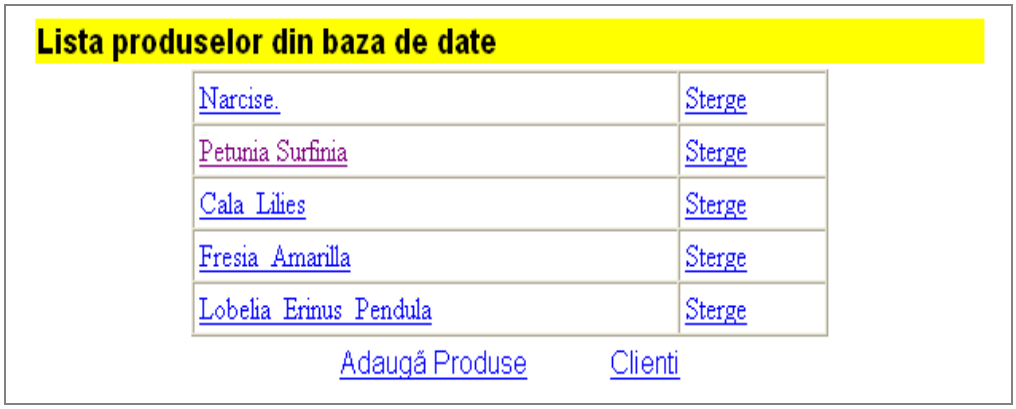

Fig. 1 The products' administration page

By clicking on one product from the list above, a new page will be launched and it will allow modifying information regarding a certain product. To delete one product from the same page, it is sufficient to click on the link "Sterge" situated right next to the product's name. In order to add a new product, the click on the link "Adaugare Produse" (from the page presented in Figure 1) will open a new page containing a form, which needs to be filled.

In order to access the pages concerning the administration of the clients, a click on the link "Clienti" (from the page presented in the Figure 1) is needed and as a result a new page shown in Figure 2 will appear. This new page allows seeing information on clients, the clients' orders and the processing of these orders, by clicking on the link "Comanda client", the emission of the invoice by accessing the link corresponding to this action from the current page. In the administration section there are also pages that contain asynchronous communication instruments with the clients of the virtual flower shop.

Fig. 2 The clients' administration page

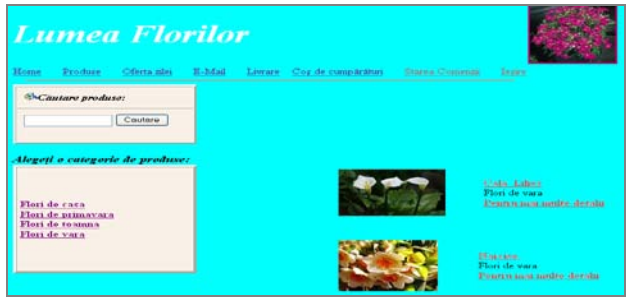

Fig. 3 The shop's main page

By launching the virtual flower shop in the browser, a new page will appear on the screen as the one shown in Figure 3, where there are presented the products commercialized by the shop.

From this page, the clients that have authenticated themselves can choose a product and put it into the shopping basket, which is shown in Figure 4. On the page dedicated to the shopping basket a client can delete selected orders, modify the quantities for a certain product and perform the payment.

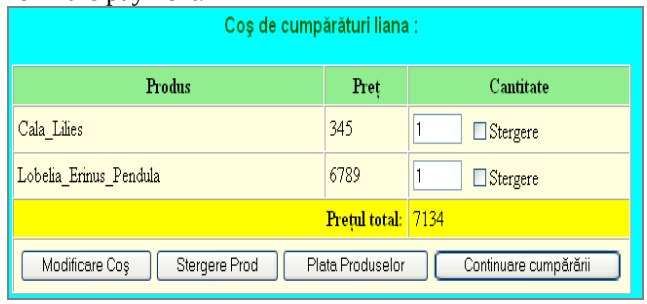

Fig. 4 The shopping basket

The source code corresponding to the creation of the shopping basket, written using PHP language is:

```
<?// the take over of the product's id
$produsID=$pid;// Adding a product to the shopping basket
if ($produsID!="")
{$sql="SELECT cos_id FROM cos WHERE cos_clientID=".$client_id." AND
cos_produsID=".$produsID;
 $nr_lini_tabel=mysql_query($sql);
while($row=mysql_fetch_array($nr_lini_tabel)){  $cos_id=$row['cos_id'];}
  if ((mysql_num_rows($nr_lini_tabel))==0)  {    $cant=1;
   $sqlString="INSERT INTO cos (cos_clientID,cos_produsID,cos_cantitate) VALUES ('".$client_id."',
'".$produsID."', '".$cant."')";     mysql_query($sqlString);  }
   else
 {  $sqlString="UPDATE cos SET cos_cantitate=cos_cantitate+1 WHERE cos_id=".$cos_id;
     mysql_query($sqlString);}}//Updating the quantity of the products
if (($modificarecant !="")or ($stergereproddincos!=""))
{$sql="SELECT cos_produsID,cos_id, cos_cantitate FROM cos WHERE cos_clientID=".$client_id;
$nr_lini_tabel=mysql_query($sql);
while($row=mysql_fetch_array($nr_lini_tabel))
{   $nouacantitate=${'pq'.$row['cos_id']} ;echo $nouacantitate;  if (is_Numeric( $nouacantitate )) {
$sqlString="UPDATE cos SET cos_cantitate='".$nouacantitate ."' WHERE cos_id=".$row['cos_id'];
mysql_query($sqlString);  } $pqs=${'pqs'.$row['cos_id']};
if ((($nouacantitate==0)and (is_Numeric($nouacantitate)))or($pqs=="1"))
   {        $str="delete from Cos where cos_id=".$row['cos_id'];                    mysql_query($str);  }
if  (!is_Numeric($nouacantitate))  {$sqlString="UPDATE  cos  SET  cos_cantitate=cos_cantitate-1
WHERE cos_id=".$row['cos_id'];     mysql_query($sqlString);}  }  }?>
```

In this virtual flower shop, there are pages that offer to the clients the possibility to register to the database, to search products and to communicate with various persons. We considered that the business that we proposed in this article can be successful only if the clients of the online flower shop are satisfied, therefore we created a set of questions. Following, we will describe the way we used this set of questions and we will work on the statistics of the results [12][6].

THE STATISTIC METHOD AND DATA PROCESSING

Based on the questionnaire, we initiated a study for 70 persons, both male and female, with ages between 18 and 40 years old. These persons had to answer the question: ”Is the action of buying flowers using the virtual flower shop a better one from all the points of view (information, price, quality and time) than the action of buying from a common shop?” The persons who took part at this study answered not only before getting in contact with this virtual flower shop, but also after the first order. The null hypothesis is that there is no significant difference between the answers before and after the first online order. The alternative hypothesis is that there is a significant diff. between the answers:

Step1. The table of contingency

	First interrogation		Total
Second interrogation	Yes	No	
Yes	30	13	43
No	12	15	27
Total	42	28	70

The previous table was created based on the following principle: a number N>30 [13][5] answers one question with Yes or No twice, before and after having ordered from the virtual flower shop presented in this article. By this action, we test if the ratio of the answers YES and/or NO from the first interrogation is significantly different from the second one.

Step2. The table of contingency created based on the table from Step1.

	First interrogation		*Total*
Second interrogation	*YES*	*NO*	
YES	*25,8*	*17,20*	*43*
NO	*16,2*	*10,8*	*27*
TOTAL	*42*	*28*	*70*

Step3.

α	0,05
df	1
Hi-square critical	3,841459149
p-value	0,035280986
Hi-square observed	4,431523284
Sensibility	0,555555556
Specificity	0,54

We need to specify that p-value<0.05, which means that the test is significant (fact also shown by the results of sensibility and specificity), but the value of p does not influence the acceptance or the rejection of the null hypothesis, this being made by comparing the values of Hi-square observed and Hi-square critical. Hi-square critical<=Hi-square [12][5] observed rejects the null hypothesis and accepts the alternative hypothesis, meaning that there is a significant difference between the answers from before and after the first acquisition on-line from the virtual flower shop. As a conclusion, in order to increase the number of persons who buy on-line we need to convince them by various methods to make the first transaction on-line, so they be able to see the advantages of this new way of buying products. The result of such effort will be favourable for both on-line customers and on-line sellers.

CONCLUSIONS

This article contains not only the theoretical steps, but also the practical ones for conceiving the project and the creation of a prototype for a flower shop, which works in the Romanian virtual environment and not only. In our opinion, the success of the virtual flower shops depends on their continuous adaptation to the market's demands. There is also important that they offer better and handier services than the classic flower shops.

We consider that the development of the B2C business, particularly of the virtual flower shops and not only, will have a decisive role in changing the old mentalities of the Romanian society and in accepting the fact that, at this time, this solution is the most effective and cheap way of interaction between buyer and seller.

In the future researches, we propose ourselves to offer solutions in order to involve the Internet network in the horticulture field, because we consider that this instrument will become indispensable in the near future.

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'GREENFINGERS' - UNCONVENTIONAL INSIGHT INTO THE ENGLISH HORTICULTURAL PHRASEOLOGY

"GREENFINGERS" - O PRIVIRE NECONVENTIONALA ASUPRA VOCABULARULUI ENGLEZ HORTICOL

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Abstract. *A passion for more than five hundred years, gardening has totally and definitively subjugated the British spirit that has it currently encoded in its DNA core structure. It is but natural for the English linguistic heritage to enrich its patrimony with words and phrases that reflect the very intense relationship between gardener and plants, a unique bondage that casts a peculiar light on a life-to-life basis. The paper presents some of the most frequently used, witty, neatly-phrased and most special words and expressions that cast spots of colour on the horticultural linguistic canvas.*

Rezumat. *O pasiune de mai bine de cincisute de ani, gradinaritul a subjugat total si definitiv sufletul britanic, de altfel de neconceput fara aceasta componenta a sa. Era, astfel, firesc ca si spatiul lingvistic sa inceapa sa creeze si sa gazduiasca expresii idiomatice care sa surprinda relatia atat de speciala dintre gradinar si obiectul adoratiei sale, si acesta este firul pe care se organizeaza lucrarea noastra, in incercarea de a prezenta cele mai recurente, inspirate si sugestive expresii pe care limba engleza le-a dedicat exclusiv lumii horticole.*

Britain has some of the most beautiful gardens of the world alluring visitors into an enchanted realm of colour, perfume and craftsmanship. Down through the centuries, inspired plantsmen and designers have taken advantage of the temperate climate of the island to create a unique and amazing variety of gardens -from grand landscaped parks and woodlands, to intimate rose gardens and small, flowery cottage gardens. Be them large or small, open or walled, public or secluded, most British gardens are filled with scented and shapely roses, which, at their best in high summer, will majestically stand out. Gardening has a special bond with architecture, and it is but natural to witness symbiosis between the two. Thus, we talk of *green roof* also known as *eco roof* or *living roof.* A green roof is a wild garden of grasses and herbs planted on a suitable surface, usually on an urban house. It traps rainfall and releases it slowly, so it helps to prevent the flooding that can happen after a storm in a built-up area. But its principal virtue is that it is a haven for wildlife, especially beetles and spiders. In turn these provide food for birds — for instance, the black redstart has been encouraged to nest in one part of London as a result of green-roof construction. A recent survey for English Nature found over a hundred species of bugs, some of them rare, in a

mixture not found in nature. Strange as it may seem, it is man's creation now that offers a hand to God's work in its attempt to preserve and foster it.

British gardens are treasure-troves of jewel-like roses and herbaceous plant gems brought by explorers who roamed the world to find new plants to enrich the botanical heritage of their gardens. The 'green' world has undoubtedly left its marks in what the biological patrimony is concerned but it has also, how else, permeated the linguistic area as well, touching it with the delicacy and expressiveness for which it stands for.

When it comes to gardeners, and gardening skills, one may refer to the exquisite skills required by anyone who indulges into such a pastime of profession with the phrase 'to have green fingers' or 'to have a green thumb', recorded for the first time as a title in 1934, as an old expression which describes the art of communicating the subtle energies of love to prosper a living plant. '*Some men have green fingers. Plants like them. They can make things grow because they love them*', states an article appeared in the Nature magazine on the 28th of December 1946.

Even if this is by far the best known and used phrase that refers to someone's very special skills and 'communication' abilities with the plant kingdom, there are other idiomatic expressions that owe their existence to the semantic core of a horticultural-based lexical register. Most of these idioms fit the following structural pattern – ***Verb + Adjective/Article/Preposition + Noun*** and manage to plastically capture the plasma of the linguistic matter, touching it with either the colour, or the suggestiveness of the 'natural' ingredient that appears in it.

Gild the lily – is an idiomatic phrase whose meaning is 'to apply unnecessary ornament', namely 'to over embellish', a very compelling image, since lilies are so delicate and lovely that gilding them would be not only a redundant act, but also one that could jeopardise the exquisite beauty of the flower. Its origin goes way back in time, in 1595, to Shakespeare's *King John*:

'Therefore, to be possess'd with double pomp, / To guard a title that was rich before, / *To gild refined gold, to paint the lily*, / To throw a perfume on the violet, / To smooth the ice, or add another hue / Unto the rainbow, or with taper-light / To seek the beauteous eye of heaven to garnish, / Is wasteful and ridiculous excess.'

One may rightfully note that *gild the lily* is not at all the correct quotation, but, unfortunately, remembering lines from Shakespeare isn't everyone's forte and this account for the alteration of the text. The term *paint the lily* was used in the 20th century, with the same meaning we now apply to *gild the lily*, which, clearly, is the correct quotation. The two versions coexisted for a time, although *paint the lily* is now hardly ever used. The first reference to *gild the lily* comes from the USA, in the Newark Daily Advocate, 1895, in what appears to be a half-remembered version of Shakespeare: '*One may* ***gild the lily*** *and paint the rose, but to convey by words only an adequate idea of the hats and bonnets now exhibited absolutely passes human ability*.'

Used mainly as a typical spatial delineating technique, laying its mark on the British garden architectural style, the hedge has also inspired the creation of an idiom, ***Hedge your bets,*** whose meaning is ‘to avoid committing oneself; to leave a means of retreat open’. ‘Hedge’ has been used as a verb in English since at least the 16th century, with the meaning of 'equivocate; avoid commitment', value that is perfectly illustrated by one of Shakespeare's most appreciated comedies, *The Merry Wives of Windsor*: ‘I, I, I my selfe sometimes, leauing the feare of heauen on the left hand... am faine to shuffle: ***to hedge***, and to lurch.’(1598)

It has been speculated that the verb 'to hedge' derives from the noun hedge, which was normally made from the impenetrable spiny tree hawthorn. The theory goes that to hedge a piece of land was a cautious, safety-first act and that this gave rise to the 'secure, non-committed' meaning. 'Hedging one's bets' was coined later in that century. It referred to the laying off of a bet by taking out smaller bets with other lenders. The purpose of this was to avoid being unable to pay out on the original larger bet. George Villiers, the second Duke of Buckingham, in his satirical play *The Rehearsal*, first used the phrase: ‘Now, Criticks, do your worst, that here are met; For, like a Rook, I have ***hedg'd in my Bet.***’ (1672)

A distinct story comes with the ***Know your onions*** idiom, whose origin (debatable as it may be), apparently lies not in the common noun, as one may suspect, but in the common noun that transferred itself into the category of the proper nouns, for here we talk about *Onions* (surname), and not of *onions* as mere common noun. In itself, the idiom means ‘to be experienced in or knowledgeable about a subject’. The English grammarian and lexicographer Charles Talbut Onions (1873-1965) was an editor of the Oxford English Dictionary from 1895 and continued to write reference works throughout a long and distinguished career, that reached its peak with The Oxford Dictionary of English Etymology (1966), published a year after his death. While it is true that 'know your onions' was coined at a time when C. T. Onions had established a reputation (i.e. during the 1920s), the match between the phrase and his name is just a coincidence. ‘Know your onions’ is in fact an American phrase, with many references in print from the 1920s onward, but none in the United Kingdom or elsewhere until the middle of the century.

Laid out in lavender is one of the most ‘scented idioms’ of the English language that bursts in any context it may appear with the delicate but persistent fragrance of one of Britain’s most delicate flowers, in fact one of the horticultural icons of the island. Although its meaning is far from conveying a positive connotation (‘preparing for burial’), this does not affect the olfactory dimension entangled. The allusion is clearly to the practice of strewing lavender or other strong smelling herbs near dead bodies to mask their smell. The term was preceded by the much earlier phrase 'laid up in lavender'. This refers to the storage of clothes with lavender to keep them fresh and free from insect damage - a precursor to mothballs. The practise was referred to in Robert Greene's, *A Quip for an Upstart Courtier*, 1592. The phrase was first printed in *A New Dictionary*

Of The Terms Ancient And Modern Of The Canting Crew, 1690: '***Layd-up-in Lavender***, when any Cloaths or other Moveables are pawn'd or dipt for present Money.'

Another pattern that may describe mould for almost all English similes that act as comparatives of equality is ***As + Adjective + As + (Determiner) + Noun***.

As cool as a cucumber means 'calm, unruffled', connotation originated by the fact that cucumbers are cool to the touch. This simile was first recorded in John Gay's poems, *New Song on New Similies*, 1732: 'I ... ***cool as a cucumber*** could see the rest of womankind.'

As alike as two peas in a pod is an idiomatic phrase that, suggestively enough, refers to two identical items or people. This simile, of course, derives from the fact that two peas from the same pod are virtually indistinguishable. The phrase, which is sometimes given as 'like as two peas', is quite old and versions of it date from the 16th century. John Lyly, for instance, used the phrase in *Euphues and his England*: 'Wherin I am not unlike unto the unskilfull Painter, who having drawen the Twinnes of Hippocrates, (who wer ***as lyke as one pease*** is to an other).' (1580). Lyly's use of 'pease' as the singular form was the norm in Tudor England. The word 'pea' came into use as the singular in the 17th century, with 'peas' as its plural form; this avoided 'peases', while the transition left 'pease' out in the cold and nowadays people hardly use that form, except in the name of the dish of dried peas, cooked to a mush - 'pease pudding'. The pudding is itself now becoming less common as 'mushy peas' have largely superseded it, which is basically the same thing. Once that process is complete, 'pease' will be gone from the everyday language.

If we have started our virtual journey through the world of those idioms that enjoy life from a double perspective, one of the words themselves, as the other one coming from the 'biological' dimension intimately interwoven with the lexical content with a quotation from William Shakespeare, let us end it in the same way. May all our lives be like a ***primrose path***, may it be joyful, colourful and rewarding. Used by the Great Will in both Hamlet and Macbeth, this idiom is simply a vivid allusion to a path strewn with flowers:

'I shall the effect of this good lesson keep,
As watchman to my heart. But, good my brother,
Do not, as some ungracious pastors do,
Show me the steep and thorny way to heaven;
Whiles, like a puff'd and reckless libertine,
Himself ***the primrose path*** of dalliance treads,
And recks not his own rede.' (Ophelia, *Hamlet*, 1603)

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ANALYSIS OF BANKRUPTCY RISK

ANALIZA RISCULUI DE FALIMENT

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Abstract: *In the appreciation state of financial health of company, the financial diagnosis has the objective major the evaluation risk afferent his activity. Some among these riskiness can point out the fragility of the company and others ones can prefigure just the bankruptcy. The risk notion has an important role in the future prefiguration of the company and in the estimation the possible fluctuations of the installment of the profitableness with help of the previsions, starting from the signals offered of the analysis position passed. Bankruptcy risk represents the possibility as the company to be in the incapacity of the pay and, accordingly, to fail. Behind to realize studies in SUA and France it showed that, for the estimation of a bankruptcy company, can be used-up accounting methods and banking methods. The accounting methods used in the case of comparative analyses in times for estimation future evolution of the activity. The banking methods find out the risk of bankruptcy means the notes of synthetic risks obtained on the base of the statistical methods of the discriminating analysis. These statistical methods permit the determination of the scoring - function which classify the companies in vulnerable and healthy.*

Rezumat: *În aprecierea stării de sănătate financiară a întreprinderii, diagnosticul financiar are ca obiectiv major evaluarea riscurilor ce îi însoţesc activitatea. Unele dintre aceste riscuri pot semnala fragilitatea întreprinderii, iar altele pot prefigura chiar falimentul. Noţiunea de risc are un rol important în prefigurarea viitorului întreprinderii şi în estimarea fluctuaţiilor posibile ale ratei rentabilităţii cu ajutorul previziunilor, pornind de la semnalele oferite de analiza situaţiei trecute. Riscul de faliment reprezintă posibilitatea ca o întreprindere să intre în incapacitate de plată şi, prin urmare, să fie declarată falimentară. În urma unor studii realizate în SUA şi Franţa s-a arătat că, în vederea previzionării falimentului unei întreprinderi, pot fi utilizate metode contabile şi metode bancare.Metodele contabile se folosesc în cazul analizelor comparative în timp în scopul estimării evoluţiei viitoare a activităţii. Metodele bancare descoperă riscul de faliment prin intermediul unor note de risc sintetice obţinute pe baza unor metode statistice de analiză discriminantă. Aceste metode statistice permit determinarea unei funcţii-scor, a cărei valoare clasifică întreprinderile în vulnerabile şi sănătoase.*

The main causes that lead to the bankruptcy of a company can be classified into the following two categories (Niculescu, 2005):

- External causes:

- Increase in the internal and external competition;
- The appearance of substitute products;
- Loss of an important customer;
- Bankruptcy of an important provider for specific materials, pieces, subsystems, that are essential for the company's activity;

- Bankruptcy of a bank with which the company used to have significant financial relations;
- The appearance of regulations regarding environmental safety and protection;
- Continuous decrease of the stock exchange quotation.

• Internal causes:

- A rotation of stocks and customers lower to that of the norms in the company's activity field;
- The use of inferior margins to those of the norms in the company's activity field;
- Financing investments with sources meant for exploitation;
- Repeated losses from exploitation;
- The impossibility of renewing loans.

An evaluation of the company's stability and of its possibility to have losses, which would anticipate the degradation of its financial situation up to the risk of bankruptcy, could be achieved using indicators that express the quality of its economical and financial activity, such as (Petrescu, 2004):

• Patrimonial solvability, whose value vas to be over 0.3 and to have an increasing evolution. A value under 0.3 represents an alert that should determine prudence from the part of the financing bank, as the company is on the verge of bankruptcy;

• Liquidity, whose value has to be greater than 1 in order to indicate a resource supplement that could be used to counter-balance incidents that may appear in the evolution of the floating capital, that is, a positive trading capital;

• Treasury, which expresses the company's ability to finance itself using stable sources, if its value is positive. A negative treasury implies a resort to bank credits for current payments, which in its turn indicates financial difficulties on the short term;

• The rate of financial effectiveness is favored by resorting to loans, as a consequence of a positive financial leverage effect.

MATERIAL AND METHODS

According to several studies performed in the US and in France, both accounting and banking methods can be used to predict the bankruptcy of a company. If the accounting methods are used for comparative analyses over time, with the purpose of estimating the future evolution of the company's activity, banking methods reveal the risk of bankruptcy using synthetic risk degrees based on statistical methods of discriminatory analysis, allowing the determination of a score function whose value classifies companies into vulnerable and healthy.

RESULTS AND DISCUSSIONS

The score function is computed using a set of financial rates obtained for companies that behaved differently when facing a bankruptcy risk.

Several scoring (computing) methods are known, and the best known are: Altman, Conan-Holder, the method of the Bank of France, the method of the Romanian Commercial Bank, etc.

The Altman model was designed in 1968 in the US, and it was the first score function that allowed anticipating 75% of bankruptcies 2 years before they occurred.

The score function (Z) includes 5 variables (rates) and has the following expression:

$$Z = 1.2R_1 + 1.4R_2 + 3.3R_3 + 0.6R_4 + 0.999R_5,$$

where:

$R_1 = \frac{Floating\ assets}{Total\ assets}$ expresses the weight of the floating capital in the total of assets and measures the company's flexibility and its effective usage of the trading capital;

$R_2 = \frac{\text{Re}invested\ profit}{Total\ assets} = \frac{Self - financing}{Total\ assets}$ indicates the ability of the company's internal financing;

$R_3 = \frac{Gross\ profit}{Total\ assets} = \frac{Exploitation\ result}{Total\ assets}$ measures the rate of return of the assets;

$R_4 = \frac{Stock\ capitalization}{Total\ debt} = \frac{Market\ value\ of\ owned\ capital}{Total\ debt}$ reflects financial independence (autonomy);

$R_5 = \frac{Sales}{Total\ assets}$ expresses the rotation speed of the assets (number of rotations).

The company vulnerability according to its score can be evaluated according to the data in the table below:

Table 1

The Altman Model

Value of the Z score	State of the company	Bankruptcy risk (%)
Z > 2,675	Good - solvability	Low – non-existent
1,81 < Z < 2,675	Precarious - difficulty	Non-determined
Z < 1,81	Difficult - insolvability	Imminent - maximum

The Conan-Holder model was designed in 1978 on a sample of 190 small and medium companies, of which half experienced bankruptcy between 1970-1975.

The score function includes 5 variables (rates) an is expressed as follows:

$$Z = 0.24R_1 + 0.22R_2 + 0.16R_3 - 0.87R_4 - 0.1R_5,$$

where:

$$R_1 = \frac{Gross\ exploitation\ surplus}{Total\ debt}$$

$$R_2 = \frac{Permanent\ capital}{Total\ assets}$$

$$R_3 = \frac{\text{Achievable and available values}}{\text{Total assets}} = \frac{\text{Floating assets} \quad \text{Stocks}}{\text{Total assets}}$$

$$R_4 = \frac{\text{Financial expenses}}{\text{Sales}} \quad R_5 = \frac{\text{Personnel expenses}}{\text{Value added}}$$

The company's vulnerability according to the score obtained is evaluated according to the data in the table below:

Table 2

The Conan-Holder Model

Value of the Z score	State of the company	Bankruptcy risk (%)
Z > 0,16	Very good	< 10 %
0,1 < Z < 0,16	Good	10 ÷ 30 %
0,04 < Z < 0,1	Alert	30 ÷ 65 %
- 0,05< Z < 0,04	Danger	65 ÷ 90 %
Z < - 0,05	Failure	> 90 %

The model of the Balance Pool of the Bank of France has been designed based on 3000 industrial companies 3 years before their bankruptcy, between 1975 – 1980.

The model uses a number of 8 variables (rates) and has the following expression:

$$100Z = -1.255R_1 + 2.003R_2 - 0.824R_3 + 5.221R_4 - 0.689R_5 - 1.164R_6 + \\ + 0.706R_7 + 1.408R_8 - 85.544,$$

where:

$$R_1 = \frac{\text{Financial expenses}}{\text{Gross exploitation surplus}}$$

$$R_2 = \frac{\text{Stable ressources}}{\text{Invested capital}} = \frac{\text{Permanent capital}}{\text{Total assets}}$$

$$R_3 = \frac{\text{Self-financing ability}}{\text{Total debt}} \quad R_4 = \frac{\text{Gross exploitation surplus}}{\text{Sales}}$$

$$R_5 = \frac{\text{Commercial debts}}{\text{Provisioning}} \times T = \frac{\text{Medium provider balance}}{\text{Goods purchase}} \times 360$$

$$R_6 = \frac{\text{Modification of the value added}}{Vad_0} \times 100 = \frac{Vad_1 - Vad_0}{Vad_0} \quad 100$$

$$R_7 = \frac{\text{Medium customer balance}}{\text{Sales}} \quad X\ 360 \quad R_8 = \frac{\text{Corporeal investments}}{\text{Value added}}$$

;

The company's vulnerability according to the score obtained is evaluated according to the data in the table below:

Table 3

The Model of the Balance Pool of the Bank of France

Value of the Z score	State of the company	Bankruptcy risk (%)
Z > 0,125	Normal	10 ÷ 45 %
- 0,25 < Z < 0,125	Unsure	45 ÷ 70 %
Z < - 0,25	Risky	70 ÷ 100 %

The Model of the Commercial Bank of Romania uses a set of rates and performance indicators to establish the company's reliability based on a score grill with 6 criteria:

- Patrimonial liquidity: $$Lp = \frac{Short\text{-}term\ assets}{Short\text{-}term\ liabilities}$$;
- Solvability: $$S = \frac{Owned\ capital}{Liabilities}$$;
- Financial effectiveness: $$Rf = \frac{Gross\ profit}{Owned\ capital}$$;
- Rotation of floating assets: $$Nac = \frac{Sales}{Floating\ assets}$$;
- Dependence on provision markets (A) and on sale markets (D) – internal and external;
- Guarantees (guaranteed deposits in Romanian lei and in other currencies, deposits, mortgages, goods purchased with credits, debt transfer).

In the case of this model, the criteria for evaluating the company's reliability are scored with points that, together, are used to classify the companies into 5 categories (from A to E), according to which their credibility is evaluated.

The score obtained by the companies reflects their economic and financial state, as well as the risk for insolvability, and the companies can be included in one of the 5 reliability categories, which allows it to be granted credits or not:

Table 4

The Model of the Commercial Bank of Romania

Category	Total points	Economic – financial state – degree of risk
A	> 20	Very good – credits can be granted
B	16 ÷ 20	Good - credits can be granted
C	11 ÷ 15	Variable – demonstrates high risk
D	6 ÷ 10	High risk – no guarantees for granting credits
E	0 ÷ 5	Very precarious - no guarantees for granting credits

According to this grill, companies in categories A and B have a good economic and financial situation, and they are reliable enough to be granted bank credits.

Companies in category C have a high degree of risk and their reliability concerning credits imposes relatively high risk insurance. These companies have to be supervised regarding their solvability, so as to recover credits from the first signs of suspicion.

The reliability of companies in categories D and E does not offer any guarantees, so that these companies cannot benefit from credits that they could return in due time.

CONCLUSIONS

Bankruptcy is a constitutive part of the competitive business environment. The risk of bankruptcy represents the possibility that a company can no longer perform payments, which, according to specialists, is process that can be predictable for about 70% of the cases, based on symptoms that anticipate their failure.

In order to predict bankruptcy, both accounting and banking methods can be used, whose purpose is to determine the financial reliability of the analyzed company.

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QUALITATIVE CHARACTERISTICS OF ACCOUNTING INFORMATION AND THE CONCEPT OF TRUE AND FAIR VIEW – FAIR PRESENTATION

CARACTERISTICILE CALITATIVE ALE INFORMAȚIEI CONTABILE ŞI CONCEPTUL DE IMAGINE FIDELĂ – PREZENTARE FIDELĂ

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Abstract: *The financial information is useful in the process of decision for the company's partners according as these satisfy certain qualities. The qualitative characteristics represent the attributes which establish the utility of the information offered by the financial statements. The General Cadre of International Accounting Standards Board (IASB) has identified the next characteristics: understandability, relevance, reliability, comparability of the financial information. The usefulness of the economics and financials information is a combination of the foregoings qualitative characteristics and it generate more satisfaction for its users. The quality of the information offered of the financial statements lead to true and fair view. The General Cadre of IASB doesn't use the true and fair view notion, but it indicate the financial statements must represents a real and correct view or present trustily the financial position, the performance and the modifications of the financial position. The concept of the true and fair view is regulated through 4th Directive of the European Union and one of fair presentation through IAS 1. Indifferently of mode in which it is named this concept - true and fair view or fair presentation – it wants to obtain the true in accounting.*

Rezumat: *Informațiile financiare sunt utile în procesul decizional al partenerilor întreprinderii în măsura în care acestea satisfac anumite calități. Caracteristicile calitative reprezintă atributele care determină utilitatea informațiilor oferite de situațiile financiare. Cadrul general al Consiliului pentru Standarde Internaționale de Contabilitate (IASB) enumeră următoarele caracteristici: inteligibilitatea, relevanța, credibilitatea şi comparabilitatea informațiilor financiare. Utilitatea informațiilor economico-financiare reprezintă o mixtură a caracteristicilor calitative menționate şi generează un plus de satisfacție pentru cei ce le folosesc. De calitatea informațiilor furnizate de situațiile financiare depinde obținerea imaginii fidele asupra activității oricărei întreprinderi. Cadrul general al IASB nu abordează în mod direct noțiunea de imagine fidelă, menționând faptul că situațiile financiare trebuie să redea o imagine reală şi corectă sau să prezinte fidel situația financiară, performanța şi modificările poziției financiare. Conceptul de imagine fidelă este reglementat prin Directiva a IV-a a Uniunii Europene, iar cel de prezentare fidelă prin IAS 1. Indiferent de modul în care este denumit acest concept – imagine fidelă sau prezentare fidelă – el vizează obținerea adevărului în contabilitate.*

The last decades of economy development in the world are characterized by an acceleration of the internationalization of capital markets and commerce. The

ever higher degree of globalization of capital markets imposes the worldwide use of a unique language for financial reporting, so that the world's economic system would benefit from credible and transparent accounting information.

The objective of financial statements is to provide information regarding financial position, performances, and the modifications of the financial position. This information is useful to a large palette of users, for motivating their economic decisions.

The requirements for qualitative financial information appeared in the United States of America after the economic, financial, and stock exchange crisis in 1929, when investors had insufficient information (Ştefănescu, 2005). The first step in this direction has been the creation of financial norms, imposed on companies that issued negotiable securities, and later the FASB – Financial Accounting Standards Board has issued the accounting norm SFAC 2 "Qualitative characteristics of accounting information".

MATERIAL AND METHOD

The qualitative characteristics are the attributes that determine the usefulness of the information provided by financial statements. The collection, processing, and communication of the information in the balance sheet are directed by a set of norms, regulations, and procedures.

At the international level, there coexist two dominant accounting streams or systems that have directly influenced the creation and presentation of financial statements. These are:

- The continental accounting system;
- The Anglo-Saxon accounting system.

In what concerns the approaches of the two accounting cultures, there are multiple and important differences, which has lead to the initiation of processes of balancing and filling in the gaps. One of the most significant differences that have appeared between the two streams regards the concept of faithful image. While in the Anglo-Saxon accounting system the faithful image is the supreme principle, the continental approach considers it the fundamental objective of financial accounting.

RESULTS AND DISCUSSIONS

The general frame of the International Accounting Standards Board – IASB mentions the following characteristics: intelligibility, relevance, credibility, and comparability of financial information.

Intelligibility means that financial information has to be easily understood by the users of financial statements. Not all the information is accessible for any user category. For this requirement to be met, users are supposed to have sufficient knowledge regarding the business process and the economic activities, to master accounting notions, and to have the desire to study the information presented. This does not mean that the information with a higher degree of complexity do not have to be expressed in financial situations.

Relevance refers to the ability of the financial information to influence the economic decisions of the users, helping them evaluate past, present, and future

events, confirming or correcting previous evaluations. This allows for an estimation of the company's ability to take advantage of the opportunities and to react immediately to unfavorable situations, as well as for a prediction of the future financial position and performance of the company. Therefore, the relevance of the information has two roles: to predict and to confirm.

The prediction role supposes that the present level and structure of the assets have a value for the users when the latter try to predict the company's ability to take advantage of opportunities and to react to unfavorable situations.

The confirmation role supposes that this information is meant to confirm previous predictions (for example: the way in which the company can be structured, or the result of the planned activities). The information concerning the financial position or previous performances are frequently used as a basis for predicting the future financial position and performances, as well as other problems of direct interest to the users, such as: payment for dividends and salaries, variations in the price of certificates, as well as the ability of the company to meet its due obligations. From this point of view, "accounting standards have the role to ensure the relevance of accounting information provided by financial statements for the decisions of investors and of other users. For example, creditors use financial information to evaluate the company's ability to meet future obligations. Information about the past is often useful to creditors for predicting future cash debts, as well as cash incomes. The reported information regarding current and long-term debts, as well as specific sources, can be used to calculate the company's financial rates and the weight of the assets of the society financed from debts." (Dycman, 1995).

Credibility means that the information presented does not include significant errors, and that it is not subjective, so that the users can be confident that it correctly represents what it is meant to represent or what is reasonable expected to represent.

In order to be credible, any information has to take into account: faithful representation, the prevalence of substance over form, neutrality, prudence, and wholeness.

Faithful representation is the characteristic through which some credible information has to faithfully represent the transactions and other events. For example, the balance sheet has to display in a credible manner the transactions and evens of the company expressed in assets, debts, and owned capital at the date of the report, if they meet the criteria for recognition.

The prevalence of the substance over form is also expressed in French as "la proéminence du fond sur la forme" and it refers to a prevalence of the economic details over the juridical ones (Horomnea, 2004).

This characteristic aims to point out the fact that certain transactions or events are not always according to what results from their juridical expression. For instance, if a company gives away an asset to another party, so that the documents express the transmission of the copyright to that respective party, there can exist contracts that give the company the right to enjoy future economic

benefits from the respective asset. In such circumstances, reporting a sale would not represent in a credible manner the completed transaction. The most relevant case is that of the leasing contract, especially that of operational leasing.

Neutrality implicitly states that the information is objective, free from influences. Financial statements are not neutral if they influence the making of a decision or the formulation of a pre-determined professional reasoning.

Prudence means including certain precautions in applying professional theories necessary for making the estimations required in uncertain conditions, so that the assets and the incomes are not over-valued, and the liabilities and debts are not under-valued. Financial statements have to overcome uncertainties that affect events and transactions, such as: cashing uncertain debts, the probable usage duration for devices and equipments, the number of complaints regarding the products in guarantee. All these uncertainties are recognized through the presentation of their nature and value, practicing prudence in drawing financial statements.

However, using prudence does not presuppose creating excessive provisions or reserves, deliberate under-evaluations of the assets and incomes, or an over-evaluation of debts and expenses.

Integrality supposes that, in order to be credible, information in financial statements has to be complete, within the reasonable limits of the threshold of significance and of the cost of its raising. Omissions make information become fake or misleading, so that it is no longer credible, and it becomes defective from the point of view of its relevance.

The general frame of IASB presents the characteristics of relevance and credibility and the interrelations between them, showing that they are useful taken individually, but their usefulness is more appropriate if a series of restrictions are observed, such as: opportunity, the cost-benefit ratio, the balance between qualitative characteristics, faithful image / presentation.

Opportunity means that if there is an exaggerated delay in information reporting, it loses its relevance. There are situations when the management has to choose between two variants: the relative value of a report and the provision of credible information.

The cost – benefit ratio represents more of a constraint than a characteristic, as the benefits of the information should be higher than the cost of their production.

The balance between qualitative characteristics is necessary in order to meet the objectives of financial situations, and it also represents an issue related to professional thinking problem.

The faithful image/ presentation suppose that the application of the main qualitative characteristics and of the appropriate accounting standards normally results in drawing financial statements that reflect a faithful image of the company's situation.

Comparability proves useful when it is required to identify the tendencies in the financial position and performances of the company. Any information is

more valuable if it can be compared in time or space, respectively, if it can be compared to other reference values. The measurement and presentation of the financial effort of the same events and transactions have to be done in a coherent and unitary manner, both within a company, in time, and in other companies at the same moment.

The importance of comparability resides in that the users need to be informed about the accounting policies used in making the financial statements, the changes in these policies, the effects of these changes, so as to be able to identify the differences between the accounting policies used in a company at various moments, as well as between those used in various companies.

The qualitative characteristics of the accounting information provided in annual financial situations lead to a faithful image on the activity of any company.

The general frame of IASB does not approach directly the notion of faithful image, mentioning that financial situations have to render a real and correct image, or to faithfully present the financial situation, the performance, and the changes in the financial position. Such an objective is met through the four compulsory characteristics of the information provided in financial statements.

In an accounting system based on normative regulations, as is the national accounting system, a faithful image is presented by observing the requirements for regularity and honesty, where regularity refers to observing the applicable accounting rules and procedures, and honesty, to their faithful and professional application. The two components of a faithful image should lead to obtaining financial situations that provide real and useful situations for their users.

Article 2 of the 4th Directive of the European Union states the following rules regarding the faithful image:

- Annual accounts include the balance sheet, the profit and loss account, and the annex. All these represent a unitary whole;
- Annual accounts have to be clearly established, in conformity with the present directive;
- Annual accounts have to render a faithful image of the patrimony, of the financial situation, and of the result;
- If the application of the present directive is not sufficient to render a faithful image, supplementary information has to be provided;
- If in exceptional cases the application of a disposition in the present directive does not lead to a faithful image of financial situations, derogation from this disposition is required, which should be mentioned in the annex and appropriately supported.

The faithful presentation is regulated by IAS 1, which states that:

- Financial statements have to be according to the significant accounting dispositions of the IAS;
- The faithful presentation does not exclude the possibility of transgressions of certain requirements of the IAS;

- In order to ensure a faithful and complete image regarding the financial position, the performance, and the cash flows, the application of the IAS does not exclude the possibility of supplementary information;
- Inappropriate accounting statements cannot be corrected neither by presenting the accounting policies used, nor through grades or explanatory materials;
- It is required to present the cases when certain dispositions of an IAS are applied before the date of applicability of the respective IAS.

CONCLUSIONS

The usefulness of economic and financial information is a mixture of the qualitative characteristics mentioned and generates extra satisfaction, which in specialized literature is called "non-quantifiable benefits" (3). In the hierarchy of these characteristics, the usefulness shifts between the higher or the lower weight given to relevance or to credibility.

As a result of the qualitative characteristics of the information provided in the company's financial statements, the concept of faithful image – faithful presentation refers to obtaining the truth related to accounting, which is a relative notion from a philosophical point of view, as the subject field of accounting is no exception.

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THE ANALYSIS OF HUMAN RESOURCES QUALITY FROM ROMANIAN AGRICULTURE

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Abstract. *The problems of human resources in agriculture is a challenge domain of study, regarding the quantitative and qualitative analysis. After radically changes from Romanian economy, is followed more and different consequences on nowadays socio-economic state. Certainly, one of fields affected by these changes is the agricultural sector.*

In present, the quality of human resources in Romanian's agriculture is a real problem, because we need the specialists who be able to contribute at development of this important sector of economy. An important number of people who activate in this sector haven't studies or interest to make a scientific work. This fact is reflected in macroeconomic results. The most important part of the population employed in agriculture is represented by members of the family, who work just for their own needs; as result, this socio-professional status is characterized by low quality and poor incomes. The aim of this paper is to make a detailed analysis of human resources from agriculture and to find the best solution to eliminate the poverty and to stop the continuing of subsistence agriculture.

Rezumat. *Problematica resurselor umane din agricultură se constituie ca un domeniu de studiu provocator, cu referire la analiza cantitativă şi calitativă. După schimbările radicale din economia României, au urmat probleme multiple şi diverse, cu consecinţe asupra stării socio-economice actuale. Cu siguranţă, una dintre direcţiile afectate de aceste schimbări este şi sectorul agricol.*

În prezent, calitatea umană din agricultura românească este o reală problemă, deoarece avem nevoie de specialişti care să fie capabili să contribuie la dezvoltarea acestui sector important al economiei. Astăzi, un număr însemnat al populaţiei care activează în sectorul agricol nu are studii sau interesul de a-şi desfăşura munca specifică, după reguli ştiinţifice. Acest lucru se reflectă în rezultatele macroeconomice. Cea mai mare parte a populaţiei ocupate în agricultură este reprezentată de familii de agricultori care lucrează doar în gospodăria proprie; în consecinţă, statutul socio-profesional este caracterizat prin calitate scăzută şi venituri reduse. Scopul prezentei lucrări este de a efectua o analiză detaliată a calităţii resursei umane din agricultură, pentru a găsi soluţiile potrivite de a elimina sărăcia şi a stopa continuitatea agriculturii de subzistenţă.

MATERIAL AND METHOD

The human resource do the part, beside some categories of funds, from the group of elements on which is based the realization of any economic activities. This

quality is some from the factors of influence of final results from activities develops. For this reason, analyze of quality of the human resource is vast and complex.

The installment of occupation for the labour is some from most important criterion thereupon is appreciated the developmental level social and economic of a country, respectively this capacity to deliver the places of work. Currently, is not important just the necessity to guarantee the places of work, but it must seriously consider the quality whereat is standed work, so that it can spoke by a qualitative labour, which represented one from the successful ways of the performant economies.

RESULTS AND DISCUSSIONS

The human resource and the labour to a superior level of qualification create the capacity to assimilate and to produce the informations and know-now in the areas of interest. These knowledges and informations shall be transferate to the economic activity in progress.

The human resource from an economy has the primordial role in the general development of a country. Thus, is remarked a direct relation between the developmental level of the economy and the qualification level of the labour. Romania is the second country from the Central and East Europe as the ***potential*** of work capacity[1]. Still, in the agriculture of our country is remarked an acute absence of qualified workers.

Concerning the macroeconomic level, we consider that a soft quality of the labour in agricultural sector is owed, too, to the influences of demographic nature. Thus, isn't sufficient to analyse the aspects which hold on to the formation of human quality resources, but it must directed to elements as: the number of employable persons, the modification of the structural age, the demographic urban-rural report. Such, at 1 july 2007, from total of Romanian population by 21.537.563 inhabitants, a number by 11.877.659 inhabitants (55,14 %) were in the urban area and 9.659.904 in rural area (44,85 %).

Among the incidences of demographic evolution on the labour market from Romania, can describe as be most important[2]:

- *numerical diminish the capacity of work offer*, as much that effective due to the demographic ageing process and back away from the activity, as well as news forces entered on the market labor;
- *reduction the able-bodied population for schooling*, which phenomenon shall raise severe and serious problems regarding the professional (re)conversion of educational personnel;
- *modifications in the migratory behavior of the labour*, because on internal plan is possible the inversion of sense of the migratory motion from non-agricultural - agricultural to agricultural – non-agricultural, mostly by reason of development the: social services, production in rural area, little industry, handicraft, trades, agritourism etc.

[1] http://www.business-adviser.ro/jobs_forta_de_munca.html

[2] Steliana Perț – „The impact of demographic crisis on the labour market", The books of debates sessions of *Sustainable Development Strategies of Romania* "Horizon – 2025", vol. I – Sectorial strategies, A – Demographie, Bucureşti, 2004, pag. 67-68.

In synthesis, the principals factors which influences directly the quality of human resource from the agricultural sector are: incomes diminished of the population from rural area, the low level of work capacity (qualitative labor and structural), the ageing of population which activates in the agricultural sector, the reorganization and re-technologyzation of agriculture etc.

The analyse of the current informations from the romanian economy, regarding the distribution of engaged population on specialties domains, show that the romanian society still presents the ahead-industrial characteristic. In the last years, the ponderosity of engaged population in agricultural sector, slenderized in significant measure, however Romania continues to hold the most elevate installment busyness in this sector of the economy: 32,3 % given the 4,9% mean in European Union. The situation appear to become disquietingly if is done the comparison with Bulgaria, waves just 8,9% of population is engaged in agriculture.

In this context is naturally to ask us which are the reasons of such situation, to analyse the perspectives gived the current developmental economic status and to try to surprise the quality aspect of agricultural capacity labour. It is important to compare the "quantity" of human resource with this "quality" and to surprise the effect of rapport quantity-quality amount in the economic national results.

Contextually current of evolution and development of the agricultural Romanian sector, the problem of labour is looked from viewpoint of report demand-offer, too. The labour of agricultural market is characterized, currently, by a series of acute problems and just through some anomalies.

The demand of labour from agriculture regard the necessary of prepared and specializes workers, qualified either unqualified, who can emploied in the enterprises and agricultural exploitation on determinate period, with the condition to obtain a salary remunerations.

The principals' types for demand of labour in agriculture are[3]:

Economically demand: emphasize the real necessary of workers which can contribute to obtain, in advantageous conditions, the agricultural production;

Technological demand is direct connected to the technique and the technologies used-up in agriculture or to the degree of intensivity for the branches and the agricultural cultures;

Social protective demand is determinated by the politics of protectionist order and by the social internal security.

The offer of labour is represented by a certain categories of work resources and by the possible sizes of this.

In general, the labour offer from agriculture presents a series of special characteristics. In Romania the situation is different, because is manifestated the influence of atypical factors for a market economy. Thus, as much quantitative how much qualitative, the labour offer suffers some modifications and fluctuates of reason determinate by: the demographic evolution, the migration, the

[3] Monica Bălaşa – „The characteristics of labour market", in Review „Economic Tribune", nr. 23/1995

education, the retehnologization, the reorganization, demand on a certain volume and temporal structure, low level of incomes/ inhabitants in rural area etc.

The analyses of perspective show that the offer of labour from the Romanian agriculture shall advance below the next action factors:

- the natural spore of labour resources from agriculture;
- activity installment of the labour resources from agriculture on groups of ages;
- demand/offer labour of a parts from domestic population (chiefly womens);
- the dismissal of labour stabilizate in rural area, which shall quide to a supplement of labour offer from the rural zones.

The particular aspect, which exceeds the sphere of report demand/offer for labour in agriculture, is falled across the ***quality*** of the labour.

At present, is established that this is a real problem wherewith is confronted the Romanian agricultural sector and for that is owed, fractionally, the absence of peformance registered in agricultural exploitations, especially in one of little sizes. Thus, with how much the labour from agriculture presents an elevated level of education and of qualification, with as much the productivity is major, therefore the efficiency and the general equilibrium of busyness gets consistence.

From these considerations, we believe that for solve the problem of labour productivity in agriculture, analysing the qualitative part, it's needs to started from another appearances which hold on to the evolution of a society.

Between most important aspects which hold on to this conjuncture is counted: the education, the schooling, the quality of the education, the specialization, the perfecting, the correct report between the areas market of labour and the number of schoolings persons on specialties.

To analyze else one detailed appearances of problematics presented hereinbefore, it's needs to envisaged the elements which make the difference about the agricultural sector from the amonte and from upstream and downstream sectors.

Thus, if the problems exposed is manifestated with priority in the productive sector, don't one thing is can asserted about the units for processing the agricultural prime matter, about the food sector, small industry with profile agri-food profile and the sector of food services. For this rearward, the situation is glad, at least in regarding the assurance of quality labour. Concrete, the food and drink industry from the Romanian economy represent to the level of the year 2002, 17% from the production of all processing industries, 9 % from the total national production and 7 % from the gross added value[4]. But regarding the labour, is observed that the informations are limited just at number of employed and less is considered the aspect of quality for labour which is performed by employees.

[4] Ilie Şerbănescu – *Review 22*, Year XIV (785)

A way into solution the problem of the quality for human resource from the Romanian agriculture, is the appelance to the programs of reconversions, re-qualification and professional perfecting.

From recently studies is observed that just 12 % among Romanians followed courses for professional perfecting, comparative with mean of European Union, of 21%. Here one the reason which can justify the less performance from the Romanian agriculture. In this frame is useful to see the examples from developed states, in which already is puting the problem of a high qualifications for human resources: Germany, Sweden, Austria are improved the installment of busyness except on the strength of economic sectors which solicits high qualified labour.

From reason of a phenomena manifestation as the most overhead presented, the specialists from the frame European authorities propose a series of solutions to recovery. One from these solutions visas the quality of human resource, which may be analized through the European *index of quality professional life*. Based on criterions of the the quality labour (criterions which results from remark and researches) the index must be completed and published in rhythmic mode[5]. This index could be used-up with success in the emphasis of the modifications and the evolution of the quality professional life in the Europe, as well as these effects about economic productivity. On the strength of European index of quality life can established the measures and can take decisions of improvement the quality of human employable resource.

For this reason, already they were established the specific programs of innovation and professional formation: the framework program for competitivity and innovation, the structural funds, the integrate program concerning the learning for all life.

The long period of transition on which traverse the economy of our country, had a negative impact about the agriculture, and one from the basic characteristic is falled across the acute absence of stock which led to the growth of the inefficiency in allocation of the funds with consequences about the growth and competitivity of Romanian farmers and entire agricultural sector. Therefore, the agriculture of Romania rests agriculture of subsistence, and the labour market from this sector is definite by a big weight of the farmers in the total busy population, as well as the big number of elderly farmers.

To these is added an excessive dependency by the agricultural activities of the population from rural area, a educational level diminished and an accentuate decline of real incomes of the population.

CONCLUSIONS

Chronologically, a prime appearance remarkeded is that of the period '89 which produced a phenomenon against European upstream. A concrete, through the massive dismissal from the industrial sectors, the population was migrated

[5] Răzvan Moceanu - „The quality of work and the sustainable productivity in EU", in Review „Economic Tribune" nr. 6/2007

toward rural area, with the development of specific agricultural activities. The immediately consequence were the unprofessionalizing and the impoverishment of a important part of population, nowise the development of agricultural sector. To these is added the intensification of the high qualificated labour migration phenomenon, to sectors better remunerate.

Therefore, the report demand/offer of labour in agriculture is conditioned by ensemble of the influence factors which explains the elasticity of this mechanism:

- the volume of agricultural production (stricken directly by agricultural capacities of production);
- the degree of endowment of the agriculture with production factors, soil and stock;
- the degree to using the existing capacities of production in agriculture and particularly of land;
- the level of the productivity labour from agriculture;
- the coefficient of using the capital invested in agriculture and in the sectors of processing the agricultural products;
- the relative evolution of the labour price from agriculture beside the prices of anothers factors of production;
- the general economic conjuncture.

The attainment of the suggested aims concerning the assurance the labour quality, presupposes a bilateral approach of some elements as: the cooperation on the place of labor, the motivation employees, the annihilation of major problems of professional average. The main consequence of the improvement of the human resources quality from agriculture is the assurance of the economic stability.

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STUDIES REGARDING THE OPTIMIZATION OF MANURE AND FERTILIZER APPLICATION IN APPLE AND PLUM TREE CULTURES FROM A FRUIT TREE FARM IN THE BACAU COUNTY

STUDII PRIVIND OPTIMIZAREA APLICĂRII ÎNGRĂŞĂMINTELOR NATURALE ŞI CHIMICE LA CULTURA MĂRULUI ŞI PRUNULUI ÎNTR-O EXPLOATAŢIE POMICOLĂ DIN JUDEŢUL BACĂU

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Abstract. *At the present and future stage of means development and production factors at the Joint-Stock Trade Company of BENEŞTI, the farming production will greatly depend on fertilization, which will result in a substantial change in the natural content of production conditions. From the various factors, which influence the apple tree and plum tree production, we have chosen for this study the use of manure and chemical fertilizers; the used methodology will also be presented in the study of other production factors. In order to establish the fertilization rates and types that are going to be administrated, we took into account that the apple tree needs high quantities of nitrogen and potassium, while the plum tree has high yields of fruits when phosphorus and potassium are used. For determining the best fertilizer rates, either mathematical methods on computer or simple calculations may be used. In the second case, we start from the production that is meant to be obtained, the specific consumption of active substance and the stock of active substance that already exists in soil, established according to the agrochemical mapping.*

Rezumat. *În stadiul actual al dezvoltării mijloacelor şi factorilor de producţie la SC BENEŞTI SA, dar şi în perspectivă, producţia agricolă va depinde într-o măsură mai mare de aplicarea îngrăşămintelor, care vor duce la o schimbare substanţială a însăşi conţinutului natural al condiţiilor de producţie.Din multitudinea de factori care influenţează producţia de mere şi prune, am ales pentru cercetarea întreprinsă îngrăşămintele naturale şi chimice, metodologia utilizată, urmând a fi prezentată şi pentru studiul altor factori de producţie.La stabilirea dozelor şi felurilor de îngrăşăminte ce se vor administra s-a ţinut cont de faptul că mărul solicită cantităţi mari de azot şi potasiu, iar la prun se realizează o stimulare a legării fructelor când se foloseşte fosfor şi potasiu.Pentru stabilirea dozelor optime de îngrăşăminte se pot utiliza fie metode matematice cu rezolvarea pe calculator, fie calculaţii simple. În acest de-al doilea caz se porneşte de la producţia prevăzută a se obţine, consumul specific de substanţă activă şi de rezerva de substanţă activă existentă în sol, stabilită pe baza cartării agrochimice.*

MATERIALS AND METHODS

In order to determine the best fertilizer rates, we have used two methods: the classical method, starting from the production estimated to be obtained, the specific

consumption of active substance and the stock of active substance that already exists in soil, established according to the agrochemical mapping and the method of linear programming on computer.

For illustrating the way of optimization by means of these methods, our studies have been conducted on the apple tree and plum tree cultures from an intensive plantation at the Joint-Stock Trade Company of Beneşti Stănişeşti.

RESULTS AND DISCUSSIONS

Among the material resources of industrial origin, used for the development of fruit growing activities, the chemical fertilizers have a special importance in preserving and increasing the productive capacity of fruit growing patrimony. Under conditions of using rationally the fertilizers, they ensure the increase in soil fertility, by its enrichment with some nutrients, especially nitrogen, phosphorus and potassium. Their use in fruit growing production is required by the need to satisfy the greater food demands, especially for fruits and fruit produces, on the condition of knowing soil chemical composition.

The amounts of chemical fertilizers are generally reduced and they are not always spread according to the size and structure of reserves present in soil. A single element is often administered, especially as superphosphates, which have no influence on fruit production, but only in association with nitrogen and potassium. Insufficient amounts of pesticides are also used, which are often spread at random, not when they are necessary for anti-parasitical treatments. Therefore, the chemical control becomes inefficient, the harvest being partially or even totally damaged. The use of insufficient amounts of chemical fertilizers and pesticides, associated to an improper spreading, do not result in resource saving, but in high crop losses, with negative impact on the efficiency of fruit growing activity. These disadvantages are the results of a bad management in using the resources. By using improper rates and inadequate application technologies, they produce the process of soil acidification (ammonium nitrogenous) and humus decay, having as effect the substantial crop diminution.

From the various factors influencing the apple and plum fruit production, we have chosen for our study the use of manure and chemical fertilizers; the used methodology will be also presented in the study of other production factors.

In order to establish the fertilization rates and types that are going to be administrated, we took into account that the apple tree needs high quantities of nitrogen and potassium, while the plum tree has a high yield of fruits when phosphorus and potassium are used.

Calculations were done by using the model presented in table 1.

For obtaining a mean yield per ha of 27000 kg in apple tree and 18000 kg in plum tree, when the above-mentioned amounts of active substance already exist in soil, it is necessary to administer in apple tree, per ha, 340-350 kg ammonium nitrogenous, 625-650 kg superphosphate and 400-450 kg potash salt.

The agrochemistry laboratories establish the amount of fertilizers, which must be administered, starting from the nitrogen (IN), phosphorus (P/ppm) and potassium index (K/ppm) and the mean estimated yield.

The same recommendations of the agrochemical laboratory specify that the organic fertilizers will be applied once in 2-3 years, at rates varying between 30 and 50 t/ha (tab. 2).

Table 1

Calculation of fertilizer rates used for apple tree and plum tree, under conditions of the Joint-Stock Trade Company of Beneşti

No.	Specification	Apple tree			Plum tree		
		N	P	K	N	P	K
1.	Estimated mean yield (kg/ha)	27000			18000		
2.	Necessary of active substance kg/a.s. /t active	13.85	17.14	20	12.50	15.62	18.75
	kg/as/ha	374	462	540	225	281	337
3.	Active substance present in soil kg/ha	270	315	372	140	160	225
4.	Difference to be added	104	147	168	85	121	112
5.	Losses by leaching and transf. in soil %	8	15	10	8	15	10
	kg/ha	8.3	22	17	7	18	11
6.	Active substance to administer (kg/ha)	113	170	185	82	140	122
7.	Industrial fertilizer type	Ammonium nitrate	Super-phosphate	Potash salt	Ammonium nitrate	Super-phosphate	Potash salt
8.	Fertilizer content active substance %	33-34.5	16-22	40-50	33-34.5	16-22	40-50
9.	Established rate industrial fertilizer (kg/ha)	350	650	450	300	600	300

Table 2

Manure rates in t/ha for apple tree and plum tree plantations

Clay content (A%)	Value of the nitrogen index (IN)						
	0.5	1.0	1.5	2.0	2.5	3.0	3.5
10	41	25	19	16	15	14	13
15	61	37	29	25	22	21	20
20	71	43	33	28	26	24	23
25	77	46	36	31	28	26	25
30	81	49	38	33	29	27	26
35	84	50	39	34	30	28	27
40	86	52	40	35	31	29	28
45	88	53	41	35	32	30	29
50	89	54	42	36	32	30	29

Data given by the agrochemical study carried out in 2007, in the analysed area, show values of the nitrogen index (IN) comprised between 2.30 and 3.25, and the clay content in the first 30-50 cm of soil has values comprised between 33-39%, indicating a necessary of 30 t/ha manure.

The nitrogen rates to be applied in apple tree and plum tree plantations will be calculated according to the estimated harvest (IN) (tab. 3).

Taking into account the estimated harvest of 27 t/ha of apples and IN of 2.5, on the average in soil, the nitrogen rate, which has to be applied is of 94 kg/ha, and in plum tree, at a estimated harvest of 18 t/ha, the nitrogen rate will be of 104 kg/ha.

For the calculation of phosphorus rates, we took as base the values of the estimated harvest (t/ha) and the soil supply with mobile phosphorus P (ppm) (table 4).

In case of establishing phosphorus rates, at a yield of 27 t/ha in apple tree and at a very weak and weak supply degree with phosphorus, the best rate is of 110 kg/ha, and in plum tree, at an estimated yield of 18 t/ha, it is of 125 kg/ha. At potassium and phosphorus, the rates of active substance are also established according to the values of estimated harvest and soil supply with mobile potassium, K(ppm) (table 5).

Table 3

Optimum rates of nitrogen in kg a.s. /ha for fruitful apple tree and plum tree plantations

Species	Estimated harvest t/ha	Value of the nitrogen index (IN)						
		0.5	1.0	1.5	2.0	2.5	3.0	3.5
Apple tree	26	125	104	97	94	91	90	89
	27	129	107	101	97	94	93	92
	28	132	110	103	99	97	95	94
Plum tree	16	135	113	105	101	99	98	97
	17	139	116	108	105	102	101	100
	18	141	118	110	107	104	103	102

Table 4

Optimum phosphorus rates in kg a.s./ha for fruitful apple tree and plum tree plantations

Species	Estimated harvest t/ha	Value of the P index (ppm)									
		5	10	15	20	25	30	35	40	45	50
Apple tree	26	262	146	108	80	77	69	64	60	56	54
	27	269	150	110	87	79	71	65	61	58	56
	28	276	154	113	93	81	73	67	63	59	58
Plum tree	16	286	163	120	99	86	78	71	67	63	60
	17	293	167	123	106	88	80	73	68	65	62
	18	300	171	125	112	90	82	74	70	66	64

Table 5

Optimum potassium rates in kg a.s./ha for fruitful apple tree and plum tree plantations

Species	Estimated harvest t/ha	Value of the K index (ppm)							
		60	80	100	120	140	180	220	260
Apple tree	26	198	175	162	153	147	138	132	126
	27	206	180	167	158	151	142	136	130
	28	210	186	172	162	155	146	140	134
Plum tree	6	218	194	179	169	162	152	146	138
	7	224	200	184	174	166	156	150	140
	8	230	205	189	178	170	160	154	142

Considering that in the investigated area, the soils with the mean potassium supply (175-257 K ppm) are prevalent at a yield of 27 t apples/ha, 136 kg a.s. potassium/ha are necessary, and in plum tree, at an estimated yield of 8 t/ha, 154 kg/ha are necessary.

The optimization of fertilizer rates may be also done by means of economic-mathematical methods, respectively, the linear programming. The used function of production is a second-degree polynomial function, with an independent variable allowing the establishment of the influence of a single factor of production on the production level and efficiency.

The base equation of the linear function with an independent variable is:

1. $f(y) + a_0 + a_1 \times 1$

- Where y = apples yield (t/ha);
- x_1 = natural fertilizers (rates); one rate = 5 t manure
- a_0, a_1 = coefficients of regression function

Based on the data obtained under conditions of the studied fruit growing farm, which concern the amounts of applied manure and the obtained apple yield, the calculation table was drawn with the expressions necessary to determine the coefficients (table 6).

Table 6

Calculation of expressions necessary for determining the coefficients in apple tree

f	Fertilizer rates x_1	Apples yield t/ha (y)	x_1^2	X_1Y
1	0	24.500	0	0
1	1	24.845	1	24.85
1	2	25.330	4	50.66
1	3	25.925	9	77.77
1	4	26.445	16	105.78
1	5	26.895	25	134.47
1	6	27.290	36	163.74
1	7	27.570	49	192.99
1	8	27.760	64	222.08
1	9	27.540	81	247.86
1	10	27.360	100	273.60
n	$\sum x_1$	$\sum y$	$\sum x_1^2$	$\sum x_1 y$

For the plum tree, we have used data from table 7, using the same calculation methodology and obtaining the solved equation of the function.

$Y = -0.0014\ x^2 + 0.1395\ x + 4.4349$

$R^2 = 0.96$

Taking into account the aspects resulted after the analysis of the additional use of manure rates on production, we may conclude that the best use is of 42 t/ha.

Table 7

Calculation of expressions necessary for determining coefficients in plum tree

f	Fertilizer rates x_1	Plum yield t/ha (y)	x_1^2	X_1Y
1	0	14.750	0	0
1	1	15.025	1	15.025
1	2	15.485	4	30.97
1	3	16.010	9	48.03
1	4	16.570	16	26.28
1	5	17.050	25	66.28
1	6	17.530	36	85.25
1	7	17.950	49	125.65
1	8	18.145	64	145.16
1	9	17.930	81	161.37
1	10	17.710	100	177.10
n	$\sum x_1$	$\sum y$	$\sum x_1^2$	$\sum x_1 y$

For this we are used the date from the tables 8 şi 9:

Table 8

Correlation between mean aple yield and amount of manure

Variant	Fertilizer rate t/ha – x_1	Mean yield kg/ha - y	Mean yield per rate (kg) - y	Marginal yield per rate (kg) y^m
1	-	24,500	-	-
2	5	24,845	69	69
3	10	25,330	83	97
4	15	25,925	95	119
5	20	26,445	97	104
6	25	26,895	96	90
7	30	27,290	93	79
8	35	27,570	88	56

Table 9

Correlation between mean plum yield and amount of manure

Variant	Fertilizer rate t/ha – x_1	Mean yield kg/ha - y	Mean yield per rate (kg) - y	Marginal yield per rate (kg) y^m
1	-	14.750	-	-
2	5	15.025	55	55
3	10	15.485	74	92
4	15	16.010	90	105
5	20	16.570	91	112
6	25	17.050	92	96
7	30	17.530	93	96
8	35	17.950	91	84
9	40	18.145	85	39

CONCLUSIONS

At the present and future stage of the development of production means and factors at the Joint-Stock Trade Company of BENEŞTI, the farming production will greatly depend on the economic means additionally invested, which will lead to a substantial change in the natural content of the production conditions.

Our study has shown that the proposed changes concerning the way of using manure and chemical fertilizers are the main ways of reaching the aims of profitableness and the increase in the obtained yield from the quantitative and qualitative viewpoint.

The optimization of fertilization, accompanied by the improvement in technical endowment and organization, and by the modern management, adapted to the real conditions of the area, represents the safest ways of economic efficiency, of reaching the obtained yield in apple and plum trees to the biological variety potential, as it is shown by the fruit-growing farm of Beneşti Company.

The establishment of viable fruit-growing farms, highly connected to the competition market, which have the best dimensions and are able to organize the fruit growing activity in accordance to the new international techniques and technologies, as well as setting up new organization types of these fruit growing farms represent a structural policy requiring the interference of State by corresponding economic means, for ensuring the remodelling of fruit growing farms.

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THE INTERNATIONALIZATION OF THE ANNUAL FINANCIAL SITUATIONS REGARDING THE EU ADERATION

SITUAȚIILE FINANCIARE ANUALE ÎN CONDIȚIILE ADERĂRII LA UNIUNEA EUROPEANĂ

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Abstract. *The financial situations determined according to the current regulations of a country are often not completely available to the foreign investors. The various accounting options and the diversity of the published pieces of information frequently lead to international comparisons. These kind of difficulties represent to the investors supplementary costs which could have been avoided. A complete harmonization of the financial-accounting pieces of information is advantageous for all enterprises, considering the importance of the international stratum for all the levels of the economy. The commercial trades do not take place within an enclosed national environment but within the framework of the world-economy where the diversity of the socio-economical, legal and politic factors have created considerable differences regarding the annual accounts of various countries, both structure and content. Thus the pieces of information differ in what quality and quantity are concerned from one country to another and do not allow the process of comparison to take place.*

Rezumat. *Situațiile financiare stabilite conform reglementărilor şi uzanțelor unei țări sunt adesea greu accesibile pentru investitorii străini. Diferitele opțiuni de contabilizare şi diversitatea informațiilor publicate conduc frecvent la comparații internaționale. Aceste dificultăți reprezintă pentru investitori costuri suplimentare care ar putea fi evitate. O armonizare a informației contabil-financiare este conformă interesului tuturor întreprinderilor, avându-se în vedere importanța dimensiunii internaționale la toate nivelurile economiei. Schimburile comerciale nu se desfăşoară într-un spațiu național închis, ci în cadrul economiei mondiale în interiorul căreia diversitatea factorilor economico-sociali, juridici şi politici au determinat diferențe considerabile referitoare la conturile anuale ale diverselor țări, atât în ceea ce priveşte structura, cât şi conținutul. Astfel informațiile sunt diferite cantitativ şi calitativ de la o țară la alta şi nu permit comparabilitatea.*

Taking into account the internationalization of the sale markets, the fusion tendency of the national markets into a common one, the increase of the international investments there appeared the necessity to close the accounting systems. Such a thing is especially asked by the international investors to determine the opportunity of the capital placing (Tabara & Horomnea, 2000).

There are several accounting cultures, but the Anglo-Saxon and the continental ones especially imposed. The question is toward what accounting conception will tend the international harmonization?

The two conceptions arrived at a common denominator at the end of 1980 years concerning the concepts, the conventions and evaluation methods, remaining at the same time different in the following fields:

-institutional (the Anglo-Saxon conception is not codified in a national plan, in contrast to the American accounting conception);

- technical (the classifying of the expenditures and of the incomes in the continental conception is made in accordance with the nature, in contrast to the Anglo-Saxon classification by function). Such a fact determined in the French accounting two bearings represented by financial and administration ones.

The differences between the two tendencies generated divergent conceptions on the users satisfying as follows:

- the Anglo-Saxon conception is giving priority to the satisfying of the decisions needs of the investors against the population;
- the continental conception wishes the satisfying of all the users.

The most representative international accounting organizations are represented by:

- ♦ IASC (International Accounting Standards Committee), created in 1973;
- ♦ IFAC (International Federation of Accountants), founded in 1977;
- ♦ FASB (Financial Accounting Standards Board), American normalization organism;
- ♦ ICCA (Canadian Institute of Accepted Accountants), Canadian regulation organism;
- ♦ ONU (United Nation Organization);
- ♦ CEE (Economical European Community).

Till this moment, Economical European Community made efforts in the accounting harmonization toward the direction of approaching the accounting systems of the member countries, drawing up several directives referring to:

- the publishing of the annual accounts of the societies with limited responsibility- Directive I, March 1968;
- the structure, the contents of the annual accounts, of the administration report for the societies with limited responsibility and for the shares societies – Directive IV, July 1978;
- drawing up the consolidated accounts – Directive VII, June 1983;
- professional qualification of expert accountants - Directive VIII, April 1984.

As a consequence, the harmonization of the accounting information of the annual accounts in international contrivance, as well as in the European one, has to solve several problems, to remove several obstacles, through which extremely important are (Feleaga, 1996):

-linguistic barriers, being relatively to say that exists an official language as compared to others;

-national traditions which influence the manner to apply the texts in one field;

-the techniques of administration and informing, different from one country to another;

the play of options inserted in the texts of directives, referring to the principles for the drawing up and evaluation of goods, the presenting of the annual accounts, the publishing and control of annual accounts.

The normalization and harmonization of the accounting systems represent two processes which interpenetrate and reciprocally complete. The **normalization** of the accounting has as scope the elaboration and the applying of some concepts, methods and rules concerning the producing and utilisation of accounting information in the view of ensuring the comparability of such information in time and space (Pahone, 2004).

The **harmonization** is a term devoted to the international accounting to designate the reducing of the differences between the international accounting regulations. The harmonization is distinguished from normalization which presumes primordially the total standardization of the rules (Feleaga, 1996).

Between the factors which necessitate harmonization at the international level we are able to enumerate (Feleaga, 2001):

- the asking of the users for financial situations;
- the more and more evident globalization of the economics;
- the enlargement of European Union;
- the increasing globalization of capital markets;
- the tendency toward privatization of some enterprises.

We appreciate as a priority the adaptation of financial situations of one enterprise from one country in such manner to conform to different national accounting standards, in the view of making them corresponding to the bursaries from another countries.

In one market economy the accounting harmonization and normalization have as object the organization of the functioning rules for the market of accounting information, in the view of the optimization of financial communication. The two processes are necessary since contribute to the defining of the offer and asking of accounting information as well as to the lack of balance appearing at the level of one of them. The accounting information market might assure the protection of the interests of the associates and third parties through the favouring of:

- the development of the accounting information (from the point of view quantitative and qualitative);
- their publishing (transparency);
- the increase of the comparing possibilities in time and space.

In 1973 was established the International Accounting Standards Committee (IASC) on the basis of one agreement between accounting professional organisms from Australia, Canada, France, Germany, Japan, Mexico, Holland, Great Britain and Ireland and U.S.A. Since 1983 the quality as a member of IASC is attributed to every professional accounting organisms being members of the International Federation of Accountants (IFAC).

The financial situations established in accordance with the regulations and usages of one country are often hardly accessible to stranger investors. The different options of accounting and the diversification of published information are driving

frequently toward international comparisons with really little conclusiveness. Such difficulties represent for the enterprises and investors additional costs which might be avoided. One harmonization of financial-accounting information is corresponding to the interest of all enterprises, taking into account the importance of the international dimensions at every level of economy (Tabara & Horomnea, 2000).

In the third section of "The financial situations of the enterprises" from the Harmonized Accounting Regulations with the Directive IV of CEE and International Accounting Standards it is stipulated that every enterprise is obliged to draw up annual financial situations which might include: the balance sheet; income and loss account; the situation of the changes of own capital; situation of the treasury fluxes; accounting politics; and explicative notes.

The Law of accounting no. 82/1991, republished, modified and completed trough G.O.no. 61/31Aaugust 2001 (O.M. no. 531) foresee at the article no. 27, paragraph 3 and 4:

„For juridical persons applying the accounting regulations harmonized with the directives of CEE and International Standards of Accounting. Approved through the order of the Ministry of Public Finances the annual financial situations composed from balance sheet, income and loss account, the situation of the changes of own capital, the situation of treasury fluxes, accounting politics and explicative notes" (paragraph 3).

In the IASC regulation there are stipulated the following objectives concerning the special role owned by the balance sheet both in the internal decisional processes as well as especially in the decisions taken by the external users of the accounting information:

- the elaboration and publishing for the public benefit of the accounting standards which will serve as basis for the presentation of financial situations and for the promoting at the international level their acceptance and respecting;
- the carrying on the activity toward the improvement and harmonization of the regulations, accounting standards and procedures associated with the presentations of financial situations.

In the view of the harmonization of the accounting information the IASC Council adopted as a general frame having as principal objective the providing of the comparability of such information.

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THE ACCOUNTING TREATMENT OF GOODWILL

TRATAMENTUL CONTABIL AL GOODWILL-ULUI

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Abstract: *In the accounting sense, Goodwill can be thought of as a "premium" for buying a business. When one company buys another, the amount they pay is called the purchase price. Accountants take the purchase price and subtract it by a company's book value. The difference is called Goodwill.*

Rezumat: *Din perspectiva contabilității goodwill-ul este considerat un fel de" premiu" pentru achiziția unei afaceri. Atunci când o întreprindere cumpără o altă întreprindere ea plăteşte un anumit preț de achiziție. În anumite situați poate apărea un execedent a prețului de achiziție peste valoarea contabilă a activelor întreprinderii cumpărate. Această diferență se numeşte goodwill.*

Goodwill (GW) or the commercial fund as it is named in the French terminology, can be defined in several ways, somehow related, the most used of its acceptations being the following: the enterprise reputation; the market value of marks (brands); the difference between the cost (the price) of acquisition of enterprise and the net value of the assets of this. The accounting treatment is based on the last definition. Thus, from the accounting point of view, a GW appears as a result of the operation of acquisition of the enterprise.

In spite of the apparent simplicity in defining GW – as difference of acquisition – the accounting operation of this excess of value over the net value of the assets of the enterprise confronts with numerous dilemma and controversies. Far being the most serious between them is if GW can be considered economical assets in the technical sense of this term. Concerning this question there are sufficient arguments both pro and against. The most important argument pro results just from the manner itself of defining the assets: a controlled resource of enterprise, resulted from its previous activities and capable to relieve gains or other future economical advantages. It is as clear that GW combines all these three characteristics. The most important argument against is based on the fact that, though immaterial by its nature, GW, however, can not be integrated among the non corporal assets of the enterprise, so they are defined by the IAS 38 norm, as they represent a non separable residual value, consequently, it cannot be valorized on the market independently of the patrimonial ensemble of the sold/bought enterprise. Also, the fact that GW cannot be evaluated in a rigorous manner than in the moment of the enterprise acquisition but not after that. However, if GW is introduced in the balance assets for equality resetting between the total assets and the total liabilities, it is necessary the increase of the own capitals of the enterprise with an equivalent value.

To reckon GW as assets rises the problem of its depreciation in time, respectively of amortization. In this sense, the following accounting options were outlined:

1) include and maintain GW in assets without amortize or provision it;

2) impute GW on the own capitals;

3) capitalization GW and its provision if it is found that the assets acquired have depreciated;

4) capitalization GW and its amortization on the period of operation the assets acquired;

No matter the solution, the GW amortization will influence consistently the level of the financial results of the exercise. From this reason, the enterprises can benefit by a large margin "to adjust" the yearly results with the help of a simple enough financial-accounting mechanism : bigger current expenses with GW amortization reduce the profits of the period, reducing at the same time the future GW amortizations but decreasing the future profits. Also, this approach diminishes the total assets and the own capitals, creating the impression of a higher level of the profitableness got by the enterprise. Another difficult aspect connected to GW amortization refers to the system or rhythm of amortization. The linear amortization of GW could distort the image of the economical potential of the enterprise, as from the economical point of view, GW does not behave like the most balance immobilizations which lose their value, gradually, in time, in the measure of the physical and moral wear advance. GW has a very volatile value which can register considerable fluctuations even in very short periods of time. Let us think about the enterprise image – a generating essential element of GW – can deteriorate very quickly under the influence of some relatively minor events.

How can however be established the accounting policy of the enterprise concerning GW? The international accounting experience formulated the following variants of GW treatment:

1) in the enterprises which make no provisions of plans of compensations for managers it is preferred a method which produces adverse effects upon the accounting results, such as GW maintain in the assets without amortization or provision or GW imputation upon the own capitals;

2) in the enterprises characterized by a high degree of duties it is preferred a method which does not reduce the size of the own capitals, for example GW incorporation in assets without amortization or provision;

3) in the enterprises whose main financial objective consists in getting a certain minimal level of profitableness it is preferred a method which does not diminish the result – to maintain GW in assets without amortization and provision or imputation GW upon own capitals;

4) for the enterprises strongly dependent from the political point of view it is indicated the application of a method which permits the restriction of the political "visibility" especially by reducing the accounting results such as capitalization and GW amortization or capitalization and the provision of this.

Since 2004 IFRS 3 norm "Enterprises Groups" is that which establishes the accounting GW treatment, replacing IAS 22 norm. In fact, IFRS 3 norm offers rules of recognition of GW positive and negative (badwill) resulted from operations of acquisition of the enterprises. The respective norm stipulates that any cost overrun of acquisition over the right value of the net assets is a GW and must be considered as

being assets. GW is a payment to buy anticipated future economical advantages in the moment of making the acquisition operation. The estimates of these possible future advantages must be made with great prudence because, in certain situations, a GW issue can be explained by the fact that the right value of the net assets was not correctly determined. According to the IAS 22 norm, GW must be accounted at its depreciated cost with the size of the amortizations calculated and the loss of value. The GW amortization will be registered systematically, during the economical utility of this, established in function of the duration of valorization of the future economical advantages. This does not mean, however, that in all cases, with the passing of time, GW will diminish as an expression of eroding its beneficiary capacities. It is possible that, due to some specific actions of development, GW acquired must be substituted gradually by an "internal" GW. In spite of this, IAS 38 norm "non corporal Immobilizations" do not permit the introduction among the assets of GW created by the enterprise, imposing GW amortization acquired during its life. So, the method and system of amortization must reflect as faithfully as it can the rhythm hoped of the consumption of the future economical advantages which result from GW acquired. The changes of proportions in the structure, duration and rhythm of the operation of the economical advantages due to GW can justify the reexamination method of amortization.

If certain conditions appear where GW obtained by acquisition shall not generate the future economical advantages hoped by the buyer, it will be initiated, according IAS 36 norm "The Assets Depreciation", a test of depreciation of GW and the accounting registration of the loss of constant value. A test of this kind consists in the determination of the recoverable value of the generating unity of treasury, the eventual identified loss being charged first to GW allocated to the treasury unity and after to other assets of the unity.

Another important aspect associated to the accounting treatment of GW refers to negative GW registration. IAS 22 norm stipulates that, in the measure in which the negative GW corresponds to some measurable and identifiable, predictable future losses with precision, but do not result from the duties of the enterprise, it must be registered in the account of results at incomes. But if the future, predictable losses cannot be identified and estimated rigorously, the negative GW will be registered as income as follows:

1) the size GW negative which does not exceed the right value of the acquired non financial assets registered as income on a systematic basis, on a duration of utilization left weight average of the acquired, redeemable, identifiable assets;

2) the size GW negative which exceeds the right value of acquired non financial assets must be registered immediately as an income .

The IFRS 3 norm regulates that a GW negative must be reckoned immediately as an income and introduced as such in the account of profit and loss of the enterprise.

From those exposed up to now, the result is that an essential element of accountancy practices of GW is the determining of the duration of functioning (reproduction) of this. To determine this duration the following criteria are considered:

1) dynamism and the perspectives of the business sector to whom GW is attached;

2) the phases of the lifecycle where are the main products and technologies of the enterprise which benefit of GW;

3) the level and structure of research-development expenses, marketing and humane resources development made by the enterprise carrying GW;

4) the phase of the organizational life cycle where is the enterprise;

5) the necessary period that a young business become stable from the financial and profitable point of view;

6) the degree of depreciation and obsolescence of the main technical systems used by the enterprise;

7) the measure in which the enterprise acquired could be administrated efficiently by other leading team;

8) the hope of professional life of the employees or groups of key employees;

9) the duration of juridicial protection of the intellectual property and rights held by the enterprise;

10) the duration of important agreements of delivery and acquisition achieved by the enterprise with important customers and suppliers;

11) the competitors" strategies;

12) the duration of upon the enterprise acquired;

13) diverse legal and contractual provisions in the measure of influencing the duration of functioning GW, etc.

CONCLUSIONS

From the accounting point of view, goodwill represents a residual value with ambiguous traits. This ambiguity leaves its mark on the practices of accountancy of the goodwill and regulations existent in this domain. The accounting practical and theoretical reflections oscillate between amortization and the calculus of a depreciation. The enterprises which want to protect against the risks of value loss, especially those quoted on the exchange, prefer the GW amortization.

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THE REPUTATION‘S VALUE OF CAPITAL

VALOAREA DE CAPITAL A REPUTAȚIEI

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Abstract: *The role of organizational reputation was studied as a source of sustainable competitive advantage and superior performance. Organizations, like individuals, have reputations that create consequences. The effects of organizational reputation on a firm's financial performance are reviewed, particularly in terms of goodwill valuation.*

Rezumat: *Reputația organizațională este abordată ca sursă de avantaje competitive solide şi performanțe financiare superioare. Organizațiile, ca şi indivizii, au reputație fapt care generează anumite consecințe. Efectele reputației organizaționale asupra performanțelor financiare ale firmei pot fi studiate printre altele cu ajutorul evaluărilor bazate pe goodwill*.

An organization’s reputation has as main external effects the loyalty confidence and guarantee. In other words, an organization with solid reputation inspires confidence and the feeling that it would be loyal in its relations with partners [1]. Or, an organization which presents from the perspective of the public’s segments with whom it is in contact such characteristics is an organization with predictable and reliable behavior. And anticipation and security confer certainty and, consequently, control. Or, at least, the feeling of these. Certainty and control are, it is well known, in great demand in the modern world of organizations, world characterized by an extreme complexity and a big fluctuation as they facilitate decision making and the promotion of behavior directed to fixed objectives. This explains the organizations’ attraction with good reputation. From the reasons exposed above, with reputed organizations, nobody is afraid to do business: you are not excited with all kinds of surprises, besides the attractive ones, certainly. Thus, reputation is something very beneficent for the organization it has but also for the organizations which communicate and interact with this. Reputation simplifies relations much. A solid reputation has the function of reducing the transactional costs sensitively [2]. The transactional costs are the costs of the contractual relations of the firm unfold on the market. The main elements of the transactional costs are:

1)costs for finding suppliers of good quality, especially in the case of products/services sole exemplar;

2)costs of drawing up valid agreements with specifications concerning quality, confidentiality, delivery terms, performance guarantees, penalties paid in case of unperformance;

3)costs of following the agreements execution;

4)costs of litigation;

5)specific costs, such as the firm's vulnerability towards the suppliers and customers' behavior or the disadvantage given by the competitors's capacity to have access at know-how and the technologies developed by the suppliers;

6)costs of reports concerning the market's conjuncture;

Reputation saves these costs, making the commercial relations cheaper and, consequently, more efficient. At the micro-organizational level, the positive consequences of reputation are expressed in two manners:

1)the market-share's extension of the organization (quantity factor);

2)the increasing of financial performances of organization (quality factor), especially the ratio flux inclusively by the possibility of practicing higher prices.

The above mentioned are arguments under which we have the reason to state that reputation has a value of capital. The conclusion is that reputation functions like a "lubricant" of the organizational business. The practicing of this function is based on the principle of reciprocity in inter-individuals and inter-groups relations: the tendency of paying somebody back in his own coin, respectively of responding at the behavior of the others by a similar behavior. The fact that an organization benefits by a good reputation means that all its partners assign a high probability to it that will give reliable answers at questions of maximum importance:

1)for customers these are quality, price, diversity, accessibility, service, guarantees;

2)for suppliers – to honour payments and the issue of supplementary orders;

3)for shareholders – controlled financial risks and investments return;

4)for creditors – solvency and guarantees;

5)for partners – respect the terms, flexibility and efficiency;

6)for state – the laws' respect and the tax payment;

7)for the community – civic involvement and social responsibility, etc.

How is it possible, however, the assigning of a financial value to the reputation held by the organization? For an economical organization, this investigation can start from the simple statement that between the business volume achieved by the organization – expressed directly with the help of the turnover – and reputation, there is a positive relation; the increasing of reputation determines an extension of the turnover, the altering of reputation leading, on the contrary, to its decreasing. This means that reputation is an important source of competitive advantages for a firm.

Consequently, the turnover can be regarded as a function of reputation. A firm with a better reputation will have, as a rule, a higher turnover than a firm with parameters of similar operations but with a "common" reputation. Certainly, the turnover is also due to other factors than reputation, especially to factors of patrimonial nature. Starting from these theoretical premises, we can build the following relation which point out the size of that part of the turnover which was won by virtue of holding by the firm of a solid reputation:

= $CA - CA_{sect} - \overline{CA}$, where :

= the turnover due to a better reputation of the firm;

= the total turnover got by the firm;

$\overline{CA}$ = the medium turnover achieved by the firms from the sector. This index shows how much wins on the average under the form of sales' volume, a "common" firm of the sector. By "common" we have in view both technical, commercial, financial conditions of operation and the reputation. The advantage of this index consists in the fact that it also expresses the action of some specific factors of market, such as conjuncture or seasonality etc. which have repercussions on all the operators from the sector;

CA = the increasing of the turnover explained by factors of patrimonial nature. It is, in fact, the variation of the breakeven of the firm expressed as turnover, variation that takes place between two successive periods. At the turnover level corresponding to the breakeven, the firm ensures the equality between income and total expenses and the profit is null. The breakeven is the result of the structure of the firm's costs, more exactly, of the manner in which these divide into fixed costs and variable costs. Generally, more important the fixed costs are, higher the breakeven is. And the costs' structure is, in its turn, the expression of the dimension and the structure of the firm economical patrimony. A patrimonial structure dominated by liabilities and assets on long term (immobilizations) and/or liabilities of fixed payments will generate, as a rule, more important fixed costs. On the contrary, a patrimony formed particularly by current liabilities and assets (on short term) and/or liabilities of variable payments will especially generate variable costs. In the former case, we shall have a higher breakeven, in the latter – a lower one. As reputation is created on time and must also be used and held in a lasting perspective, it can be assimilated to non balance, intangible, immobilized assets. Certainly, reputation does not appear in a balance but, by the synergies it produces, facilitates a more efficient valorization of the assets inscribed in the balance. For this reason, the expenses of creation, entertainment and operation of the balance liabilities and assets can be considered like a "mirror image" of the reputation. By virtue of this argument, a better reputation can sustain an efficient operation even in the conditions of a higher breakeven or which has increased.

Undoubtedly, in the special literature, other models of financial evaluation of reputation can be encountered: Interbrand, Sorgem, Marken-Bilanz, etc. The characteristic of the model proposed by us consists in the fact that it allows a direct and quick evaluation but, in spite of this, objective of reputation. We draw attention that value got on the basis of the above relation is not the financial expression of reputation but only a part of the turnover that the firm obtains due to reputation. To be able to confer to reputation a financial value we must have in view that as reputation generates a flow of economical gains (turnover), it can be considered a kind of capital. Knowing that , to get the value of capital of

reputation, this flow of gains must be capitalized. By capitalization operation, an economical gain (V) is turned into the size of capital (investment) which relieved (C) with the help of a rate of capitalization (k);

$$C = V / k$$

The rate of capitalization used in calculus can be weight medium cost of capitals attracted by the firm increased with a special risk premium (*cmpc risc*). Thus, the value of capital of reputation (R) is established as follows:

$R = CA_r / cmpc$, where:

$cmpc$ = the weight medium cost of capitals corrected with the level of the specific risks of the firm.

Why can be considered the weight medium cost of capitals in the quality of rate of capitalization? Because the process of creation of the economical patrimony of the firm, inclusively its intangible part expressed generically by reputation, is sustained by financial efforts which imply certain costs in function of financing resources – the capitals – used. To correct the weight medium cost of capitals with the size of the financial risks and of specific operation, it is necessary as reputation is not, however, a balance assets. Or, the weight medium cost incorporates only the characteristic risks to the "official" economical patrimony. Also, it is well known that a good reputation is won very hard, but it can be lost very quickly. The reputation's loss occurs as a natural result of risks' accumulation associated to the firm. That is why, as a protection measure against the fluctuations of the value of capital of reputation, the weight medium cost of capitals must be appreciated with a premium of special risk.

The organization's reputation, as essential element of the image of this, expresses synthetically the valorization of some particular functional characteristics such as credibility, loyalty, notoriety, honesty, reliability, correctness. These characteristics claim their origin in elements which, in the special literature, are designated overall with the help of the concept of goodwill [3]. Some authors assimilate reputation with brands detained by organizations but reckon that the market of the brands adds a supplement at the net value of the organization's assets contributing to form the overall value of this.[4]. The brand is considered, consequently, an important resource of goodwill. That is why the reputation's value of capital can be used further on to determine the organization's overall value which would include both balance elements and non balance elements:

The overall value = The accounting net assets + Reputation (Goodwill)

Let's come back, however, at the initial relation $= CA - CA_{sect} - CA$. If we move the term CA at the left part of this relation, we get another important equality:

$$CA - CA_{sect} = CA_r + CA_{patr}$$

The difference $CA - \overline{CA}$ signifies the increasing or the excess of the turnover of the firm with a good reputation over the medium turnover, specific to the firms with a common reputation. It shows, in other words, how bigger is the turnover of a reputed firm compared to the turnover characteristic to the firms with normal image and credibility. The right part of the last equality, $CA_r + CA$ part, specifies the influences of the two factors which have determined the excess issue of the turnover. Thus, a higher turnover in the case of a firm with solid reputation is the result of reputation accumulation, on one hand, and the variation of the breakeven expressed as a turnover, on the other hand. The existence of this turnover is one of the direct quantity expression of the market extension and of the firm's operations, with immediate effects upon the overall value of this. Equality $CA - CA_{sect} = CA_r + CA$ can be used to prevision the turnover volume, the reputation capital and the firm overall value. It is extremely interesting the prevision approach of this equality with the help of intervals of certainty (of confidence) and generally of the fuzzy multitude [5]. Let us follow the next example to see how the model functions:

Index	Current year	Previous year
1. Turnover	20000	18500
2.Costs total variables	11000	10000
3.Costs total fixed	2100	1870
4.Margin upon costs variables (1-2)	9000	8500
5.Margin upon costs variables in % (4/1)	45%	46%
6.Breakeven as turnover (3/5)	4667	4065

The result is that the variation of the breakeven as turnover (CA) is 4667 – 4065 = 602. If $\overline{CA}$= 16250, then = 20000 – 16250 – 602 = 3148. The equality $CA - CA_{sect} = CA_r + CA$is affected in this case, as follows: 20000 – 16250 = 3148 + 602 = 3750. This means that a turnover increasing with 3750 is due to the accumulation of reputation with 3148 and to the variation of the breakeven with 602.

If we take into consideration an cmpc = 11 %, in the conditions of total absence of risks (the premium of risk being, then, equal with 0), the value of capital of the reputation is: R = 3148 / 11% = 28618. If the accounting net assets of the firm is, for example, of 15000, the result is the next overall value of the firm: 15000 + 28618 = 43618.

But if we take into consideration the existence of very little risks which, according to the method of the premium evaluation overall risk of risks, are supposed a premium risk of 0,25, we shall get the following level of cmpc risc: cmpc x (1+ premium of overall risk) = 11% x (1 + 0,25) = 13,75 %. In this case,

R = 3148 / 13,75% = 22894 and the firm's overall value is 15000 + 22894 = 37894.

CONCLUSIONS

The increasing of risks erodes the value of capital of reputation. In the moment, the risks of operation and financial specific to the firm begins to increase, the reputation of this how solid it was in the past, begins to lose its value of capital. The higher risks reduce the positive estimates made by the economical background concerning the good-faith and the potential loyalty of the firm. A complementary conclusion drawn is that the firm, in the conditions of superior risks, must make more consistent efforts in view to maintain, develop and valorize its image and reputation.

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A BEHAVIOURIST PERSPECTIVE UPON THE MANAGEMENT OF THE ORGANIZATION

O PERSPECTIVĂ COMPORTAMENTALISTĂ ASUPRA MANAGEMENTULUI ORGANIZAȚIEI

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Abstract: *Behaviorism is a theory of human learning that only focuses on objectively observable behaviors and discounts mental activities. Behavior theorists define learning as nothing more than the acquisition of new behavior. Experiments by behaviorists identify conditioning as a universal learning process. This theory is relatively simple to understand because it relies only on observable behavior and describes several universal laws of behavior. Its positive and negative reinforcement techniques can be very effective in managerial processus. Behaviorism often is used by managers, who reward or punish organizational behaviors.*

Rezumat: *Comportamentalismul reprezintă o teorie a învățării bazată pe observarea obiectivă a comportamentelor umane şi care face abstracție de activitățilr mentale profunde. Comportamentaliştii definesc învățarea ca dobândire a unor comportamente noi. Experimentele behavior-iştilor au scos în evidență condiționarea ca proces universal de învățare. Această teorie este relativ simplă în aplicare deoarece se axează în exclusivitate pe comportamentele observabile, descriind câteva reguli comportamentale universal valabile. Tehnicile de întărire pozitivă şi negativă specifice comportamentalismului se pot dovedi foarte eficiente în procesele manageriale. Comportamentalismul este utilizat de manageri care recompensează şi pedepsesc comportamentele organizaționale.*

The concept of organization cannot be dealt separately from another concept – that of human behavior. This close connection is generated by the fact that the organization represents first of all a humane community created and directed to touch determined objectives. Before being a bank, an industrial company, a trade firm, an ONG, a university, an administrative institution, a religious congregation, etc. the organization is a structured human group and carries on an activity through the mediation of the persons' behavior which make it up. And the behavior constitutes a series of independent reactions of the individual – cognitive processes, decisions, affective manifestations, communications, actions, relations, emotional states, etc – directed consciously or unconsciously towards a certain aim. The task of the management consists in converting physical, psychic and intellectual energies of the members of the organization in behavior according to the demands of functioning and the objectives of the whole organization.

The management must prevent the individuals' natural tendency of aiming preponderantly their own interests and goals, turning their egocentric conducts into behavior necessary to the well functioning of the organization. But the functioning of the organization is always centered on objectives which represent performance aspirations or target. Consequently, the management mission is to finalize an organizational background which produces conducts in the measure of ensuring the performances wished. So, the management initiates, regulates, stimulates and controls the members' behavior of the organization to get performances. Without "good" conducts "good" results cannot be touched. In an organization any aspect of existence and functioning is impregnated with behaviourist connotations more or less pronounced, more or less obvious. Certainly, an organization has a status and clear juridicial-administrative barriers, also a financial and material support but the specific juridicial-administrative order and regulations serve for marking it from other organizations and placing the members' actions and decisions, in other word their conducts, in certain forms and patterns, while the patrimonial elements are used and developed only in the work process, namely only in the context of some conducts. Generalizing easily, we can state that in organizations the human conducts represent alpha and omega. This statement expresses also the reason which would justify the managers' focusing attention on conducts to be able to improve the organizations performances they lead. I have deliberately used the conditional "would justify…".

The truth is that the managerial culture and the practices which result from it do not encourage too much the managers' preoccupations to understand and shape the human conducts. The culture of the practical management is predominated by a technocentric culture, with frequent managerialist accents (managerialist ideology, characteristic especially to the managers from the economical organizations, can be defined as an exclusive orientation towards the insurance of the efficiency by the total neglect of any human costs or the external implications of the organization functioning). As a rule, the managers prefer to analyse accounting balances, sales reports, stocks situations, expenses registers, agreements, price lists, budgets, bank documents, etc. as all these have precise and verified information. They introduce certainty or, more exactly, confer the sensation of certitude. But the human conducts often take away from certainty, escaping in areas dominated by hazard, event, ambiguity, contradiction, imprecision. The most times they are not completely rational but cluttered up by the emotional vicissitudes, passions and pulses which have the origin from the unconscious. The man rarely calculates perfectly logical his conduct, being the tributary of some cultural values, ethical conceptions, traditions and customs which turn him into the prisoner of some relational and historical contexts well individualized. So, the human conducts are wrapped in uncertainty. This characteristic makes them very little attractive from the managerial preoccupations perspective centered in quasi-totality on the "battle" against uncertainty and on the instauration of a rational control upon thinks and events.

To facilitate the targets, the managers prefer to consider man and all that is human or is connected to social as being " annexes of capital" or in the best case, a "resource" as any other, generating costs, but efficiency too. It is a minimalist vision, but ignoring one think we cannot make disappear the value and the real importance of this: the human conducts situate just in the heart of the organization functioning and the organizations performance is conditioned decisively by the quality the employees' conducts. The behaviourist perspective upon management benefit by a lot of solid arguments which come to confirm its validity.

The management and the organizational conducts optimization to be efficient must set up on the factors, mechanisms, processes knowledge, which interfere in the human conducts starting and development. To know why, when and how the human conducts appear and modify is essential for management. A systematic and complex conception concerning the behavior is offered to us by behaviourism. The executive idea of behaviourism is the following: the astonishing majority of conducts can be learned by transmitting stimuli and the offer of some coherent rewards. This possibility is available not only for simple conducts, common or of routine but also for conducts which suppose creativity and assimilation of some elements of novelty, important being sustaining the respective conducts by a suitable "mix" of initiating stimuli and rewards of reinforcement. Behaviourism states that any conduct is directed towards getting some rewards but it appears as a result of the action of some initiating factors – stimuli. From the behaviourist point of view, the mission of the management is to prepare the necessary conducts with the help of adequate stimuli system and favour them by according some inciting positive consequences. Also, the management must discourage the undesirable conducts by taking off the specific initiating stimuli and applying some negative consequences (punishments) in the case they appear). In these terms, the management comes as a behaviourist selective activity through which we follow to enrich the organizational performances.

Behaviourism sustains that the most human conducts are learned, namely centered with the help of some stimuli and specific rewards with the role of developing certain habits or manners. These habits or manners will gradually constitute in the nucleus of some routines or behaviourist patterns, named in the special terminology "answers" or "reactions". Thus, the behavior is the result of accumulation some experiences. Being subject to some stimuli, the subject will try different reactions, until it will choose one by centering, namely a rewarded reaction. Next time, being subject to some similar stimuli, the subject will choose from the first centered reaction (rewarded).

Certainly, bahaviourism places at our disposal only one of the possible manners of understanding the human conducts, but there also other versions of the behaviourist science. But the main advantage of the behaviourism consists in the superior applied capacities which characterize him. Or, the stability of a managerial doctrine can be proved only by training.

CONCLUSIONS

The management is responsible for getting the performances by influencing the conducts of the organization members. Generation, directing and control of the human conducts from the organization perimeters represent, consequently, the essence of the managerial activity. To select and encourage the work behaviour which lead to the necessary results and to discourage those which do not contribute constructively to express from a behaviourist perspective the content of the organization management. In this sense, the organizational structures and mechanisms must be conceived and functionalized so that they lead and maintain the behavior wished and remove the unwished ones.

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THE SELL-BUY OF AGRICULTURE CROPS – A MASQUERADE OF REINTRODUCING THE SUBLEASING IN AGRICULTURE

VÂNZAREA - CUMPĂRAREA CULTURILOR AGRICOLE – O FORMĂ MASCATĂ DE REINTRODUCERE A SUBARENDĂRII ÎN AGRICULTURĂ

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Abstract. *In modern time history of Romania, the subleasing agriculture has been a current practice until 1907 when as a result of peasant rebellion it was cast outside the law. Shortly after the appearance of Law 18/1991 regarding the real estate, also was elaborate the Law no. 16/1994 of leasing with the purpose of shorten in the term of real estate area concentration. The farming created after 1991 on the layout of agriculture property leasing couldn't translated to practice the officially held measures throughout governing programs which in turn helped the farmers with coupons, values bonuses etc. The real beneficiary of governmental help were food industry or seed vendors as well as nutrients, pests etc. All of them also develop the masquerade technique by reintroducing the subleasing using the sell-buy contracts of crops. It is necessary the modification of Law no. 16/1994 in order to ban this practice and prohibits leasing above 500 ha. Without these measures, the traditional environment of being and continuity of Romanian ship may well disappear in less then 15 years.*

Rezumat. *În epoca modernă a României subarendarea în agricultură a fost o practică curentă până în anul 1907 când urmare răscoalei țărănești a fost scoasă în afara legii. La puțin timp după apariția Legii nr. 18/1991 a fondului funciar a fost elaborată și Legea nr. 16/1994 a arendei cu scopul urgentării concentrării suprafețelor agricole. Societățile agricole înființate după 1991 pe baza arendării terenurilor agricole nu au putut valorifica în totalitate măsurile adoptate oficial prin programele de guvernare care au acordat sprijin producătorilor agricoli pe bază de cupoane, bonuri valorice, etc. Adevărații beneficiari ai sprijinului guvernamental au fost agenții economici procesatori sau comercianți de semințe, îngrășăminte, pesticide, etc. Tot ei au pus la punct și tehnica de reintroducere mascată a subarendării prin metoda contractelor de vânzare – cumpărare a culturilor. Este necesară modificarea Legii nr. 16/1994 pentru interzicerea acestei practici și limitarea posibilității de arendare până la 500 ha. Fără aceste măsuri, asupra mediului tradițional de menținere și continuitate a românismului planează pericolul dispariției în cel mult 15 ani.*

The agriculture isn't just a economical branch, it is also a life style for the Romanians which live in the country side, being the base of the Romanian country side civilization on which resides on one hand the tradition and customs of Christian Romanian people, and on the other hand it generated a special life style which consolidate the national identity of Romanian people.

As long as between the land and Romanian peasant doesn't exist no other intermediary, both the social environment as well as the economical one have positively evolved. On the time when the intermediaries appear, meaning the leaseholders appears, the social parasitism forms, misplacing, weakening the countryside environment by loosing the tradition and valuable customs, and in the late years, the mass migration of young labor force from countryside has generated a massive depopulating of village, with negative irreversible effects. There is a complex of political and economical factors, which contributes to this phenomenon, between which the most negative is the subleasing.

MATERIAL AND METHODS

According to the Civil code, art. 1294, the sell is a convention through two parts binding themselves one to giving to the other the property of a thing and this one to pay to the first one its price. But this imply, necessarily, the concomitance of two operation (the sell – the buy) which leads to the property transmit. From juridical point of view, the sell-buy contract is a consensual contract, reciprocal and bilateral. The consensual character consists from the thing property transfer, which formed the convention object. The reciprocal character consists from the identity of juridical causes of both contracting parts regarding the assuming obligation. The bilateral character of the contract consists from the reciprocal obligations, on to the other, of each part.

The leasing contract consists in the signed convention between the owner and the leaseholder, regarding the agricultural valuables exploitation on a determined period and to a price established by the parts. The leasing contract is a reciprocal, onerous, consensual, on a determined period, with sequenced execution.

Because the subleasing is interdicted by the art. 22 from Lease Low, the businessman use a "artifice" by which has simulated the closing of sell contract of new se up crops, which once buy they look after and gather after the vegetation period, taking in a silent way in all this time the field property.

RESULTS AND DISCUSSIONS

As I already point out, the sell-buy contract has like main purpose to their signing the transmission of the purchased thing property. In the situation taking into account, we notice that the seller have before already a signed leasing contract with the landowner, towards which he assumed certain obligation. In the moment in which he signed a so-called sell-buy contract of root crops, practical he transferred on a determined period also the possession of the land on which there is the crop, this being a specifically element of leasing contract, and the leaseholder becoming by this way a parasite intermediary between the right landowner and the crop seller which has the purpose and the obligation to entertain the crop until the gather, according to the specifically technology, but doesn't have no other obligation toward the owner himself.

In reality, the lessor receives an average payment, which represents the lease and has the obligation to pay the state taxes for the property surface, the

leaseholder receives from the crop buyer a payment which is situating between 40-5-% from the estimated values of the crop, without assuming any risk, and the crop buyer, practice the sublessor beneficiating by the difference of 50% from the crop valuable and pay the income taxes to state.

We notice at from a bilateral relation, lessor-leaseholder (fig. 1), has reached to a trilateral relation, lessor – leaseholder – subleaseholder (fig. 2). The leaseholder in this situation becoming a parasite, an intermediary, a break in the way of agricultural economical development, which must disappear.

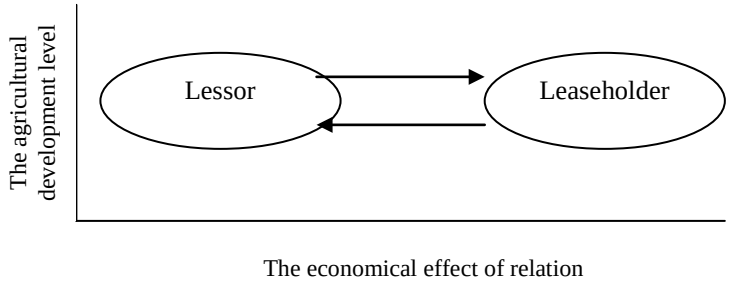

Fig. 1. The enframe in agricultural economical space of lessor-leaseholder relation

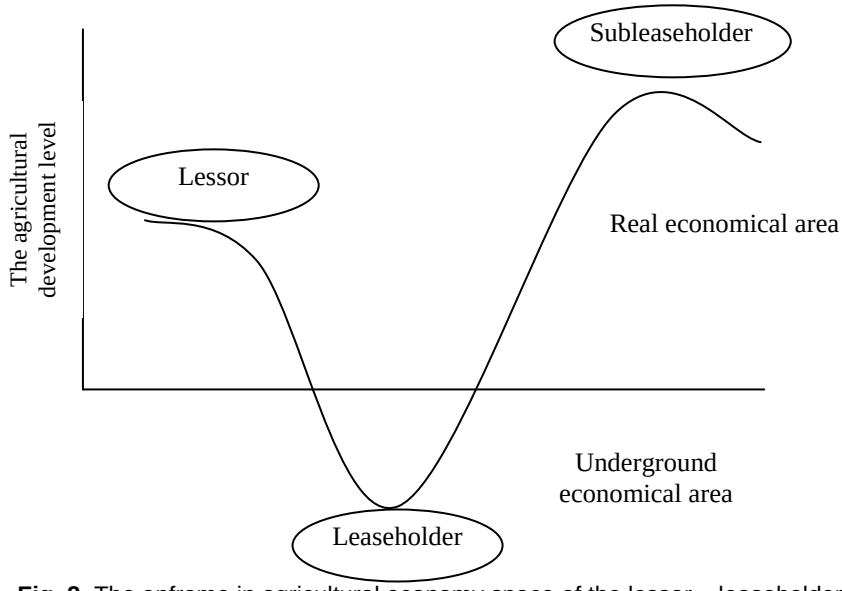

Fig. 2. The enframe in agricultural economy space of the lessor – leaseholder – subleaseholder relation

By this work frame, the owner himself (lessor) is isolated, marginalized, unmotivated to rest in rural environment, because the income obtained from lease land are not sufficient for a decent existence and, as it follows, he faces the need to emigrate, because it cannot always sell the land, by sentimental reasons or due to other juridical nature complications.

CONCLUSIONS

In some country area, some businessman from agriculture area have discovered that they may elude the Lease Low by simulating a sell-buy root contract which in reality is nothing else then a masquerade sublease. This thing has negative effects from economical and social point of view, leading to impoverish and mass migration of rural population and contributing to restraint the authentically Romanian culture and civilization. It is necessary a radical measure which to interdict the sell-buy crops and limit the lease surface to 500 ha, by modifying the Lease Low, in order to prevent the polarization of land property on the hand of a few businessman.

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EVOLUTIONARY DYNAMICS AND THE DETERMINANTS OF CLUSTER FIRMS' PERFORMANCE

DINAMICA EVOLUTIVĂ ŞI DETERMINANTELE PERFORMANȚEI GRUPURILOR DE ÎNTREPRINDERI

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Abstract. *This research article aims at investigating the evolutionary dynamics of geographical cluster and the determinants of cluster firms' performance. Differently from prevailing tendency in literature to approach performances of co-localized firms on case-based research strategies, this research departs from a purely descriptive ground in favor of empirically based research that relies on analytic techniques, hypothesis and rigorous formalization. The distinctive feature of this article lies in integrating more classical methodologies of analysis, such as network analysis and cognitive maps, to the promising simulations and computational tools. Moreover, evolutionary dynamics and cluster firms' performances are studied by approaching them from several units of analysis, within different selected geographical clusters characterized by a great variance concerning both the characteristics of co-localized actors and the stages of their lifecycle.*

Rezumat. *Acest articol are ca obiect studierea dinamicii evolutive a grupurilor geografice şi determinantelor posibile ale performanței întreprinderilor localizate în astfel de grupuri. În mod diferit de tendințele întâlnite în literatura de specialitate, această problemă priveşte performanța entităților co-localizate prin cercetări de tip calitativ bazate pe studii de caz, autorii intenționând a se baza pe tehnici care sunt prevalent descriptive, numai în faza inițială a lucrării, privilegiind mai degrabă investigările empirice ale cercetării cantitative, în măsură să garanteze aplicarea de tehnici analitice riguroase; formularea adecvată de ipoteze şi formularea adecvată de modele statistice. Elementul distinctiv al acestei lucrări este de a întrevedea printr-o alegere deliberată de integrare a metodologiei cazurilor celor mai practice, cum ar fi acela de „network analysis" şi a elementelor cognitive, cu instrumentele cele mai inovative cum ar fi cele de modele de simulare şi instrumentele competiționale. Studiul evoluției dezvoltării dinamice a grupurilor, cât şi a performanței întreprinderilor localizate, sunt analizate recurgând intenționat la diferite unități de analiză, focalizând atenția asupra grupurilor geografice foarte diferite între ele.*

This research aims at investigating the evolutionary dynamics of geographical clusters and the determinants of clusters firms' performance. In order to reach this aim, this research will depart from a purely descriptive ground in favor of empirically based research that relies on analytic techniques, hypothesis and rigorous formalization. The distinctive feature of this paper lies in studying

different geographical clusters, characterized by a great variance concerning both the characteristics of co-localized actors and the stages of their lifecycle, using hheterogeneous methodologies of analysis.

MATERIAL AND METHOD

Differently from other contexts of research, this diversity will not constitute a barrier to systematical investigation, but a wide range of knowledge to use with simulations and computational tools. Normally the diversity of geographical clusters and the heterogeneity of research methodologies have posed huge barriers to systematical investigations of clusters dynamics and clusters firms' performance.

RESULTS AND DISCUSSIONS

On the contrary, in this research geographical clusters in a huge variety of firms size distribution, network arrangements, content and impact of communications, involvement of public agencies will be examined.

Moreover, evolutionary dynamics and clusters firms' performance will be studied by approaching them from several units of analysis (single actor or complex organizations, inter-personal and inter-organizational ties, internal and external networks, etc.), differently from several studies about geographical clusters that have analysed only a single actor or a single typology of relationship. Indeed, although geographical clusters are high in research agendas we lack tools to evaluate their performance and predict their dynamics.

Essentially, the problem is that the clusters of co-localised firms exhibit an aggregate behavior that results from self-organization of local decisions.Consequently, the tools of mathematical analysis do not apply.

Thus, in this research our aim will be to integrate more classical methods of inquiry, such as network analysis and cognitive maps to the promising simulations and computational tools, which can provide a virtual environment where to test set of hypotheses for robustness and consistency.

After a period of discontinuous interest during the 1970s and 1980s, over the last fifteen years geographic clusters, (Porter, 1998; 2000), also known as Industrial Districts (Beccattini, 1979), Neo-Marshallian Nodes (Amin and Thrift, 1992), or Hot Spots (Pouder and St. John, 1996), have been the object of a growing and renewed attention across a broad range of academic disciplines (Malmberg and Maskell, 2002) generally interested in unraveling the link between spatially concentrated industries and the economic prosperity of nations.

Thus, for instance, it is has been long established that clustered networks of small medium firms constitute a prominent competitive and economic driver of the Italian industry, but similar arrangements can be found in productive systems as diverse as Mototorsport Valley in South England (Pinch and Henry, 1999), Hollywood (Scott, 1998), Silicon Valley (Saxenian, 1994), as well as the software districts in the emerging countries of East Asia. Obviously, such a wide diffusion comes along with an extreme diversity of organizational and structural forms.

Both because of their diffusion and because of their structural variety, geographical clusters are crucial to characterize and improve the performance of national productive systems (Pyke and Sengenberger 1990; Porter 1998).

Since the time when Becattini recognized in Italy the features of the "industrial districts" depicted by Marshall, however, many features have changed. Those agglomerations of large numbers of minuscule firms specialized in tiny fractions of the productive process have paved the way to more complex organizational forms, in which the variety of firms' size and behaviors contributes to the richness and multiplicity of interactions (Park and Markusesn 1995; Nuti and Cainelli 1996; Lazerson and Lorenzoni 1999).

In the last few years important attempts have been made to understand in which directions the structures and networks of such systems may evolve and, possibly, to identify an evolutionary lifecycle of industrial clusters (Carminucci and Casucci 1997), however the diversity of industrial clusters and the heterogeneity of research methodologies still poses significant barriers to systematical investigations (Staber, 1998; Staber and Morrison, 2000). In particular, because of the limited attention many investigators give to measurement issues, it is unclear whether the cluster model is becoming more or less successful.

In light of the argument that some of the previously much celebrated clusters in Italy are deteriorating or are transforming into a different mode of production (Harrison, 1994), it would be extremely helpful if researchers collected data that would permit a better evaluation of the causes and consequences of changing cluster dynamics. Further, it is notable that while business networks and industrial clusters have been the object of numerous studies looking at their influence on national competitiveness and/or local growth, much less emphasis has been placed on the antecedents of clusters firms' perfomance.

These issues point to at least two important and interlaced problems: the first, essentially methodological, is that clusters of networked firms exhibit an aggregate behavior that results from self-organization of local decisions. Consequently, when trying to predict cluster dynamics and evolutionary patterns, standard tools of mathematical analysis do not fully apply.

The second, mainly theoretical, is that there has long been a prevailing tendency in the literature to consider geographical clusters as a whole, without focusing on what is happening at the micro level of the single firm. While this ‘macro perspective' has undoubtedly favored our understanding of the overall phenomena and its implications, it has also contributed to nurturing a somewhat latent assumption that all cluster firms tend to be homogenous and thus do not merit special attention in their own right (Lazerson and Lorenzoni, 1999).

It is especially in the last few years - thanks both to significant methodological shifts made possible by use of computer simulations, and to a sharper focus of research on the micro foundations of cluster development and growth - that scholars have started tackling such crucial issues as the prediction of

cluster dynamics and the determinants of clusters firms' performance in a more analytic and systematic way.

These feedbacks at the micro level may originate collective macroscopic dynamics of a considerable complexity (Forrester 1961, 1968; Goodman 1983; Sterman 2000). It is a top-down approach aimed at identifying those relational structures that may trigger explosive and destructive dynamics for the cluster as a whole. Consequently, the systems dynamics approach is able to detect key microstructures for the aggregate behaviour of a cluster (Delauzun e Mollona, 1999; Marafioti e Mollona, 2000; Mollona, 2001). As an example, such approach may prove particularly helpful in assessing the effects of such crucial processes as business maturity, firm exit or delocalization of production due to internalization strategies (Perretti, 2003a), on the cluster mutation over time and its survival rate (Marfioti and Perretti, 1998).

On the other hand, connectionist models lend themselves to a bottom-up modelisation of geographical clusters. After initial attempts with neural networks (Giaccaria 1997) and cellular automata (Brusco, Minerva, Poli and Solinas 2002), agent-based models conquered the scene (Cavezzali and Rabino 2003). Recently, a series of agent-based models of industrial clusters appeared on the Journal of Artificial Societies and Social Simulation, the leading journal in this rapidly growing field (Brenner 2001; Fioretti 2001; Squazzoni and Boero 2002; Albino, Carbonara and Giannoccaro 2003).

Just like bottom-up does not oppose top-down, agent-based models are complementary to systems dynamics models. In fact, the reliability of agent-based models is greatly enhanced if systems dynamics macro-equations are available, that anchor the results of agent-based models to a well-known framework.

The great attraction of such methodologies is that they allow the understanding of economic actors' actions and paths of change in a context of time and space.

They account for the fact that behavior of clustered agents is situated and highly conditioned, but not determined, by structures accumulated at the level of the organization and the environment (e.g. social networks, institutions). In other words, these surrounding structures enable and constraint, but do not determine actions of system agents: chance events and human agency, often in combination with increasing returns, may result in unforeseeable changes. That is, actions and repeated interaction of agents adapt, transform, upgrade, or lock-in, both at the level of the organization and the external environment.

Because computational models may incorporate all these crucial features in a simulated environment, they allow for a much deeper and more realistic evolutionary understanding of cluster dynamics than it would otherwise be permitted by rigorous mathematical formalization.

Turning to the theoretical dimension, at least two interesting bodies of research have emerged that look at the determinants of cluster development and of clusters firms' performance: First, organizational scholars have started to investigate the antecedents of network formation within firm clusters. In

particular, given the crucial role of interorganizational ties in shaping the competitive advantage of cluster located firms, initial attempts have been made to understand and single out the generative rules leading to the establishment of an effective interorganizational field (Kogut, 2000; Antonelli, 2003). This stream of research has moved along two complementary directions.

One relatively more focused on the role of the individual actors (i.e. the firms) in shaping the local system; the second, mainly concerned with the institutional and social features of the local context, as enablers of network formation and development. Likewise, research has been undertaken that investigates the possibility of institutional and public actors to act as 'meta-organizers', that is actors capable to initiate, forge and propel interorganizational arrangements among key cluster nodes (Rulllani, 1999; Meneguzzo, 2001; Consiglio and Antonelli, 2004), so as to enhance the cluster competitive edge.

Drawing on the structural embeddedness approach a la Granovetter (1985), a second body of research has evolved that suggests the benefits of looking at the structural and relational properties of the interorganizational configurations that occur within localized industries (Grabher, 1993; Uzzi, 1997; Lorenzoni and Lipparini, 1999).In particular, scholars have started to show that these firms do actually differ in their interorganizational arrangements, and that such difference may represent a major source of variety within the cluster community (McEvily and Zaheer, 1999).Many novel analytic angles have been proposed to unveil the nature and consequences of this interorganizational heterogeneit.

The adoption of cognitive maps methodologies has provided suggestive insights on how dramatically different may be the perception of competitive interactions among co-localized organizations (Odorici and Lomi, 2001; Boari, Odorici and Zamarian, 2003).

Taken together, these emerging strands of research delineate the boundaries of a fascinating field of inquiry, whereby the integration of computational methodologies with original conceptual frameworks, offer unprecedented possibilities to enhance our understanding of how modern geographical clusters are changing over time, and what the key drivers of their competitive success are going to be.

CONCLUSIONS

The article is articulated along two different interconnected phases. By means of a sharply focused literature review, the first phase aims at identifying a set of possible determinants of the performance of clustered firms, through the construction of a significant theoretical framework mainly concerning the evolutionary paths of clusters of firms.

Moreover, it aims at developing a set of techniques to observe the alleged determinants and the actual performance of firms in selected clusters. Specifically, network analysis and cognitive maps will be used in order to identify

elementary structures of interaction between co-localized actors and the content and purpose of their business relationships. Additional information will be collected by means both of a software for group communication and of a significant revisitation of available statistical information.

In the subsequent phase, a casual relationship between the previous selected determinants and the actual performance of firms is identified through the construction and utilisation of two complementary simulation models: System Dynamics models (SDMs) and Agent-based models (ABMs).

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THE ACCOUNTING OF THE RESULT TO THE NON-PROFIT ORGANISATIONS

CONTABILITATEA REZULTATULUI LA ORGANIZAȚIILE NON-PROFIT

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Abstract. *The non-profit organisations can unfurl the activities objectless patrimonial, activities with special destination and economic activities. This article makes evident the fact that result of a period to not for profit entities is established yearly on kinds of activities and appears in the likeness of surplus or deficit. Also, the allocation of the surplus of the non-lucrativ activities and the surplus concerning the economic activities achieved in the financial current exercise on the destinations foreseed of the legal in force or settlements the covering of the deficit of financial exercise finished subdued the approval annual general meeting. The surplus concerning the activities with special destination don't is distributed. When the surplus achieved in the current period don't is distributed on his destinations or the deficit don't is covered from financial viewpoint, result of the financial exercise finished remains in expectation. This is shall considered carried over for a subsequent period, when the general assembly shall decide the destination of the surplus leaved in stand-by, fractionally or total, either cover the deficit delaied, partial or total. These facts in accounting is distinguish through groups and different accounts with their help are shall consigned operations related to results on types of activities unfurled.*

Rezumat. *Organizațiile non-profit pot desfăşura activități fără scop lucrativ, activități cu destinație specială şi activități economice. Acest articol evidențiază faptul că rezultatul exercițiului unei persoane juridice fără scop lucrativ se stabileşte anual pe feluri de activități şi apare sub forma excedentului sau deficitului. De asemenea, repartizarea excedentului activităților fără scop lucrativ şi a excedentului privind activitățile economice realizate în exercițiul financiar curent pe destinațiile prevăzute de reglementările legale în vigoare sau acoperirea deficitului exercițiului financiar încheiat se supun aprobării adunării generale. Excedentul privind activitățile cu destinație specială nu se repartizează. Când excedentul realizat în exercițiul financiar curent nu se repartizează pe destinațiile sale sau deficitul nu se acoperă din punct de vedere financiar, rezultatul exercițiului financiar încheiat rămâne în aşteptare. Acesta se va considera reportat pentru o perioadă ulterioară, când tot adunarea generală va decide destinația excedentului lăsat, parțial sau total, în aşteptare ori acoperirea deficitului amânat, total sau parțial. În contabilitate, aceste aspecte, sunt evidențiate prin grupe şi conturi diferite cu ajutorul cărora se vor consemna operațiunile aferente rezultatelor pe tipuri de activități desfăşurate.*

The non-profit juridical persons (such as: the associations, the foundations, the federations, unions, the politic parties, employers, the Mutual Aid Fund and so

on) can carried on many types of activities: activities tied of purpose for which were set up (the one non-profit), which activities lead to the formation of what funds shall be used to the realization propose object (the one economically) and which activities can unfurl to certain entities (the one with special destination).

MATERIAL AND METHODS

The result of activities carried on of the non-profit entities appears in accounting through closing of the expenditures and incomes accounts.

The non-profit activities and one with special destination can have in result either the surplus or the deficit, and the result of economic activities can be either profits or loss. All the same of the type of result, this is established cumulativelly from beginning of financial exercise, but finally result of financial exercise is established to this closing and represents final balance of the result account.

RESULTS AND DISCUSSIONS

Closing of the expenditures and incomes accounts of same periods represent the result of financial exercise. **Income** is increases in economic benefits during the accounting period in the form of inflows or enhancements of assets or decreases of liabilities that result in increases in equity. **Expenses** are decreases in economic benefits during the accounting period in the form of outflows or depletions of assets or incurrences of liabilities that result in decreases in equity *(3, art. 185)*.

The result of exercise is established to ending of the period and appears under the form of surplus or profit (in the case of economic activities), if income of the period are more greater than the expenses of the same periods, or under the form of deficit or loss (in the case of economic activities), when expenses of the period exceed the incomes of the same periods *(1, 52)*. *In case of carried on of the economic activities, the non-profit juridical persons applies the accounting settlements for economic agents.*

Distribution of the surplus (from non-profit activities) or **the profit** (from economic activities) is registered in accounting on destinations, in accordance with the legal in force settlements, after the approval of annual financial statements. To closing of financial exercise is distributed just those amounts which represents reserve constituted from the surplus/profit of current financial exercise, on the basis of a legal settlements, through article 129 “Distribution of the surplus/profit” = 106 “Reserve”. These legal settlements are referred to legal reserve (registered in accounting with help of the account 1061 “Legal reserve”) and possible statutory or contractual reserve (registered with help of the account 1063). *Surplus regarding to the activities with special destination don't is distributed.*

The possible surplus or profit that has remained after this distribution is taken over in beginning next financial exercise for which drawn up the annual financial statements in the account 117 “Carried forward result”, subsequently

were distributed on another legal destinations, after the approval repartition of the result by the general assembly *(3, art. 194, alin. (4))*.

The surplus or the profit obtained in prior financial exercises can be distributed, as per decision of general assembly, for:

- increasing social patrimony;
- formation of the reserve;
- recompense worker for the realization of the profit (if only the entity carried on the economic activities.
- cover the loss or the deficits; and so on.

The deficit/the loss achieved by a non-profit juridical person can be covered from previous formats reserve or are left at stand-by, in the conditions when they don't there are the risk cessation activity, were covered from the favorable results of the next years. Cover the deficit or the loss is done from surplus or profit of financial exercise and from one carried over, from reserve or through the diminution social patrimony, as per decision of general addition or advisory body.

The accounts 121 and 129 are closed in the beginning next one period for which drawn up the annual financial statements and accordingly both accounts appear with appropriate balance accounts in the balance-sheet drawed up for the financial exercise which refers the annual financial statements.

With help of the **121 "Surplus/profit or the deficit/loss" account** is held the evidence of the result achieved during financial exercise and is developed into synthetic second degree accounts (1211 "Surplus or deficit concerning the non-profit activities" and 1212 "Profit or loss concerning the economic activities"). Analytical accounting of the result from non-profit activities is held separately for the non-profit activities and the activities with special destination.

The 121 account is credited through the debit of the accounts:

- 117 "Carried forward result" with deficits or loss achieved in prior financial exercise, transfered about the carried forward result;
- from the class 7 "Incomes accounts" to closeness period - with the credit balance of the accounts from class 7^{th}, in view close these and the settlement of the results.

The 121 account is debited through the trust of the accounts:

- 117 "Carried forward result" with the surplus or the profit achieved in prior financial exercise, nedistributed;
- 129 "Distribution of the surplus/profit" - with the surplus or the profit achieved in prior financial which were distributed on the legal destinations (exclusive the activities with special destination);
- from the class 6 "Expenses account" to closeness period - with the debit balance of the accounts from class 6^{th}, in the sight close these and the settlement of the results;
- 711 "Variation of the stocks" to closeness period - with debit balance of the account in the sight close this and the settlement of the results.

The credit balance of the account represents the surplus/the profits achieved, if income exceed expenses, and the debit balance represents the deficits/the loss achieved, if expenses exceed the incomes.

The evidence repartition of the surplus or the profit achieved in the current financial exercise is kept with help of the **129 "Distribution of the surplus/profit" account**, distinctly for the non-profit activities (exclusive the activities with special destination) and for the economic activities. Accounting is kept distinctly on the synthetic second degree accounts (1291 "Distribution of the surplus concerning the non-profit activities" and 1292 "Distribution of the profit concerning the economic activities"), agreed with the plan of accounts.

The 129 account is debited through the trust of the accounts:

- 106 "Reserve" to closing the financial exercise - with the surplus/the profit achieved in the current financial exercise distributed to reserve, agreed the legal settlements (exclusive the activities with special destination);
- 113 "Social Fund of members of the Mutual Aid Fund (MAF)" - with the results achieved in the current financial exercise to the Mutual Aid Fund (MAF) distributed to the social fund of these members;
- 114 – "Fund for help in case of decease of members of the Mutual Aid Fund (MAF)" - with the results achieved in the current financial exercise to the Mutual Aid Fund (MAF) distributed to the fund for help of decease of these members;
- 116 "Another funds concerning the non-profit activities" - with amounts destined to constitute another funds concerning the non-profit activities (exclusive the activities with special destination) from the surplus achieved in the current financial exercise.

The 129 account is credited through the debit of the 121 "Surplus/profit or the deficit/loss" account - with the surplus or the profit achieved in the financial exercise which were distributed on the legal destinations (exclusive the activities with special destination).

The debit balance of the account represents the distributed surplus, respectively distributed profits afferent current financial exercise (exclusive the activities with special destination).

When the surplus or the profit achieved in the current period don't is distributed on his destinations or the deficit, respectively the loss don't is covered from financial viewpoint, the result of the financial exercise finished remains in expectation. This is shall considered carried over for a subsequent period, when the general assembly shall decide the destination of the surplus/profit leaved in stand-by, fractionally or total, either cover the delaied deficit/loss, partial or total.

The result or the part of result from the previous financial exercise which don't distributed or covered is accounting with help of the **117 "Carried forward result" account**, develops into three synthetic second degree accounts (1171 "Carried forward result representing the nedistributed surplus or the uncovered deficit concerning the non-profit activities", 1172 "Carried forward result representing the nedistributed profit or the uncovered loss concerning the

economic activities" and 1174 "Carried forward result appeared from the correction accounting errors"). Accounting of the carried forward result is kept distinctly for the non-profit activities and for the economic activities. Analytical accounting of the carried forward result from non-profit activities is kept distinct for the non-profit activities and for the activities with special destination.

The 117 account (with the exception of the 1174 account) is debited through credit of the accounts:

- 101 "Capitals" - with the surplus/the profits achieved in the prior financial exercises, used-up as the source of increase the capital (exclusive the activities with special destination);
- 106 "Reserve" - with the surplus/the profits achieved in the prior financial exercises (exclusive the activities with special destination) distributed to reserve (valid correspondence, as a rule, for the 1068 "Another reserve" account);
- 116 "Another funds concerning the non-profit activities" - with amounts destined to constitute another funds concerning the non-profit activities (exclusive the activities with special destination) from the surplus achieved in the prior financial exercise (valid correspondence for 1171 account);
- 121 "Surplus/profit or the deficit/loss" - with the deficits or the loss achieved in the prior financial exercise, transfered on the carry forward result;
- 424 "Bonus representing the personal share to profit" - with amounts offered staff from the net profit achieved in the prior financial exercises from economic activities, distributed for staff participation to profit, after the approval by the general assembly (valid correspondence for 1172 account).

The 117 account (with the exception of the 1174 account) is credited through the debit of the accounts:

- 101 "Capitals" - with the deficits/the loss achieved in the prior financial exercises, in the case in which cann't covered up for another way foreseed of law (exclusive the activities with special destination);
- 106 "Reserve" - with the used-up reserve for the covering of deficits or loss achieved in the prior financial exercises (exclusive the activities with special destination);
- 121 "Surplus/profit or the deficit/loss" - with the nedistributed surplus/profits achieved in the prior financial exercise;
- the accounts of current liabilities - with amounts representing afferent liabilities from the prior financial exercises, prescribed or cancelled.

The debit balance of the account represents the uncovered deficits, respectively uncovered loss, and the credit balance represents the nedistributed surplus/profit.

CONCLUSIONS

In accordance with the in force fiscal settlements, the non-profit juridical persons carried on, by virtue of law, economic activities, have the organization and manage accounting obligation, analytically distinct, for the non-profit

activities, inclusively the activities with special destination, by virtue of law, and the economic activities from their structure.

In the explanatory notes to the annual financial statements must be presented informations concerning the incomes and expenses of the financial exercise, grouped after their nature on kinds of activities, respectively non-profit activities, activities with special destination and economic activities, as well as informations concerning the constitute and the utilization of the funds from the non-profit activities. Also, in the explanatory notes are due to presented separately the propose of distribute the surplus of the net profit on destinations: amounts distributed to reserve; amounts distributed for the covering accounting deficits/loss from prior years; as well as another allocations.

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VALUE REPORTING AND STAKEHOLDERS' INTEREST IN BUSINESS COMBINATIONS

COMUNICAREA EFICIENTĂ ŞI PROTEJAREA INTERESELOR INSTITUȚIONALE ÎN CADRUL GRUPURILOR DE ÎNTREPRINDERI

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Abstract. *The research article aims at evaluating the benefits as well as the limits of the most important control instruments used in business groups for the stakeholders' safeguard, taking into account the current situation and above all some recent law provisions and professional interpretations which have brought about important changes . The research intends to appreciate the significant role played by the system of internal control, consolidated financial statements, social and environmental statements for a better protection of stakeholders' interests in business groups.*

Rezumat. *Această lucrare îşi propune să evalueze potențialul şi limitele principalelor instrumente de control pentru a proteja interesele instituționale în grupurile de întreprinderi, ținînd cont de situația curentă şi mai ales de recentele prevederi legislative şi profesionale care au itrodus inovări semnificative. Lucrarea îşi propune să aprecieze contribuția pe care sistemul de control intern, bilanțurile consolidate, bilanțurile sociale şi de mediu, pot furniza, pentru o protejare mai eficientă a intereselor instituționale în cadrul grupurilor de întreprinderi.*

The last companies' scandals and financial distresses, involving some national and international business groups, have been jeopardising the interests as well as threatening the efficacy of the instruments of control. In each case the common trait is that the companies involved were part of a business group. In this respect, the innovative feature of the research project is related to the most important peculiarities of some instruments of reporting and control in business groups (consolidated financial statements, systems of internal control, social statements).

MATERIAL AND METHODS

The research aims at having a clear understanding of the impacts of these particular instruments on the management, organizational and information areas for the safeguard of the stakeholders' interests.The research units involved in this article are clustered on the basis of the instrument of control considered and of the outcomes each unit has come up with in previous projects specifically pivoted on these topics On the basis of the results generated from some previous researches, the working team aims at realising some specific objectives on a local basis and some middle objectives related to the single stages of the research programme.

RESULTS AND DISCUSSIONS

The coordination among the local units is granted by the common trait characterising their activity: business groups. What is more, all the research units share a common objective: carrying out empirical surveys for the evaluation of the efficacy of the systems of internal control, of consolidated financial statements, of social and environmental statements in order to endorse the safeguard of the stakeholders' interests, taking also into account the particular features of such documents within business groups.

The core idea staying behind the activities carried out by the three research units lays on a common finalism which considers the interests of each business entity as the interests of the group itself so as to believe financial results and social and environmental performances as complementary.

The inadequateness of such instruments is more evident when considering listed companies which are members of groups as holding, sub-holding or controlled companies. The safeguard of stakeholders in business groups can be attained with different instruments.

The instruments the research intends to focus on draw the attention on the process of production and distribution of the value.

Stakeholders will feel satisfied when the value produced by the group is fairly distributed among all the subjects who have directly or indirectly given their contribution to generate it.

The concept of value production is principally referred to the production of income and its related financial flows, but that is not all. Indeed the view shared by all the research units considers as production of value even the manner the company acts towards the environment and the society where it runs its activity.

Such instruments are crucial for every company but they become more complex when dealing with business group.Such an organisation is indeed more sophisticated due to the presence of several business units (which mostly take up the corporate form of partnership or legal persons) which boast a judicial sovereignty but are subject to a unitary economic guidance and direction.

The presence of several units renders more complex all the aspects of business administration (management, organisation and reporting) and – in particular – the aspect of control which shall permit a fair process of production and distribution of the value among all the stakeholders.

In many cases it might occur that a higher degree of complexity can make the control instruments more vulnerable, thereby blaming the utility of consolidated financial statements, systems of internal control, social and environmental reports.

An evidence is provided by numerous cases of financial distresses occurred in other countries, which share a common trait: being part of business groups as well as the inadequacy of their instruments of control.

In this way, the objective of the research is to appreciate the potentials as well as the limits of consolidated financial statements, the systems of internal control, social and environmental reports for the safeguard of stakeholders' interests by taking into account the recent corporate law reform which have brought in some significant changes.

The research by and large intends to appreciate the role played by consolidated financial statements, the systems of internal control, social and environmental reports in business groups in order to offer a valid instrument for the safeguard of all the stakeholders' interests in business groups.

Each research unit is entrusted with specific objectives which share the same attention for a common object: the instruments of control in business groups.The constant reference to business groups will enhance the integration and the complementarity between the research units.

Each working unit will concentrate on business groups or, more exactly on a specific instrument for the safeguard of stakeholders' interests in business groups.

The concept staying behind the research lays on a finalism of company and of group which permits to systematically combine financial performances with social and environmental results.

In conclusion, the three research units are going to use a unique research methodology which – following an inductive and deductive logic – will develop empirical analysis with the purpose of improving the efficacy of consolidated financial statements, of the systems of internal control, of social and environmental reports in business groups. Business group both on a national and international scale represents one of the most prevalent form of organisation of the economic activity.

The reasons which stay behind this success lay on the benefits business groups can grant to the "economic subject" in order to achieve good conditions of efficiency and efficacy both in the interests of the group and, in particular, of its shareholders.

The expansion of business groups both internally and externally sustains the development of a business, its dimensional growth, economies of scale, the control of the market and competition.Other advantages may be related to the possibility to haze the real boundaries of the business and obtain benefits of fiscal or other nature.

Many economic sectors provide several regulations (for instance, bank groups), even on some specific subjects (for example, consolidated financial statements, antitrust), however a unique definition of business group does not exist so far nor a general model.

The outcome of this is that the law does not consider the group as such but simply focuses on the companies which are part of it, such as the holding, the sub-holding, the controlled company.

Even the recent reform of corporate law seemed to be going to fill in such a void but later it failed to do so. Indeed, with regard to business group it has

merely set up a few provisions with the aim at regulating the relationships between the company which exerts the activity of guidance and coordination and the other companies which are subject to it.

A group – as every company – shall continuously and independently produce and distribute value for all its stakeholders.

A first glance of such value is provided by its financial performances; the production of the group is measured by means of the income and the capital of the group, consisting of the holding's, sub-holding's and the other controlled companies' quotas.

From a financial point of view the production determines flows of liquidity, working capital and other financial resources which consent to appreciate both the financial balance of the group in the short run and the financial solidity of the group in the long run.

However, the results of a group cannot be just identified with its economic and financial performances. As a social institution studied in their economic substance, groups also boast a social responsibility which is to be considered for ethical, moral reasons not to endanger their future financial performances.

The instruments used for the supervision of the group results (financial and social results) – as it happens in every company – are very important in order to ensure an accurate determination of the results as well as to allow all the users to understand the destination of such results.

Consolidated financial statements, the system of internal control and social reports are a good example of instruments for the control of the results. The former (consolidated financial statement) is essential in business groups.

The other two documents – in business groups – differ to some extent if compared with companies which do not belong to a group. The last financial scandals have endangered several institutional interests (for instance the shareholders, the creditors, the employees) and shed a dark light on the provisions included in the laws set up for the safeguard of the investors' savings and of other social interests.

The countries which have been involved in such scandals have acted in response and are still taking some serious measures in order to avoid the occurrence of similar situation in the future. In european countries several legal parameters have been introduced in regard with the regulation of the abovementioned instruments.

For example the Draghi Law, the Preda Code, the reform of the corporate law, the implementation of international accounting standards for the preparation of consolidated financial statements.However, all these provisions underestimate a crucial element: all the companies involved in financial scandals were part of business groups and such a circumstance probably and partially explains the limits of such instruments.The reasons staying behind scandals and other financial distresses which have lately occurred are numerous.

The studies in business administration are able to positively investigate on the reasons which might affect consolidated financial statements, systems of internal control, social reports. In particular, this research can help outline the peculiarities of the instruments of control used in business groups.

A clear understanding of them, in turn, can lead to positive proposals of improvements to be applied to the process for the preparation and the communication of consolidated financial statements and social reports as well as to enhance the quality of the systems of internal control in business groups.

During the last decade many researches and publications have been carried out in order to critically examine the theory on consolidated accounts as well as to understand the choices made by groups as for the determination of their comprehensive income and capital.

Such researches have indeed been playing a remarkable role in this regard as they have proved to be very useful for a correct interpretation of the law, for an accurate placement within the framework provided by business theories, as well as for a better understanding of the key communication and reporting areas related to business groups' consolidated financial statements.

The concept staying behind the research lays on a finalism of company and of group which permits to systematically combine financial performances with social and environmental results.

In conclusion, the three research units are going to use a unique research methodology which – following an inductive and deductive logic – will develop empirical analysis with the purpose of improving the efficacy of consolidated financial statements, of the systems of internal control, of social and environmental reports in business groups.

CONCLUSIONS

Such researches have indeed been playing a remarkable role in this regard as they have proved to be very useful for a correct interpretation of the law, for an accurate placement within the framework provided by business theories, as well as for a better understanding of the key communication and reporting areas related to business groups' consolidated financial statements

As a matter of fact, the last companies' scandals and financial distresses, which have lately involved important national and international groups have shown that a remarkable gap exists between the consolidated financial statements and the real information requisites the stakeholders call for in order to safeguard their own interests.

Most investors have indeed felt disappointed with the control instruments, particularly with the quality and the value of consolidated financial statements.

Moreover, specific issues are raised by the fact that these systems have undergone particular development in the non-profit sector – especially social cooperation and development cooperation – which poses further questions

concerning the real capacity in terms of accountability of systems of ethical-social communication.

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CONSIDERATIONS CONCERNING THE EVALUATION AND RECOGNITION OF RISK INSURANCE ACCORDING TO IFRS 4

CONSIDERAȚII CU PRIVIRE LA EVALUAREA ŞI RECUNOAŞTEREA RISCULUI DE ASIGURARE CONFORM IFRS 4

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Abstract. *The adoption of the IFRS 4 has the purpose to implement a common accounting language for the insurance companies, as well as for the sector operators, such as the accountancy problems consultants, auditors, economical-financial analysts, etc. Passing to IFRS does not involve only the accounting area, but has larger objectives that points to the strategic management of the insurance companies as well as the planning of the activities of these kind of societies.*

Rezumat. *Adoptarea Standardului International de Raportare Financiară IFRS 4 a avut ca scop implementarea unui limbaj contabil comun pentru societățile de asigurări, dar şi pentru operatorii din acest sector, cum ar fi consultanții pe probleme de contabilitate, auditorii, analiştii economico-financiari, etc. Trecerea la IFRS nu a rezolvat numai problemele din domeniul contabilității, având obiective mult mai ample care au avut în vedere şi managementul strategic al companiilor de asigurări, precum şi planificarea activității unor astfel de tipuri de societăți.*

The development of the world trade influences significantly the industry of the insurances, due to the appearance and development of the multinational corporations that consider the world as their private market and they try to place their production operations in the countries that offer economic advantages. In the same time, these corporations request cover in insurances valid across the world, which represents a challenge for the industry of the insurances. In this context, the insurance companies must develop their financial capacity and create administrative agreements in order to protect the major values that are exposed to damages. In the same time it is necessary to develop the set of intermediaries in insurances, of the offices of administration of the damage, as well as of the facilities offered by the reinsurance.

The creation of the free zone trade inside EU influences the insurance policy and the risk management through the appearance of the following opportunities and dangers:

- acting on a new market, free and with an important potential of growth of the profit and of the work places

- the possibility of the insurance company from other country to offer its products in all the member states of EU
- creation of the branches or subsidiary companies in all of the member states;
- the potential clients will be able to have access to the foreign insurance products;
- the increase of the competition that can have the effect of lowering of the insurance tariff practiced by some companies when they are very high with no justification;
- the tendency of standardization of the covered risks, the conditions and the terms of the insurance contracts;
- the tendency of consolidation of more European companies of insurance by acquisitions and fusions;

MATERIAL AND METHODS

The purpose of this work is to underline the connection between the management of the risk of insurance, function of its nature and its assessment in the accounting according to the international standard of financial reporting – IFRS 4.

We are trying to show the manner in which certain decisions that must be taken regarding the prevention of the negative consequences determined by a bad analysis, administration and assessment of the risk of insurance can influence the economic and social value of the insurance companies.

The new demands of solvency for the insurance companies based on the risk represents one of the priorities for the European Union, and that is why in this article we aim to show what is the purpose of the monitoring of the solvency of the insurances, one of the main objectives of the management in view of keeping the financial autonomy, the flexibility of the administration, but also support of the decisions for financial straightening in the conditions that is necessary and imposed.

RESULTS AND DISCUSSIONS

The nature of the risk in insurances and its classification

A definition of the mere risk refers to the uncertainty of producing of an event that has as effect a damage irrespective of its nature, excluding the possibility to obtain any earning as a consequence of the occurrence of the mere risk, while the speculative risk refers to the uncertainty that the occurrence of an event that might have as effect either the obtainment of an earning or of a loss. Another classification of the risks involves the manner in which the occurrence of the uncertainty can modify in time.

The static risks are specified to an unchanged environment found in a stable balance (as the natural events: storm, lightning, flood etc.) the dynamic risks are the consequence of the environment modifications such as: social troubles, increase of the degree of technological complexity. These two types of the risks can be a mere risk as well as speculative. Another classification of the risks in insurances divides them into subjective and objective risks. The subjective risks refer to the appreciation of a person whose state of doubt or worry is caused by a given event. In essence the subjective risk

represents the uncertainty of psychological nature that is created out of the mental attitude or the state of a person.

The objective risks are different from the subjective risks by the fact that they can be noticed more precisely and, as a consequence, measurables. Generally, the objective risks represent the probable variation of an event or a state estimated based on the accumulated experience by a person. Also, the objective and the subjective risks are oriented as a priority to the effects of the production of the mere risks, on the persons and businesses.

Sources of production of the mere risks in insurances

The risk regarding the property – any owner or user of mobile or immobile goods is submitted to the damage risk, destruction or robbery, as consequence of the occurrence of some natural events of human actions. The businesses can be affected by the potential losses of goods as consequence of some fires, explosions etc.

The risks regarding the civil responsibility – the persons as well as the companies can be responsible for the damage made to other persons or companies out of their fault. The actions in justice for the damage produced by the third parties, have as result the settlement of some important amount of money, for the compensation of the damaged parties as well as for punishing the ones responsible for that.

As a consequence, the physical persons as well as the companies must give special attention for the identification of all sources of risk of civil responsibility that might appear and assure the necessary measures in order to face the possible damages.

The risks regarding the persons / potential losses with the health of the persons represent the third category of the mere risks; for example the premature death of a person may have as effect, on one hand the loss of a certain amount of income of a family, and on the other hand, the appearance of some expenses for the funerals.

This event has negative consequences on the businesses of a company if it about a person of the top management, whose replacement is difficult to realize. The physical persons as well as the insurance companies are confronted with other risks associated to the health condition, such as the accidents and the illness that involves expenses with the medical treatment.

Methods of the risks assessment

The probability of producing damages - represents the probability in time of appearing of the risk or the relative frequency of production of damages in a period of time. This method applies either for the probability of producing one event, either for a bigger number of events. The probability of producing damage is expressed as the report between the number of the damage and the great probability of appearances and the total number of possible damage in a certain group.

Example: 2500 buildings from a location are exposed to the risk of a landslide. Based on the previous experience it is known that 1000 of them will be affected by this event.

Solution

- probable number of damage =1000
- total number of the buildings exposed to the risk=2500

The probability of producing the damage= the probable number of damage/ the total number of the buildings exposed to the risk = 1000/2500 = 4%

So the probability of the damage productions of 4%

The experience in the insurance sector shows that often there are conditions that have as effect the increase of the probability of production of the damage, in the situation of production of certain events or damages suffered in the case of production of the event, are much bigger that they were estimated.

The degree of exposure to the risk– can be determined as being the sum of the objective risks presented in a given situation, representing the relative variation of the estimated damages.

Notations:

Objective risk = RO;

Probable variation of the estimated damage = VPPe;

Total number of the estimated damages = Tpe;

According to these notations we have the following calculation relation:

RO = VPPe/ Tpe

Example: In the locations X and Y there 25000 buildings, the medium annual average of the fires is of 250 in each location. Based on the statistics we can estimate that for the location X in the following year the fires numer will be between 245 and 255, and in the city Y between 230 and 270. The degree of exposure to the risk (Gexpr) will be determined as follows:

For the location X - GexpR = 255 - 245/100 = 10/100 = 10%;

For the location Y- GexpR =270 – 230/100 = 40/100 = 40%;

The Law of the big figures:

In the case when the calculation of the degree of exposure to risk has no meaning for one objective, this becomes important in the situation of the increase of the number of exposed objectives to the risk.

The Law of the big figures reflects the fact that the loss that is the damage probably estimated is decreased as the number of the unities exposed to the risk increases. As a consequence, the degree exposure to risk decreases as the object exposed to risk increases.

Example: An enterprise X with chemical profile where the people work with toxic has 200 employees. Another enterprise with the same profile has 100 employees. The probability of the damage producing as a consequence of the risk exposure is 30 % in a year for each enterprise. In conclusion for the enterprise X, the total number of damage is: - for the enterprise X–0,30 x 200 = 60.

- for the enterprise Y – 0,30 x 100 = 100.

Based on the statistics, for the enterprise X it was an average of 16 damages per year, and for the enterprise Y an average of 48 damages per year. Applying the method of the exposure risk, we find out that :

- for the enterprise X - GexpR = 16/60 = 0,27 or 27%;
- for the enterprise Y - GexpR = 48/30 = 1,6 or 160 %;

In conclusion, we can notice the fact that the degree of exposure to risk increases, the loss suffered being indirect proportional with the number of objectives in the situation of producing of a risk.

The management of the insurance risk

Risk management is graduating from tehe tactical to the strategic, from tehe craft or sherwd shopping for insurance coverage to the art of balance – sheet makeovers an information age decision – making

In the conditions which the risk sources can be identified, and the caused damages by the production of the risk can be estimated, certain decisions should be taken regarding the way of protecting the persons and the companies against the negative consequences of these risks. The process of the risk management must contain in the first place:

- identification of the risks – the management concentrating generally on the identification of the relevant exposures for the production of mere risks.
- the assessment of the risks- stage where the risks are classified function of the size of the quantum of the damage;
- the selection of the techniques and methods of management of the risk, respectively all the decisions for the administration of the identified risks;
- implementation of the decisions and their periodical review – the techniques and the methods previously selected must be put in practice and reviewed periodically in order to correspond to the possible modifications regarding the nature of the risk, the frequency of its producing, the gravity of the damage estimated.

The economic and social value of the insurance societies. The monitoring of the insurance solvency.

The sum of the funds accumulated helps the insurance company to reduce the maximum possible damage. The cumulated liquidities of the insurers are invested, what allows a better allocation of the economic resources and the increase of the production. The bigger the investment funds are the more available is the capital on the market available at lower prices. The insurance companies can be involved actively in the prevention and decrease activities of the damage; they can contribute to the social stability and of the business environment, through the protection of the business and its persons.

The solvency – constitutes the capacity of the insurance company to face the dues on long and medium term and it depends on the size of the debts as a prioritary objective of the management of the insurance companies, that want to keep their financial autonomy and the flexibility of the administration and results from the balance between the cash of the insurance bonus and the payment flows of the damage. The solvency of the insurance company represents the ratio between the solvency margin that the insurance company disposes of and the minimum solvency margin.

The future activities of the insurer are uncertain, and the purpose of the solvency minimum margin is to guarantee that the insurer has sufficient assets in order to pay the future damage. Function of the ratio between the solvency margin that the

insurer has and the minimum solvency margin that determines the solvency degree of the insurer.

CONCLUSIONS

If after the analysis of the financial reports and of the financial controls made, we can state that it is on the threshold oh insolvency or it has a high risk of insolvency, what endangers the assumed obligations towards the insured, in this case we will request from the Administration Council to constitute and apply a plan of financial straightening that will have to foresee:

- the limitation of the volume of gross and net subscribed bonuses, on a period from 3 months to one year, so that these could not overpass the established values in the decision of opening of the straightening procedure;
- the interdiction of renew the contracts of insurance come to their finality, or as it is the case, of only a few types of insurance contracts established in the decision of financial straightening;
- the insurance company should make the transfer of the portfolio of insurances, totally or partially, under the legal conditions, in case this measure is disposed, the insurer will do the operations regarding the portfolio transfer as emergency in no more that 60 days from the date of the decision;
- the interdiction for the insurance company to make certain investments;
- the restraining of the territorial network of the insurance company by dissolution, under the conditioned of the law, in certain branches and subsidiaries, work units or other secondary locations, as well as the replacement of the significant persons that were identified as responsible regarding the start of the procedure of the financial straightening of the society has been decided.

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ASYMMETRIC INFORMATION, SYSTEMIC RISK AND FRAGILITY IN FINANCIAL MARKETS AND NETWORKS

ASIMETRIA INFORMAȚIONALĂ, RISCUL SISTEMATIC ŞI FRAGILITATEA PE PIAȚĂ ŞI ÎN REȚELE FINANCIARE

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Abstract .*The aim of this research paper is to improve the (mostly) theoretical analysis of several issues related to the role of asymmetric information in financial markets and networks, with special reference to the problems of default, systemic risk and financial crises. The first issue is the one of default and of its role in determining the structure of financial systems and financial networks. From this viewpoint, a key role is played by international institutions (as lenders of last resort) and by central banks. A second research topic are non-market financial organization, based on bilateral relationships among agents. This sort of structure characterizes interbank relations and (at the other end of the spectrum) informal financial networks which play an important role in developing countries.*

Rezumat. *Obiectivul acestei lucrari este îndreptat spre o analizare aprofundată (obiectiv prevalent toretic) a unor aspecte legate de rolul asimetriei sistemului informațional pe piața şi in rețelele financiare, cu referință în special la problematica insolvabilității şi a crizelor financiare. Un prim aspect al cercetării este acela de a analiza falimentul şi rolul acestuia în determinarea structurii sistemelor finanaciare şi al relațiilor financiare internaționale. Din acest punct de vedere, un rol cheie revine instituțiilor internaționale (ca prestatori în ultimă instanță) şi băncilor centrale. Un al doilea aspect pe care ne propunem să-l analizăm, îl reprezintă studierea relațiilor financiare, care se desfăşoară pe piețele non- financiare, bazate pe relațiile directe între entități;astfel de relații caracterizează relațiile interbancare şi rețelele informaționale de creditare, cu rol important în multe țări în curs de dezvoltare.*

The general aim of the papers is to improve our understanding of several issues related to the role of asymmetric information in financial markets and networks, with special reference to the issues of default and financial crises.

Our aim is mainly theoretical: We want to improve our knowledge of some issues which are important for the understanding of financial systems. However, it is possible that some of the analytical tools we plan to develop will have interesting operative applications to the definition of systemic risk. These developments would be more than welcome but are not our main aim.

MATERIAL AND METHOD

Recently, the analysis of default as an equilibrium phenomenon has made impressive steps forward, also because of recent developments in the literature of general equilibrium models with incomplete financial markets. A first aim of the paper is to analyze the phenomenon of overborrowing in models with heterogeneous agents and non-exclusive contracts.

This issue is especially important in international financial relationships because these contracts are typically characterized by limited enforceability. With asymmetric information and non-exclusive contracts there is an important moral hazard problem in international finance due to the role of financial institutions as lenders of last resort. There is moral hazard on both sides: obviously for borrowers, but also for lenders. In fact, given the implicit warranty created by international institutions, lenders may find individually optimal to monitor borrowers below the (socially) optimal level. One of the aims of the research paper is to develop the analysis of this issue, also keeping into consideration its consequences of international capital flows and on financial crises.

Financial crises also affect currency markets. Within the paper, we plan to analyze models of exchange rate determination and to study the role of central banks, also taking into consideration the extremely important empirical results obtained in the last few years exploiting transaction data for currency markets.

RESULTS AND DISCUSSIONS

Financial systems are given by market and non-market institutions, mainly because of the direct relationships among banks and among banks and non-bank agents. A second aim of the paper is to study interbank relations using the tools of network theory and the results of the economic analysis of networks. We intend to analyze from this viewpoint both bank runs and default contagion due to interbanks loans. This second situation can be naturally described as a network where each agent is a node and where a loan relation is described by a link. This allows us to describe a well defined network where agents are not necessarily symmetrically located and this structure can be analyzed using some analytical results of network theory.

On the other hand, several results of the economic analysis of networks will be applied to analyze bank runs. Another example of financial network is given by the network of non-anonymous relationships typically characterizing underdeveloped financial systems or, more generally, financial systems where part of the population can not access organized financial markets. Our aim is to analyze these organizational structures (the typical example is given by Greeman Bank) using the techniques developed for the analysis of games on graphs. Finally, also to fully develop the analytical tools required for these applications, we plan to study some issues in network design and endogenous network formation, especially analyzing the effects of externalities on the network connectivity.

In the last few years, there have been tremendous advances in the analysis of the role, the structure and the micro-structure of financial markets with asymmetric information. They allowed for a much improved understanding of both the canonical anonymous and competitive model and of the direct bilateral financial relationships among economic agents. These developments allowed for a better understanding of many theoretical and empirical issues.

The first issue directly relevant for our research paper is the one of default and of its role in determining the structure of financial systems and international financial relationships.

In the last few years, there have been important advances in the analysis of bankruptcy in competitive economies. Starting with Dubey, Geanakoplos and Shubik (2001), the theoretical literature has considered both pure exchange economies (see, for instance, Bisin and Gottardi (1999) and Bisin and alii (2001)) and production economies (see, Dréze, Minelli and Tirelli (2003)). This kind of competitive models can be extended to study moral hazard problems. It suffices to allow individual agents to default.

Strategic bankruptcy is especially relevant when considering international financial markets, mostly due to the absence of international authorities able to enforce contracts. Generally speaking, the only possible punishments for default are seizure of assets abroad and exclusion from future loans.

There is a quite large literature on strategic default, analyzing (inter alia) its consequences on risk sharing and on the propagation of financial shocks. Kehoe and Levine (1993), Kocherlakota (1995) and Alvarez and Jermann (2000) have shown that perfect diversification of consumption risks across individuals may not be optimal and portfolio may be subject to solvency constraints prohibiting agents from holding large amounts of contingent debt. See also Kiyotaki and Moore (1997).

The concept of strategic bankruptcy is crucially relevant in the analysis of international financial crises and in explaining why capital flows toward poor countries are so small, a fundamental problem in the theory of development.

With respect to financial crises, it is often argued that the role of international institutions (e.g., IMF) as international lender of last resort induces moral hazard: expecting to be bailed out by the IMF, debtor countries have weak incentives to implement good but costly policies, thus raising the probability of a crisis (Meltzer Commission Report (2001)).

Hence, there is trade-off between official liquidity provision and debtors' moral hazard. This trade-off is studied, for instance, in Corsetti, Guimaraes and Roubini (2003), where international financial crises are caused by the interaction of bad fundamentals and self-fulfilling runs by international lenders.

The model has a unique equilibrium where agents have different behaviour according to their private information. Intervention by international institutions, given the fundamentals, may help to prevent liquidity crisis, due to the effect of the possibility of such an intervention on the portfolio policies of private investors. If there is an international institution ready to provide liquidity to a country in troubles, private investors will have a higher degree of confidence in such an economy and this will avoid capital runs.

Given the fundamentals, in general more private investors will be willing to roll over their investments. The influence of such an institution is increasing in the size of its interventions and the precision of its information. A second relevant result is established in Morris and Shin (2002): contrary to the conventional view, official lending may actually strengthen a government incentive to implement desirable but costly policies. This can make financial crises more unlikely and increase the governments' expected net benefits of stabilization policies (Corsetti, Desgupta, Morris and Shin (2002)).

International financial crisis involve also currency markets and movements of the exchange rates. In the last ten years, one of the most active fields of research in

international finance has been the analysis of the relevance of the order flow in determining exchange rates.

The canonical portfolio approach to the determination of the exchange rates is based on the equilibrium of the stocks of the relevant financial activities, currencies transactions per se are irrelevant

With respect to the second issue mentioned above (capital flows toward poor countries are quite small), strategic default can explain why liberalizing financial markets may have little impact on investment in developing countries. However, this assumption lends no immediate support to the idea that restricting capital inflows is beneficial. In general, models where borrowers cannot commit to repay loans are characterized by underinvestment with respect to first best allocations.

Hence, any policy restricting capital movements across countries is unambiguously harmful because it increases the spread between the marginal productivity of capital and the lending interest rate and also because it implies a limitation on the ability to insure investors from country specific risks.

On the other hand, since incentives to default are inversely related to a country's (or an investor's) output (cash-flow or net income), direct transfers to borrowers may be the most obvious welfare improving policy, since this policy increases the borrowers willingness to meet financial obligations, thereby raising investment.

However, the idea that international capital flows and direct financial transfers to developing countries should be stimulated as much as possible is challenged by a growing number of economists and policymakers.

The recent recessions and financial crises experienced by countries that have undergone substantial liberalizations in the past ten years have lead some to advocate capital controls and the development of a domestic financial market.

Overborrowing in a model with strategic default may actually occur when agents are able to borrow from multiple creditors under asymmetric information. It is often observed that entrepreneurs or governments are financing their papers by raising funds from different lenders simultaneously.

This problem is not exclusive to international financial markets. Non-exclusivity of financial contracts is an empirical fact and it is analyzed in a, by now, large literature. In general, contract non-exclusivity is a source of inefficiency in the presence of incentive problems, since it generates externalities across lenders. For instance, examining the case of sovereign risk where LDC countries borrow in a competitive international credit market, Kletzer (1984) shows that, when lenders are unable to observe the borrowers' total indebtedness, competitive equilibria may be inefficient (with respect to a second best) and characterized by relatively high rates of interest and lending. Incentive problems caused by limited commitment are not relevant just for international financial institutions. It is well known that, in developing countries, banks face very high insolvency rates and are often unable to observe the borrowers' balance sheet and their contractual obligations.

In these countries, the coexistence of formal and informal financial arrangements is a well documented phenomenon, where the informal sector includes credit cooperatives and associations, moneylenders and extended families (see Arnott and Stiglitz (1991), Stiglitz (1990), Besley and Coate (1995), Banerjee, Besley and Guinnane (1994)).

Network design has traditionally been studied as a problem of efficient internal organization of large economic units in the presence of complex informational processing needs. Recent works by Demange (2003) and Currarini (2003a, 2003b) have shown that new and interesting design issues emerge once the stability of the network is considered as the objective of design, and when spill-overs across organizations are possible.

These papers view the formation of economic networks as a game in which agents establish and sever links with the sole objective of maximizing their individual payoffs. Both papers highlight the possibility of a conflict between equilibrium and efficiency, in both a dynamic and a static framework.

The efficiency-stability conflict has been the object of a series of more recent papers, trying to characterize conditions under which this conflict would disappear. In particular, Currarini and Morelli (2000) have shown that letting agents bargain over payoffs at the same time as they establish links leads to efficient equilibrium networks in a large class of economic situations. However, bargaining over links does not seem to be sufficient for efficiency when spillovers are present. As shown in Currarini (2004), agents may fail to form the efficient network because of the distortions caused by spill-overs on the incentives to form and delete links.

These advances in network theory are important for the analysis of financial structures, mostly with reference to two different issues:

A. non-market structures, which can be analyzed using network theory, may be more efficient than markets in preventing opportunistic behaviour. Networks, based on non-anonymous and long term relationships, can use more effective sanctioning systems, which might not be available to banks and large financial institutions. This view is based on the assumption of peer monitoring (Stiglitz, 1990). For instance, the success and the social desirability of the financial contract of group lending may ultimately depend on the type of social structure that characterizes the community from which groups of borrowers are drawn (Besley and Coate, 1995).

B. network structures play an important role in the banking sector, too. Inter-bank networks affect the degree of liquidity of the system, the amount of risk run by individual bank and the possibility of disruptive bank runs. Network theory can have an important role in the analysis of systemic risk, i.e., the risk of contagion of default among banks. In the literature there are several definition of systemic risk (a recent survey is in De Bandt and Hartmann (2000)).

CONCLUSIONS

Network theory and the results of the economic analysis of networks can also be applied to the analysis of some of the issues mentioned above. Economic theory has recently devoted an increasing attention to the emergence and the functioning of non-market institutions.

This interest is partly motivated by the failure of decentralized markets to generate efficient allocations of resources in the presence of various kinds of imperfections. Moreover, by the empirically observed importance of many kinds of non-market arrangements, in particular in the early stages of development. Non-market institutions typically involve non-anonymous interpersonal relations.

These relationships, the way in which they emerge and their role for socio-economic outcomes, are the object of a large literature that studies networks and groups.

The theoretical theory of networks has traditionally followed two main lines of research. One direction has considered the network as given and unchangeable by economics agents, and has studied the actions taken by agents embedded in the network and the design of architectures that are desirable on efficiency or equity grounds. Another line of research views the network as a structure generated by economic agents via voluntary acts of link formation. Here the objective is determining which network structures form in equilibrium, and assessing whether equilibrium structures satisfy various desirable properties, such as efficiency.

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PERSPECTIVES OF HARMONIZATION OF ACCOUNTING IN SMALL AND MEDIUM ENTERPRISES: THE EFFECTS OF INTERNATIONAL ACCOUNTING STANDARDS AND OF BASEL 2

PERSPECTIVELE DE ARMONIZARE A SITUAȚIILOR FINANCIARE ALE IMM-URILOR, PRIN PRISMA STANDARDELOR INTERNAȚIONALE DE RAPORTARE FINANCIARĂ IAS/IFRS ŞI ACORDULUI BASEL 2

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Abstract.*The aim of this research is to identify the real disclosure needs for Small and Medium size Enterprises investigating the reasons that could lead to a rise in the disclosure other than juridical ones (in particular, fiscal obligations and state financing).*

Many recent academic researches show an increasing interest toward SMEs, both for their relevance into the national economic system, as for their specific features in terms of ownership structure, skills in fund raising, corporate governance models and financial disclosure.

Rezumat. *Obiectivul acestei lucrări este acela de a înțelege care sunt exigențele efective de comunicare a întreprinderilor mici şi mijlocii, investigând motivațiile care pot sta la baza implementării unui sistem informațional transparent, dincolo de exigențele juridice, în special cele cu privire la obligațiile fiscale şi accesul la instrumentele de finanțare preferențiale, pentru a putea prezenta care sunt beneficiile rezultate de aici. Mai multe cercetări recente pe plan internațional prezentau un interes crescut al specialiştilor față de IMM-uri, atât în ceea ce priveşte contribuția lor în contextul național, dar şi pentru particularitățile lor din punct de vedere al structurii proprietății, accesul la sursele de finațare, modelelor de guvernață şi"disclosure".*

Basle 2 agreement pushes international SMEs, predominantly family business, towards wider and deeper accounting information, in order to make the banks able to value their rela economic condtions for leans.

In other words, we will try to understand how and with what intensity this change will affect SMEs behaviour regarding the degree of transparency in accounting information, to obtain the concession of credit from the banks.

The research group will examine, therefore, the impact that the prospective introduction of international accounting standards for SMEs could have on their external financial communication and on their ability to obtain credit with the introduction of Basle 2.

MATERIAL AND METHODS

The aim of this research article is to understand the real disclosure needs, the rules and the models for SMEs financial disclosure and auditing's systems, to estimate the adaptability of many instruments of business economic analysis for grater enterprises to SMEs – as well as IFRS, IAAS, CoSO Report - and to examine its potentials impacts on financial disclosure. The group of research will elaborate possible solutions interacting with national and international standards setters.

RESULTS AND DISCUSSIONS

The necessity to create effective instruments for small and medium size enterprises is felt in a strong way since the SMEs external information has become object of important attention in the international harmonization process by the IASB that, in the 2004, has emitted a Discussion Paper to collect opinions and to evaluate the opportunity of accounting standards for SMEs and its possible role which standard setter in this field ,and by the Basil 2 agreement. In particular, the sub-objectives of this research are the followings: The analysis, therefore, will be concentrated on the characteristics of the internal and external auditing systems implemented in the great enterprises to propose a possible model of internal and external auditing systems for SMEs.

This analysis will be concentrated on the aspects that engrave on the competitive and development opportunities both SMEs and advisers and auditors ("small practitioners"), considering the costs generated from the necessities of adjustment of the internal control and auditing systems. It will make particularly reference to the United States, where the Sarbanes-Oxley Act has deeply modified the internal control systems and the responsibilities of enterprises and managers, and to the United Kingdom, that constitutes a benchmark for the governance and reporting mechanisms.

Estimating in specific way, in the light of the outcomes of the comparative analysis of such different international reality, the main points of weakness of the accounting standards, auditing standards and the models of control finding during the research. The attention will be paid on the functional interdependence between these last ones, to evidence the elements of convergence and those of dyscrasia, and also the possible solutions to obtain models and rules by wich SMEs could pick the propulsive thrust to the increment of competitiveness supported by the international contingency.

Although the phenomenon has international importance, the experience of National SMEs may be considered a particularly significant reference in order to understand, explain and analyze the phenomenology in general, the informative issues (economic and financial communication) and the control (including the auditing). On the other hand, it cannot be overlook that the control systems are been born and developed in the countries of Anglo-Saxon matrix. From that the interest in analyzing the state of the art of the control activities that put into effect in small and medium entities of other countries. The substantial insufficiency of

international literature on the SMEs will give indispensable to uses mechanisms of direct contact with academics and organizations of these countries, to integrate the theoretical-general understanding of the studied phenomena with the experince.

Hence, financial reporting of SMEs seems to be strongly influenced by the "family effect" reducing both its internal and external communicational skills. Recently, it has been pointed out how, also from an historical perspective, family firms' financial statements have been tailored according to the owners' needs and their accounting knowledge (Mussolino, Pugliese, Viganò, 2004), pointing out the necessity of a more suitable individualization of economic amounts and events that mainly concern the stakeholder of thr SMEs.

An important attention to the phenomenon is present in traditionally more sensitive to the requirements of the greater enterprises countries: the United States (in the 2000 there are SME's 21 million) and the United Kingdom (in the 2003 there are SME's two milion.(IAPC, 1989; APB, 1996).

About 1970s, the American Institute of Certified Public Accountants instituted a board (Committee on Generally Accepted Accounting Principles for Smaller and/or Closely Held Businesses) to investigate the "standard overload" matter, trying to find out an alternative solution to the high number of rigid and too detailed rules also issued to both Big and Small-Medium-sized Entities. Later, the Financial Accounting Standard Board – who established a special board (called Small Business Advisory Committee, SBAC) – often took part in this debate many times issuing specific accounting documents in order to reduce the informational costs for different typology of firms.

Indeed, after the introduction of the International Financial Reporting Standards as principal accounting source for UE listed companies, the International Accounting Standard Boards has a great interest to extend its accounting standards to the European Small and Medium-sized Enterprises in order to strengthen its position in this large market. On the other hand, there is a strong demand for an accounting harmonization through the IASB documents not only for the listed companies but also for the Small and Medium-sized Enterprise finacial entreprises.

In this way, it would increase competitive abilities of SMEs being comparable with greater dimensions enterprises thanks to international generally accepted principles (simplified for SMEs), not only against the companies of equal dimension but also and above all with the great enterprises, in sector level and in to take up a loan.

The maintenance of a renewed competitiveness is tied up to the reliability of the information that the enterprise supplies to stakeholders.

Such reliability is assured by the role carried out by the internal and external control systems that, in their development, have widened their range with processes addressed to assure the effectiveness and the operating efficiency of the enterprise and the individuation of errors or fraud. (Root, 1998; Baraldi, Shovel, Zanigni, 2004; Comoli, 2002; Salvioni, 2004; Tettamanzi, 2003; Zanda, 2002).

From here the interest on how these control systems, created and developed in the countries of Anglo-Saxon matrix and modelled on the characteristics of the great enterprises, are suitable to SMEs, on how much they are open to influence from the introduction of new accounting standard or on how much they would be affected by the implementation of the harmonization process.

At international level, the IAASB (International Auditing and Assurance Standards Board) is discussing within IFAC (International Federation of Accountants), on the standard adaptation to the requirements of small audit practices of smaller dimensions enterprises. The currently practiced solution is the insertion guidance in every standard. The IFAC has created a permanent Task Force that sponsors the interests and the requirements of small practicing, and it give opinions to various publishes documents from the IFAC's technical committees, for example the Ethics and the IAASB. Moreover, the CNDCR's "Commission for the Audit Principles", in 2004, has approved ISA1005 "Considerations on SMEs Auditing" to the aim to evidence as the auditing in SME's demends particular considerations.

It seems useful to emphasize that the main motor of the requirement of a change in the state of the art of SMEs controls has been the Basel 2 that, fixing minimum patrimonial requirements and the coverage of various kind of risk to which the bank is exposed, emphasizes the necessity for the credit companies to adequately estimate the risk resulting from the reliability of the opposite parties (the customers) and the operating risk connected to the inadequacy of the procedures, the human resources and the internal systems.

In this way, fixing duties and engagements for the banks, the Agreement introduces considerable repercussions on the enterprises, because pondering the banking risk will fall back just on these last (customers) through instruments of rating bound to financial, economic and patrimonial requirements on which base the possibilities of access to the credit, reproposing the central position of the balance sheet and the internal and external control activities, in the within of the appreciation of the credit merit of the enterprises. (Oldani, 2004; Lenoci, 2003;)

The integrated communication takes on a new value for SMEs because, on the same conditions of default's risk, the lack of reliable information could place them in worse classes of rating with consequent possibility to increase the costs of the financings or quite to look at itself excluded from the access to the credit. These circumstances assume greater importance if we take into consideration that in some contexts, among which Italy, the undercapitalization of the enterprises and the elevated debit share supplied from the banking system confirm the problems of the existing relationship between the banks and the SMEs. Moreover, the variety and the complexity of the business risk (strategic, financial, operative, technical productive), require a structure of corporate governance, the presence of dedicated business functions, the use of appropriates methodologies of risk managemnt(Pogliani, Valdani,Best, 2004).

Therefore in the last years, under the push of an increasing sensibility towards the topic, it has been assisted to the birth and the development of models

of internal control systems (CoSO Report, ERM) and of the activity of internal auditing (IIA, AIIA) that, operating in complementary sense to the activity of external auditing, generate sure benefits for the companies.

Therefore, the indications of Basel 2 push the companies to equip themselves with an integrated and effective approach in the surveys, evaluations and monitoring of the complex of the business risks able to supporting the timely identification of the necessary ones corrected (Doherty, 2000) to improve the handling of capital, to stabilize the profit and to guarantee to the market and to the control authorities the necessary information on the profile of risk of the company.

A different situation is more likely to be modified under the strong influences of the new accounting standards (IASB) and the "Basel 2 Agreement" which will affect both the financial statement structure and the evaluation criteria of items in the SME's financial reports.

Pressures raising from a new global market and the chance of reducing asymmetric information with external financers (thus reducing the cost of capital) will increase the SMEs' attitude towards a financial statement as a mean of „economic"information vehicle.

CONCLUSIONS

In conclusion, the understanding of the SME stakeholders' informational needs and an analysis of the consistency of these needs with the international accounting standards become evidently important and justify a need for a research in this field.

On the other hand, the active role of the Standard Setters in this debate is a clear sign for the importance of this paper in the management of national Firms. the European enterprises; according to the new "credit score models" of banks, pricing system of external debt will rely upon financial and economic ratios of the balance sheet and income statement However, the social-political-economical differences among European countries require some remarks about the adaptability of the International Accounting Standards to the productive situation of the European SME.

In particular, some observations have to be made on the SME national family business, as well as a change of mind about the control that in the SMEs are no more justified from the reduction of agency costs (because the Principal coincides with the Agent) and therefore must find a their own theoretical position, of the models and the rules in line with the peculiar necessities of the entreprises of smaller dimension.

It's widespread opinion that the external informative and the control system of SMEs cannot be considered just as a streamline in the accounting of the large firms. It needs to be rebuilt according to their specific features of SMEs. IASB also recognized those differences, still taking into consideration whether or not it is necessary to build up a specific accounting system for SMEs.

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THE DIAGNOSIS AND EVALUATION OF THE ECONOMIC RISK (OPERATING RISK) IN THE ECONOMICAL ACTIVITY OF THE ENTITIES

DIAGNOSTICUL ŞI EVALUAREA RISCULUI ECONOMIC (DE EXPLOATARE) ÎN ACTIVITATEA ECONOMICĂ A ENTITĂȚILOR

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Abstract. *The diagnosis based on the data from the profit and loss account is not the only possibility to assess the performance of an enterprise, based. There is also a fundamental analysis model, based on the structure of expenses (variable and fixed) in relation to the turnover, a model that will allow the evaluation of the economic (operating) risk of the enterprise. The economic activity of an enterprise obviously requires the existence and the manifestation of the economic operating risk, as a consequence of the fact that one cannot accurately correlate and anticipate the elements of the due result of the operating activity (quantity, cost, price) with the elements of the operating process (supply, production, sales). In other words, the operating risk represents the probability that the income generated by the operating activity may not cover the expenses involved in the process, as a result of their structure. Therefore, risk does not depend only on general factors, but also on the structure of expenses, on their behaviour given the volume of activity respectively, behaviour that influences yield, thus triggering a leverage effect on the result of the operation.*

Rezumat. *Diagnosticul pe baza datelor din contul de profit şi pierdere nu este singura posibilitate de apreciere a performanţelor întreprinderii, existând un model de analiză fundamentat pe structura cheltuielilor (variabile şi fixe) în raport cu cifra de afaceri, model care va permite aprecierea riscului economic (de exploatare) al întreprinderii.Activitatea economică a unei întreprinderi presupune în mod evident, existenţa şi manifestarea riscului operaţional economic (de exploatare), ca urmare a faptului că nu se pot corela şi anticipa cu certitudine elementele rezultatului aferent activităţii de exploatare (cantitate, cost, preţ) cu elementele procesului de exploatare (aprovizionare, producţie, desfacere). Cu alte cuvinte, riscul operaţional reprezintă probabilitatea pentru care veniturile degajate de activitatea de exploatare să nu acopere cheltuielile implicate în acest proces, ca urmare a structurii acestora. Aşadar, riscul nu depinde numai de factorii generali, ci şi de structura cheltuielilor, respectiv de comportamentul acestora faţă de volumul de activitate, care influenţează în mod determinat rentabilitatea , realizând un „efect de levier" asupra rezultatului exploatării.*

The risk of economic activity or operating risk is in fact the risk determined by a slowing down of the operating (production) yield and it essentially depends on the grouping of the production expenses into fixed and variable expenses and their correct assessment. Economic risk is connected to the structuring of the

operating costs (into fixed and variable costs) and directly depends on the higher or lower weight of the fixed expenses in the total expenses.

MATERIAL AND METHODS

The activity of an enterprise is subject to economic (or operating) risk since it cannot accurately predict the different components of its result (cost, quantity, and price) and of the operating cycle (purchases, processing, sales). By the nature of its activity and its position in the economic environment, the results of the enterprise are influenced by a series of economic-social events: the rise in the energy price, an increase in salaries, the increase in competition, technological advances, etc. Starting to this consideration, in this paper, I tried to explain the importance of the risks concerning the deploy of the any economical activity, witch obviously requires the existence and the manifestation of the economic operating risk. The risk does not only depend on the general factors (sale price, cost, turnover) but also on the structure of the costs, on their behaviour as related to the volume of activity, respectively.

RESULTS AND DISCUSSIONS

The flexibility and sensitivity degree

The flexibility degree depends on the technical potential of the enterprise, on the human potential, as well as on its organisational structure. The fluctuation will be better mastered by the economic agent as the latter displays a high degree of flexibility. Therefore, the risk of the economic activity expresses the volatility of the economic result in the operating conditions. The sensitivity degree of the economic result makes every enterprise a more or less risky investment.

The break even analysis

The cost-volume-profit analysis is a means of measuring risk, also called the break even analysis. The break even analysis became an operating and effective method to evaluate risk in the financial analysis.

Linked to the marginal analysis, the use of the break even (or the balance point diagram) is a highly efficient instrument for outlining both the dependence of the business volume on the production costs and the income gained by the enterprise – or the losses it suffered – in relation to the different volumes of sales.

By pointing out the correlations between cost, price and volume of sales, the break even analysis allows the explanation of certain aspects related to:

- the relative importance of the different categories of costs;
- the way in which these costs vary depending on the volume of production;
- also the means to control these fluctuations;
- the anticipation of the influences generated by the structure changes of production, prices and costs on the profitableness of the enterprise;
- the establishment of the production capacity necessary to reach maximum yield;
- the chance to accept or refuse contracts of a certain nature or importance, etc.

The calculation of the break even essentially leads to the establishment of the minimum production volume or of sales from where an enterprise must start to make profit. Moreover, one can also identify the maximum recommended volume production must be expanded to in order to maximise profit, in relation to the production capacity or the investment made. The break even is an instrument that measures the flexibility of the enterprise in relation to the fluctuations of its activity and it is therefore a method to measure risk. Also called "critical turnover" or "operating break even point", the break even is the moment when the turnover covers the operating expenses and the result is null. After this moment, the activity becomes profitable.

The French literature defines the critical/breakeven point (balance point) as „point mort" or „l'analyse du seuil de rentabilité", and the English literature defines it as „break-even", defining the notion of expenses as the sum of the variable expenses due to the volume of activity and the total fixed expenses.

Using the break even point as an instrument to assess risk involves the proper command of the calculus methodology and its cognitive value. In order to analyse this instrument in risk analysis, one must properly know the methodology of calculating the break even, as well as its informational value. The break-even point calculation and analysis methodology differs depending on the following situations:

a) the study is conducted for a single product or a group of products;
b) the study is conducted for the entire activity of the enterprise.

The breakeven point analysis methodology for mono-productive enterprises or when we refer to a single product (group of products) relies on the following implicit hypotheses:

- the price for the production factors cannot be influenced;
- the price of the goods produced and sold cannot be influenced;
- fixed expenses do not vary in time;
- the variable expenses are not proportional to the level of activity.

Therefore, the only lever that can be triggered in the enterprise in order to diminish the effects of the operating risk and to increase yield is the level of activity.

a) **The break even for a single product or a group of products** can be established in physical or value units or in number of days.

For the enterprises that produce and sell a wide range of products, with different costs and prices, the calculation of the break even and its informational value are conditioned by the organisational structure of the expenses and especially the distribution pattern of the fixed expenses. The break even in physical units is operating for mono-productive enterprises.

For the enterprises that manufacture a single product, *the physical units break even* is established starting from the hypothesis of a constant variable cost (v = ct) in relation to a growth in the volume of production. This means that regardless of the physical volume of production sold (Q), the variable expenses per product unit are constant while their total volume varies (CV).

$$\mathbf{CV = v \times Q}$$

Similarly, we also start from the hypothesis of the constancy of the unitary sale price (p), regardless of the volume of sold physical products (Q). In other words, the market absorbs the entire production at the same price.

$$\mathbf{CA = p \times Q}$$

Based on these hypotheses, *the break even*, which represents the physical volume of the production sold which covers the total expenses (fixed expenses +variable expenses; CT = CF + CV) and the result of the operation is null (RE = 0), is established as follows:

$$CA = CT$$

$$RE = Ø$$

$$CA = CV + CF$$

$$(p \times Q = v \times Q + CF$$

$$p \times Q - v \times Q = CF$$

$$Q_{PR} = \frac{CF}{p - v}$$

where:

Q_{PR} - the physical volume of the production sold in order to reach the break even (PR);

p – v – the unitary margin on variable expenses (MCV) or the gross margin of accumulation per product unit.

Results in:

$$Q_{PR} = \frac{CF}{MCV}$$

In order to determine the *break even in value* units, the enterprises that manufacture a single product multiply the break even in volume (Q_{PR}) with the unitary sale price (p), resulting in the following equation:

$$p \times Q_{PR} = \frac{CF}{MCV} \times p$$

but

$$\frac{MCV}{p} \times 100 = R_{MCV}$$

where
R_{MCV} – the margin rate on the variable cost
results in:

or

$$CA_{PR} = Q_{PR}$$

$$CA_{PR} = \frac{CF}{RMCV}$$

According to the last equation, the break even represents the value of the turnover for which the sum of the fixed expenses equals the absolute margin on the variable cost. The establishment of the break even in the decisional process is of particular interest as it signifies the calendar date when break even is reached.

$$PR_{days} = \frac{CApr}{CArealizată} \text{ x } 360$$

The break even analysis on products reveals the profit and the yield rate for each sort, as well as the path to take in order to increase this rate.

b) ***The break even analysis for the entire activity of the enterprise*** is conducted for a large range of products.

For heterogeneous production, on the level of diversified production respectively, the break even is measured by means of value indices:

Critical turnover (CA_{CR}):

$$CA_{CR} = \frac{CF}{1 - \frac{CV}{CA}}$$

where:
CF - sum of fixed expenses;
CV - sum of variable expenses
$\frac{CF}{CA}$ - variable expenses for 1 leu turnover:

The use of the manufacturing capacity at critical point (G_{CR}):

$$G_{CR} = \frac{CA_{CR}}{Qmax} \text{ x } 100$$

where:
Q_{max} = the manufacturing capacity expressed in value units;

Critical time period (T_{CR}):

$$T_{CR} = \frac{CACR}{\frac{CA}{T}}$$

where:

$\frac{CA}{T}$ – average turnover per time unit (day, month, year)

The indices presented above are thus calculated in the hypothesis of a linear activity, without considering the seasonal factor.

In practice, enterprises often record a seasonal trend of income, as the turnover varies form one time period to another during a financial exercise. Thus, the break even point will be established in relation to the moment when the gross margin on the cumulated variable expenses covers the fixed annual expenses.

CONCLUSIONS

Knowing and anticipating the risks and the effects they generate is a fundamental prerequisite of success in business and, implicitly, indispensable instruments for the effective management of any enterprise.

The operating risk also represents the impossibility of the enterprise to adapt in time and at the lowest cost to the changes in the environment. The economic risk evaluates the possibility of recording (gaining) an insufficient result or even some losses.

The quantification of the risk and the company uncertainty, as well as the determination of the influences that they have over the economical phenomena, represent a permanent problem for the decision factors which coordinate the activity in companies. It is obvious that the decisions are fundamental and pertinent, when the one who adopts them, as well as those who apply them, are well informed and capable of mastering the effects of change in a satisfactory way.

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ANALYSIS OF THE AGRICULTURAL BRANCHES, CROP AND ANIMAL PRODUCTION IN VRANCEA COUNTY

ANALIZA RAMURILOR AGRICULTURII, VEGETALĂ ŞI ZOOTEHNICĂ, DIN JUDEȚUL VRANCEA

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Abstract*:The research performed focuses on the analysis of agriculture branches, crop and animal production in Vrancea county on the basis of some specific statistical indicators. Vrancea county comprises 5 towns of which : 2 municipalities, 68 communes and 331 villages according to the data from the Statistical Yearbook of Vrancea county. The analysis of the scientific experiment covers a period of 12 years (1995-2006) and is based on a series of specific characterizing indicators: the number and structure of main crops and livestock.In 2006 the total area of Vrancea county was of 485.703 ha, out of which 255.666 ha (52,63%) represents the agricultural area. This one has the following structure: 148.084 ha arable land (58%), 27.209 ha vineyards (11%), 3.836 ha orchards (1%), 27.209 ha hayfields (13%) and 32.777 ha pasture (17%). From the point of view of property, the agricultural area had the following structure on 31.12.2005: 97,66% private property and 2,34 % state property. The agricultural-economic context of Vrancea county favors crop cultivation and livestock breeding. During the studied period for these fields of activities an increasing trend was observed. The present project presents the of activity with livestock and crop yield decrease.*

Rezumat. *Cercetarea întreprinsă îşi propune analiza ramurilor agriculturii, vegetală şi zootehnică, din judeţul Vrancea pe baza unor indicatori statistici specifici. Judeţul Vrancea are în componenţă 5 oraşe, din care: 2 municipii, 68 de comune şi 331 de sate conform datelor existente în Anuarul Statistic al Judeţului Vrancea. Analiza demersului ştiinţific acoperă o perioadă 12 ani (1995-2006) şi este bazată pe o serie de indicatori specifici de caracterizare: numărul şi structura principalelor culturi şi a efectivelor de animale, producţia agricolă animală şi vegetală. Suprafaţa totală a judeţului Vrancea era în anul 2006 de 485.703 ha, din care 255.666 ha (52,63%) reprezintă suprafaţa agricolă..*

Aceasta se structurează astfel: 148.084 ha teren arabil (58%), 27.209 ha vie (11%), 3.836 ha livadă (1%), 27.209 ha fâneţe (13%) şi 32.777 ha păşuni (17%). Suprafaţa agricolă, din punct de vedere al proprietăţii, la 31.12.2005, a fost structurată astfel: 97,66 % domeniul privat şi 2,34 % proprietatea statului. Arealul agro-economic al judeţului Vrancea prezintă condiţii favorabile pentru cultivarea plantelor şi creşterea animalelor. În perioada analizată s-a constatat o tendinţă de creştere a producţiilor acestor ramuri. Lucrarea prezintă cauzele care au manifestat tendinţa de descreştere a producţiei vegetale sau animale.

MATERIAL AND METHODS

Statistical specific indicators for Vrancea county were used. As sources of information we resorted to the Statistical Yearbook of Vrancea County for 2006, the Statistical Vrancea County Department, and other direct studies performed. The comparison and statistical data analysis methods were used for this scientific project.

RESULTS AND DISCUSSIONS

Table 1

The evolution of total land fund according to size and structure (hectares)

Year	Total land	Agricultural land		From which:				
		ha	%	Arable land %	Pastures %	Hayfields %	Vineyards %	orchards %
1995	485703	255284	100	57,50	16,69	12,74	11,25	1,82
2000	485703	255454	100	57,76	16,82	12,94	10,90	1,58
2002	485703	255601	100	57,90	16,87	12,91	10,79	1,53
2004	485703	255658	100	57,92	17,00	12,90	10,68	1,50
2006	485703	255666	100	57,93	17,10	12,82	10,65	1,50

[Source: http://www.vrancea.insse.ro/] - processing dates

Analyzing the data about the evolution of total land fund according to size and structure, a slight tendency towards increase was noticed during 1995-2006. During this period the agricultural area grew with 382 ha. Some increases were also registered at the level of arable use (with 0,43%), pastures (with 0,41 %), and hayfields (with 0,08 %) disadvantaging vineyards and orchards.

In 2006, the agricultural area of Vrancea county was of 255.666 ha : arable land – 148.111 ha (57,93%), pastures – 43.719 ha (17,10 %), hayfields – 32.777 ha (12,82 %), vineyards – 27.236 ha (10,65 %) and orchards – 3.823 ha (1,50%) (Fig.1).

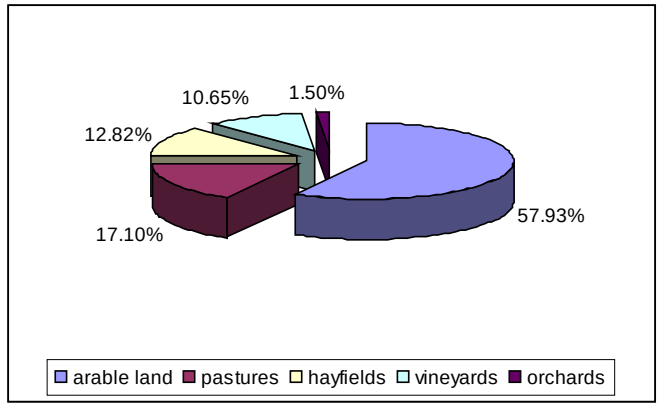

Fig. 1 – **The structure of total land fund by use in 2006**

Table 2 shows the cultivated area with the main crops for Vrancea county, during the period 1995-2006. For most of crops the cultivated land diminished in 2006 in comparison with 1995, except for oilseed plants which increased with + 38,43 percent .

Table 2

Cultivated area by main crops (hectares)

Year	1995	2000	2002	2004	2006	2006/1995 %
Cereals for grains	114535	107555	112603	114176	91961	**80,29**
- Wheat and rye	31676	26148	39017	29748	20156	63,63
- Barley and two-row barley	3194	4292	4455	3108	3320	103,94
- Maize grains	78569	75890	67764	79628	66820	85,05
Potatoes	1859	2048	2106	2024	1847	99,35
Sugar beet	1395	836	392	18	40	2,87
Oilseed plants	9262	11100	10577	11633	12821	138,43
Vegetables	4796	6038	5934	5797	539	11,24

[Source: http://www.vrancea.insse.ro/] - processing dates

Arable land is part of the higher category and represents the majority of agricultural land area, namely 57,93%. Table 3 shows the structure of cultivated areas by main crops.

Table 3

Cultivated area by main crops (hectares) - % from arable land

Specificare	1995	2000	2002	2004	2006
Cereals for grains	78,03	72,89	76,08	77,11	62,09
- Wheat and rye	21,58	17,72	26,36	20,09	13,61
- Barley and two- row barley	2,18	2,91	3,01	2,10	2,24
- Maize grains	53,53	51,43	45,78	53,78	45,12
Potatoes	1,27	1,39	3,12	1,36	1,25
Sugar beet	0,95	0,57	0,26	0,01	0,03
Oilseed plants	6,31	7,52	7,15	7,85	8,66
Vegetables	3,27	4,09	3,76	3,55	3,64

[Source: *Anuarul Statistic al Județului Vrancea 2006*] – processing dates

According to the data analyzed, during the period 1995-2006, the majority is represented by cereals for grains with 78,03% in 1995 and 62,09 % in 2006. A clear decrease of 15,94 % can be observed, which has a positive side, taking into account the unbalanced structure of crops. This fact influences economic outcomes and gives the possibility of performing a balanced rotation of crops in order to comply with agro-technical requirements.

Three categories of factors are involved in agricultural yield: natural, economic and social ones and the results obtained – from the pint of view of quantity, quality and economic efficiency – are directly proportional with the manner in which these three factors are harmoniously combined.(1, 1998)

Crop yield situation of Vrancea county is illustrated in Table 4.

Table 4

Crop yield by main crops (tons)

Year	1995	2000	2002	2004	2006	2006/1995 %
Cereals for grains	284990	182617	240621	419478	277985	97,54
- Wheat and rye	89280	60010	53142	87833	50998	57,12
- Barley and two- row barley	14181	10923	6303	7445	5546	39,11
- Maize grains	179584	110712	180036	320689	218890	121,89
Potatoes	20134	16122	23317	27936	44111	219,09
Sugar beet	27837	7401	5630	419	1200	4,31
Sunflower	12096	11013	8830	20573	18517	153,08
Grapes	272422	243189	231085	317658	166238	61,02
Fruits	27411	33485	30962	46970	67323	245,61

[Source: *Anuarul Statistic al Județului Vrancea 2006*]

Comparing 2006 with 1995 an increase tendency is observed for the following crops: maize grains (with +21,89 percent), potatoes (with -119,09 percent), sunflower (with +53,08 percent) and fruits (with +145,61 percent). For the other crops (cereals for grains – wheat and rye, barley and two row barley, sugar beet and grapes) in 2006 compared with 1995 a decrease tendency was registered.

Table 5

Livestock (heads)

Year	1995	2000	2002	2004	2006	2000/ 1995 %	2006/ 2000 %
Cattle	65474	56736	57087	57790	62448	86,65	110,06
Swine	104337	48371	50331	87448	81130	46,36	167,72
Sheep	208772	155263	148682	138604	160869	74,37	103,61
Goats	22865	13843	16070	13921	21204	60,54	153,17

[Source: *Anuarul Statistic al Județului Vrancea 2006*] – processing dates

During the period 1995-2000 a decrease trend was demonstrated: for cattle with -13,35 percent, swine with -53,64 percent, sheep with – 25,63 percent and goats with – 39, 46 percent.(Fig. 2).

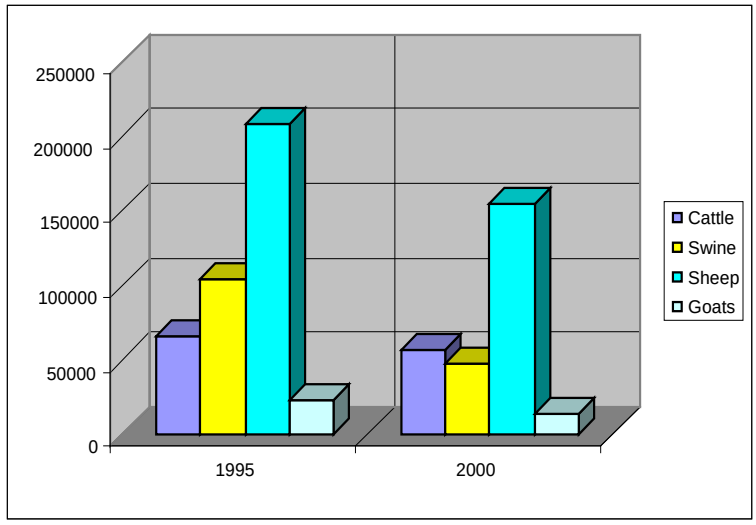

Fig. 2 – Livestock for Vrancea county during the period 1995 -2000

During the period 200-2006 an increase in livestock number was recorded: for cattle with + 10,06 percent, swine with +67,72 percent, sheep with +3,61 percent and goats with +53,17 percent.(Fig. 2)

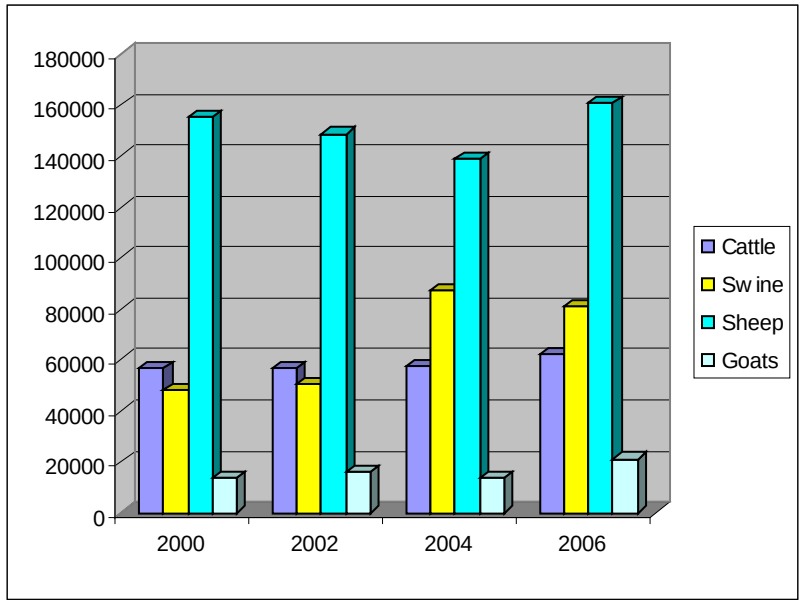

Fig. 2 – Livestock for Vrancea county during the period 2000 -2006

Table 5 shows the evolution of livestock production during 2001-2006 and the increase or decrease tendency of livestock yield for 2006 in comparison with 2001.

Table 5

Livestock yield

Year	2001	2002	2004	2006	2006/ 2000 %
Meat – total of which (tons):	31500	25500	28433	23378	74,22
Beef (tons)	7249	5334	6701	4752	65,55
Pork (tons)	6300	6800	7744	6250	99,21
Mutton and Goat meat (tons)	1812	2082	3551	1815	100,17
Poultry meat (tons)	16138	11233	10425	10558	65,42
Milk (hl)	1061,7	1065,7	1173,7	1329	125,18
Sheep and Goat milk (hl)	992,8	996,8	1082,0	1180	118,86
Chicken eggs (thousand pieces)	142,7	142,7	170,4	172	120,53
Extracted honey (tons)	240,6	297,1	330,2	181	75,23

[Source : *Anuarul Statistic al Județului Vrancea 2006*]

CONCLUSIONS

According to the data analyzed, during the period 1995-2006, the cultivated area with main crops was dominated by cereals for grains in a percentage of 78,03% in 1995 and 62,09 % in 2006. A clear decrease of 15,94 % can be observed, which has a positive side, taking into account the unbalanced structure of crops. This fact influences economic outcomes and gives the possibility of performing a balanced rotation of crops in order to comply with agro-technical requirements. It should be emphasized the fact that the number of livestock for the period 1995-2000 decreased but during 2000—2006 the tendency was of increase.

In comparison with 1995, in 2006 there was a growth of maize for grain, potatoes, sunflower and fruit yield but for wheat, barley and two row barley, sugar beet and grapes yield clearly diminished. By comparing the situation of livestock yield in Vrancea county in 2006 with the one in 2001 it can be observed an increase of mutton and goat meat yield also of milk, wool and eggs but also a decrease of pork, beef, chicken meat and honey production.

The agricultural-economic context of Vrancea county favors crop cultivation and livestock breeding. During the studied period for these fields of activities an increasing trend was observed.

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PARTICIPATIONS IN ASSOCIATED ENTERPRISES. THE ACQUISITION COST METHOD

PARTICIPAȚII ÎN ÎNTREPRINDERI ASOCIATE. METODA COSTULUI DE ACHIZIȚIE

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Abstract. *According to IAS 28 "Investment in Associates", the associated enterprise is represented by an unity in which the investor has an important influence and this society is neither subsidiary nor joint venture of his. The investments that assure an important influence could be treated by the equivalence method, at the acquisition cost or at the fair value. The first two methods are essentially different by the way of the associated enterprise benefits are recorded on. In accordance with the acquisition cost method the investor records its participation at cost as long as no depreciation exists. Only the benefits that are distributed by the associated enterprise are accounted by the investor. He recognize the incomes only if he gets allocations from the cumulated net profits of the society in which he invested, benefits that appear ulterior of the acquisition date. The allocations that are gets in addition of these profits are considerate a recover of the investment and are registered that a diminution of the acquisition cost of it.*

Rezumat. *Potrivit IAS 28 „Participații în întreprinderile asociate", întreprinde-rea asociată este acea unitate în care investitorul are o influență semnificativă şi care nu este nici filială a acestuia, nici asociere în participație. Participațiile care asigură exercitarea unei influențe semnificative pot fi tratate prin metoda punerii în echivalență, la costul de achiziție sau la valoarea justă. Primele două metode diferă în mod esențial prin maniera în care sunt înregistrate beneficiile întreprinderii asociate. Potrivit acestei metode, un investitor înregistrează participația sa la cost atât timp cât nu are loc o depreciere. Numai beneficiile distribuite de întreprinderea asociată sunt contabilizate de acționar. El recunoaşte ve-niturile doar în măsura în care primeşte repartizări din profiturile nete cumula-te ale întreprinderii în care a investit, beneficii ce iau naştere ulterior datei de achiziție. Repartizările primite în plus față de aceste profituri sunt considerate o recuperare a investiției şi sunt înregistrate ca o reducere a costului acesteia.*

IAS 28 „Participations in associated enterprises" applies to the enterprises over the consolidating society exercise a significant influence. The societies consolidation according to that standard is made through the **putting in equivalence** method.

MATERIAL AND METHOD

According to IAS 28 „Participations in associated enterprises", the associated enterprise is the one in which the investor has a significant influence and which is not his subsidiary, and association in participation either. The authority to participate to the decisions looking the financial and operational politic of the associated enterprise, but the missing of the right to control these politics is known under the name of significant influence.

The holding, directly or not directly, through the subsidiaries, of participation which represent 20% or more from the vote rights of an enterprise suppose the exercising of a significant influence over it, excepting the case when can be clearly demonstrated that the situation is different. If the investor holds, directly or indirectly, through the subsidiaries, less than 20% from the votes in the enterprise in which he made the investment, we can suppose that he does not exercise a significant influence, excepting the case when we can clearly demonstrate that exist that kind of influence.

Participations which assure the exercising of a significant influence can be treated through the putting in equivalence method, at the acquisition cost or to the true value. The two methods are essentially different through the manner of the associated enterprise benefits registering.

RESULTS AND DISCUSSIONS

According to that method, an investor registers his participation at cost during a period of time in which not exist a depreciation. *Only the benefits distributed by the associated enterprise are accounted by the share-holder*. He recognise the incomes only in the limit of the received repartitions from the cumulated clear profits of the enterprise in which he made the investment, *benefits which appears after the acquisition date*. The repartitions over these profits are considered an investment recovering and are registered as a diminution of its cost.

The mentioned aspects are presented in the following example: the „A" society bought at 15.02. „N" stocks at a „B" enterprise pay with the sum of 35.600 lei. N May, the first unity receive dividends of 5.600 lei. Because the dividends are drawn from the „N-1" exercise's result, meaning from the benefit which appears before the titles acquisition date, the distribution of a profit part under that form not represent a financial income for the „A" unity, but a diminution of the participation cost. The value of the last one goes from 35.600 lei to 30.000 lei (35.600 lei – 5.600 lei = 30.000 lei). That operation supposes, for the „A" entity, the following account article:

Accounts at banks	=	Participations	5.600	5.600

After the exercise in which the titles was bought is not always easy to determine the dividends origin. It seems normal to consider that a dividend was drawn from the results previous the participation acquisition date, for the situation when the cumulated distributions are bigger than the established benefits at that date. For the contrary case, we can say that the obtained dividends refers to the results registered after the stocks acquisition date.

We suppose that the stocks of the „A" enterprise to the „B" society represents 30% from the last society capital. These titles was bought at 01.05.„N", and the obtained results and the dividends distributed by „B" are the one from the table 1.

Table 1

Results obtained and dividends distributed by the „B" society in „N" and „N+1" years

Nr. crt.	Specification	Exercise	
		„N"	„N+1"
1	Profit	16.200	19.000
2	Distributed dividends	8.000	10.600

Because the participation acquisition at the „B" entity was made on 01.05.„N", and the profit of this exercise is of 16.200 lei, we can consider that the benefit realised after the mentioned date is of 10.800 lei (16.200 lei x 8 months / 12 months = 10.800 lei). Because that value is superior to the distributed dividends in „N+1" year (10.600 lei), it can be considered as draws from the benefits after the date of the stocks buying and, as consequence, must be registered in bookkeeping as incomes in the hold proportion measure (30%):

Accounts at banks	=	Incomes from dividends	3.180	3.180

For the case when the „N" exercise profit was, for example, of 12.000 lei, the benefit registered after the titles acquisition date (01.05.„N") will represent 8.000 lei (12.000 lei x 8 months / 12 months = 8.000 lei). As conclusion, we can say that the size of the dividends distributed in the „N+1" year (10.600 lei) is superior to the profit obtained in the „N" exercise from the date of the stocks buying (8.000 lei). That lead to the fact that a part of the benefits looks also the previous years („N-1" etc.). In that situation result a total difference between the two values, of 2.600 lei (10.600 lei – 8.000 lei = 2.600 lei) which must be considered as a drawing from the profits previously the date of the participation obtaining. The distributions for the „N+1" exercise are registered in bookkeeping in the following manner:

Accounts at banks	=	% Participations	3.180	780
		Incomes from dividends		2.400

We will extend the taken example to the „N+2" year and we will consider that the obtained results and the distributed dividends by the „B" enterprise are the one contained by the table 2.

Table 2

Obtained results and distributed dividends by the „B" society in „N", „N+1" and „N+2" years

Nr. crt.	Specification	Exercise		
		„N"	„N+1"	„N+2"
1	Profit	16.200	19.000	–
2	Distributed dividends	8.000	10.600	20.000

The modality of calculus and registering in bookkeeping of the aspects which correspond to the „N+1" exercise, previously presented, is the following one:

Accounts at banks	=	Incomes from dividends	3.180	3.180

To see why is happening in the „N+2", year must be compared the cumulated values of the obtained benefits and distributed dividends for the 01.05.„N" - 31.12.„N+1" period of time:

- ♦ cumulated profit = 10.800 lei + 19.000 lei = 29.800 lei;
- ♦ cumulated distributed dividends = 10.600 lei + 20.000 lei = 30.600 lei;

Differences = 30.600 lei – 29.800 lei = 800 lei.

Because the distributed dividends (30.600 lei) are bigger than the profits obtained from the participation acquisition date (29.800 lei), the sum of 800 lei must be considered as a drawing from the profits previous to the participation obtaining date. The distributions in the „N+2" exercise was registered in bookkeeping in the following way:

Accounts at banks	=	% Participations	6.000	240
		Incomes from dividends		5.760

If we cumulate the sums registered in the accounts in the „N+1" and „N+2" exercises we obtain for these the following values:

♦ accounts at banks = 3.180 lei + 6.000 lei = 9.180 lei;

♦ participations = – 240 lei;

♦ incomes from dividends = 3.180 lei + 5.760 lei = 8.940 lei.

A simple manner to follow the events in the „N+2" exercise, and which lead to the obtaining of the same results, regards the following calculus:

♦ the holding more than one of the profit for the 01.05„N" - 31.12.„N+1" period of time: 10.800 lei + 19.000 lei = 29.800 lei, which means that the incomes for the „A" society will be of 8.940 lei (29.800 lei x 30% = 8.940 lei);

♦ the holding more than one of the distributed dividends for the „N+1" and „N+2" years: 10.600 lei + 20.000 lei = 30.600 lei, from which 9.180 lei (30.600 lei x 30% = 9.180 lei) belongs to the „A" enterprise.

From the effectuated calculus we can observed that, the cumulated value of the distributed dividends by the „A" unity (9.180 lei) is bigger than the part quota of the profits obtained by the „B" entity for the reporting period of time (8.940 lei), which means that a part of the benefits looks, also, the previous years (9.180 lei – 8.940 lei = 240 lei). That value will represent a partial recovering of the made investment. That lead, in consequence, to the participation cost diminution, according to the following register in bookkeeping:

Accounts at banks	=	% Participations	9.180	240
		Incomes from dividends		8.940

CONCLUSIONS

According to the acquisition cost method, the investor register his participation at cost till do not exist a depreciation and only the distributed benefits by the associated enterprise are register in bookkeeping by the share-holder. The last one will recognise the incomes only if he receive repartitions from the cumulated clear profits of the enterprise's in which he invest, benefits which appears after the acquisition date. The repartitions received in plus over these profits reduce the participation's cost.

It considers that a dividend was drawn from the previous results of the participation's acquisition date for the situation when the cumulated distributions are bigger than the established benefits at that date. Contrary, the dividends obtained refers at the results registered after the titles buying date.

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SOME ASPECTS BOUNDED BY THE PUTTING IN EQUIVALENCE PROCEDURE

UNELE ASPECTE LEGATE DE PROCEDURA PUNERII ÎN ECHIVALENȚĂ

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Abstract. *This kind of procedure involves the majority stages that are met at the consolidation through the total or proportional integration. First of all the associated enterprises accounts are retreated if this one does not use the same accounting methods so those of the unity that own the participation. Because the minority investor is not always be able to get the necessary information, those adjustments are sometimes impossible to realize and this aspect must be mentioned in the appendix. In the contrary with the consolidation through the total or proportional integration, the associated enterprises accounts are not cumulated with those of the unity that owns the participation. According to this we can say that the equivalence procedure does not represent a consolidation procedure and gives us the reason by using it to the individual accounts establishment. The participation is accounted to its acquisition cost. The difference between this value and the corresponded fraction of the associated enterprise own capitals at this date is divided in two components: the fraction that correspond to the plus of the latent value of the associated society identifiable assets; the goodwill that is determined by difference.*

Rezumat. *O asemenea procedură comportă majoritatea etapelor întâlnite la consolidarea prin integrare globală sau proporțională. Se convine, de la înce-put, să se retrateze conturile întreprinderii asociate dacă aceasta nu utilizează aceleaşi metode contabile ca societatea care deține participația. Cum acționarul minoritar nu este întotdeauna în măsură să obțină informațiile necesare, aceste ajustări sunt uneori imposibil de realizat, aspect care trebuie menționat în anexă. Contrar a aceea ce se întâmplă în cazul consolidării prin integrare globală sau proporțională, conturile întreprinderii asociate nu sunt cumulate cu cele ale en-tității care deține participația. Astfel se probează că punerea în echivalență nu reprezintă o procedură de consolidare, acesta fiind şi motivul pentru care ea poate fi utilizată pentru întocmirea conturilor individuale. Participația este con-tabilizată la costul său de achiziție. Diferența dintre această mărime şi fracțiunea corespunzătoare din capitalurile proprii ale unității asociate de la această dată se descompune în două elemente: fracțiunea corespunzătoare plusurilor de va-loare latentă care privesc activele identificabile ale societății asociate; fondul comercial (goodwill) determinat prin diferență.*

The societies consolidation according to the 28 „Participations in associated enterprises" is making through the *putting in equivalence method* and applies for the enterprises over the one the consolidating society exercise a significant influence.

MATERIAL AND METHOD

According to the putting in equivalence method, the participation is revaluated in every year according to the results of the associated enterprise and to other events which affects its own fond (the assets revaluation, the enterprises regrouping etc.). IASB consider that the received dividends not furnish o correct measure of the benefit which correspond to an investor because they often are not in report with the associated enterprise's results. He has responsibility looking the performances of the enterprise in which he invest and, implicit, looking the profitability of his investment. Because integrates, in the consolidated financial situations, his part from the results of an enterprise over exercise a significant influence, it offer, in that mode, a analysis of the gains and investment. On that base can be determined much useful indicators.

REZULTS AND DISCUSSIONS

The putting in equivalence procedure supposes the majority of the phases met at the consolidation through global or proportional integration. We consider, from the beginning, to retreat the accounts of the associated enterprise if the last one do not use the same accounting methods like the one used by the society which hold the participation. How the minority share-holder is not always in measure to obtain the necessary information, these adjustments are, sometimes impossible to realise, aspect which must be mentioned in annex.

Contrary to the aspect which corresponds to the consolidation through global or proportional integration case, the accounts of the associated enterprise are not cumulated with the one of the entity which hold the participation. In that way we can prove the fact that the putting in equivalence does not represent a consolidation procedure, that being the motive for which it can be used for the individual accounts elaboration.

Participation is accounted at its acquisition cost. The difference between that measure and the fraction which correspond to the own capitals of the associated unity from that date will be decompose in two elements:

♦ the fraction which correspond to the pluses of latent value which looks the identifying assets of the associated enterprise;

♦ the commercial fond (goodwill) determined as difference.

We consider, for a better understanding of these aspects, that the „A" enterprise buys, at the beginning of the „N" exercise, for the sum of 300.000 lei, a participation of 30% in the „B" society's capital. At that date, the own capitals of the „B" unity represent 600.000 lei. The real value of the last entity assets correspond to their accounted, excepting some constructions estimated at 60.000 lei and which appears in the „B" society's balance-sheet for the sum of the 40.000 lei. The analysis of the participation price will be realised through the dates from the table 1.

Table 1

The participation acquisition price analysis

Nr. crt.	Specification	Elements of calculus
1	The part-quota from the clear accounted active of the „B" unity (30%) which returns to the „A" enterprise	600.000 lei x 30% = *180.000 lei*
2	The part-quota from the pluses of latent value registered at the identifying assets of the „B" society which returns to the „A" entity	(60.000 lei – 40.000 lei) x 30% = *6.000 lei*
3	Postponed taxes which correspond to the established plus- values	– 6.000 lei x 16% = *– 960 lei*
4	**TOTAL (rd. 1 + rd. 2 + rd. 3)**	**185.040 lei**
5	Participation acquisition cost	300.000 lei
6	Commercial fond (goodwill) determined as difference **(rd. 5 – rd. 4)**	300.000 lei – 185.040 lei = *114.960 lei*

Because the latent plus-values of the identifying assets and the goodwill not figure in the associated enterprise's balance-sheet, its accounted result does not take account by the amortisation or the depreciation of these elements. As consequence, must be corrected the part from the result which return to the investor.

We suppose, in that sense, that the utile period of life of the constructions from the „B" unity, remained at the participation's acquisition date, is of 20 years and the commercial fond will be amortised, also, on the same period of time. We must correct, therefore, the part of the „A" society's in the result of the „B" entity (table 2).

Table 2

The correction of the „A" society's part in the „B" unity's result

Nr. crt.	Specification	Elements of calculus
1	The yearly amortization of the „A" unity's part in the latent plus- values which correspond to the identifying assets of the „B" enterprise (reduce the result of the „A" entity)	6.000 lei : 20 years = *300 lei/yea* (–)
2	The commercial fond amortization (reduce the result of the „A" society)	114.960 lei : 20 years = *5.748 lei/yea* (–)
3	Yearly reintegration of the postponed taxes which correspond to the latent plus-values for the identifying assets of the „B" enterprise (increase the result of the „A" unity)	960 lei : 20 years = *48 lei/yea* (+)
4	**TOTAL (rd. 1 + rd. 2 + rd. 3)**	**– 300 lei/year + (– 5.748 lei/year) + 4 lei/year = – 6.000 lei/year**

The registering in bookkeeping of the presented aspects needs the elaboration of the following articles:

▪ at the balance-sheet level:

Result$_{„A”}$	=	Titles put in equivalence $_{„A”}$	6.000	6.000

▪ at the results account level:

The part-quota from the result of the society put in equivalence	=	Result$_{„A”}$	6.000	6.000

CONCLUSIONS

The application of the putting in equivalence method furnish more information about the investor's clear assets and clear income.

The using of the putting in equivalence is compulsory for the consolidated accounts. The only exceptions from that obligation refers at the fact that:

♦ the participations are buy only to be yield in 12 month from the acquisition date and for which, the leadership seek, actively, a buyer;

♦ participations satisfies the ensemble of the following conditions:

● the investor is himself subsidiary of an other society which public group accounts;

● the other investors was informed by the investor's decision and they not opposite to it;

● the titles emitted for the investor are not quoted to the stock-exchange.

Participations which are not put in equivalence are treated according to the IAS 39 „Financial instruments: recognition and evaluation", meaning there are register in bookkeeping at the true value (at the stock-exchange course) if these stocks are quoted on an active market, or are evaluated at the acquisition cost, in contrary.

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THE E.U. ACTION PLAN ON CORPORATE GOVERNANCE

PLANUL DE MĂSURI AL U.E. PRIVIND GUVERNANȚA CORPORATISTĂ

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Abstract. *The research paper aims to analyze the governance system of national firms. The term governance is used in a broad sense, and is extended to the institutional environment and to the endogenous mechanism as well. The Action Plan recently approved by the EU Commission will arguably take on an increasing influence both on the scientific debate (at the national and international level) and on the future initiatives aimed at modifying various aspects of the existing regulation (and self-regulation) on corporate governance matters.*

Rezumat. *Obiectivul acestei lucrări este acela de a realiza o analiză asupra asupra guvernanței corporatiste din firmele naționale din punct de vedere al legislației naționale. În acest sens, conceptul de guvernață, trebuie înțeles, în totalitatea sa, pentru a putea cuprinde contextul juridic şi istituțional, precum şi sistemul din interiorul firmelor, adoptat de entitățile economice. Planul de măsuri, recent aprobat de Comisia Europeană va conduce probabil la o creştere dublă a influenței asupra dezbaterii ştiințifice(atât la nivel național cât şi la nivel internațional) şi asupra inițiativelor viitoare, modificând diferite aspecte atât la nivel normativ cât şi la nivel de autodisciplină.*

The paper aims, consequently, at analyzing some of the most important topics which will be touched by the EU Action Plan.

With respect to the governance mechanism adopted by firms, three specific aspects are studied: the structure and composition of the Board of Directors of listed companies, the relationship between ownership structure and firm performance and the appropriateness of the information on executive compensation conveyed by financial statement to allow the stakeholders to evaluate the costs and the incentive effects of the firms' compensation plans.

MATERIAL AND METHODS

The article aims to analyze the governance system of national and European firms. The term governance is intended in a broad sense, and is extended to the institutional environment and to the endogenous mechanism as well.

The Action Plan recently approved by the EU Commission will arguably take on an increasing influence both on the scientific debate (at the national and international level) and on the future initiatives aimed at modifying various aspects of the existing regulation (and self-regulation) on corporate governance matters.

RESULTS AND DISCUSSIONS

The paper aims, consequently, at analyzing some of the most important topics which will be touched by the EU Action Plan.

With respect to the governance mechanism adopted by firms, three specific aspects are studied: the structure and composition of the Board of Directors of listed companies, with a particular attention for the themes of separation between the roles of Chairman and CEO and the relationship between Board structure and firms' performance; the relationship between ownership structure and firm performance, with a particular attention to the model of family control and to pyramidal groups; the appropriateness of the information on executive compensation conveyed by financial statement to allow the stakeholders to evaluate the costs and the incentive effects of the firms' compensation plans.In the same stream of research is the study of the reform of corporate governance system in Europe (EU Action Plan)

Under the first perspective, the question is whether a European reform strategy is emerging that enhances convergence of national legal systems in this area and is whether the European strategy (if any) differs from the US one and whether the possible differences are influenced by the corporate governance structures prevalent in Europe. With respect to the domestic reform, the aim is the analysis of the effectiveness of the d.lgs. 6/2003 to make our law more attractive to investors and to develop a more efficient and wider capital market.

Finally, the paper aims at the conceptualization of a theory of deterrence through the comparison of American and European enforcement systems.

Corporate governance is one of the hot topics in the current economic debate, especially after the corporate scandals that involved important Italian and American companies in the last two years.

Emerging cases of corporate malpractice showed that conflicts of interest had led to diffuse problems concerning several aspects of the business conduct of these companies (e.g. wrong investment decisions, misleading communications to the market, perverse effects in executive compensation, etc.); this situation, in turn, has led academics and regulators to renew their concerns about the structure and the effectiveness of existing corporate controls (the so-called "corporate gatekeepers"), and to evaluate the opportunity to introduce new control systems.

Other European legislators are considering reforms of their national corporate governance systems. Furthermore, it is coherent with a stream of initiatives implemented by the European Authorities: following the recommendations formulated by the High Level Group of Company Law Experts (Winter Commission), the European Commission approved in may 2003 an Action Plan on corporate law and governance ("Modernisation of Company Law and Enhancement of Corporate Governance – A Plan To Move Forward"), whose key policy objectives are to strengthen shareholder rights and third party protection in order to foster efficiency and competitiveness of business.

The institutional environment substantially affects the endogenous governance mechanism adopted by firms. In this respect, it is relevant that the EU Action Plan

aims not only at strengthening shareholder rights, but also at enhancing corporate governance disclosure, modernizing structure and functioning of the Board of Directors and at co-ordinating corporate governance efforts of member States. As a consequence, the Italian corporate governance system could be subject to remarkable modifications in the next years, and an in-depth analysis – from a Law and Economics viewpoint – of the current system, its possible shortcomings and reform perspectives appears both important and urgent. In this respect, ownership structure of companies and groups, board composition and functioning, executive compensation are three particularly interesting fields for research.

This is not to say that boards are generally useless or that audit committees cannot play a useful function in detecfting fraud.Gatekeeper services counterbalance, at least in part, board weaknesses. The term ‘gatekeeper' is currently used to refer to outside professionals who provide verification or certification services to investors (Coffee 2004).

Therefore, the gatekeeper strategy is directed to recruit third parties in enforcement. Policy makers, therefore, have a difficult choice to make between market mechanisms, liability rules and public regulation as to various types of gatekeepers. The choice of the relevant liability criteria has been particularly analysed by lawyer-economists considering whether strict liability or negligence-based liability is optimal for gatekeepers.

Another topic of relevant interest is the nature of the enforcement system adopted to prevent corporate frauds. The dimensions of legal intervention are different (Shavell 2004).As far as securities frauds are concerned, non-monetary fines (e.g. imprisonment) are needed because, moral considerations apart, the level of the private benefits that can be achieved through fraud is so high that civil suits cannot be sufficient to deter the violator, since his assets will never be sufficient to redress the social cost of his action. In order to prevent fraud, mandatory disclosure is also needed.

A system of mandatory disclosure has to rely on a public enforcer, able to intervene when a company is seeking to hide information and able to "verify the veracity of the number disclosed", an action that "a private intermediary can only do through a lawsuit, an avenue which is very slow and expensive" (Zingales 2004). Monetary civil fines (administrative fines, in Continental Europe) are also usually associated with public enforcement of mandatory disclosure.

However, there are at least three strong arguments against a system that relies entirely on the public enforcement of law. First, in the real world public agencies are not usually the most efficient enforcers because they cannot have access to the widespread information that private parties naturally possess (Shavell).

Second, they lack adequate financial resources to investigate all potential wrongdoers and to pursue all pending investigations with the same unrestricted vigour.The "revolving door" between public and private jobs, i.e. the incentive not to be too harsh with some wrongdoers in view of potential future employment with them in the private sector, and political influence are very easy examples of the nature of these payoffs, not to mention bribery, the extreme form of payoff (Glaeser 2001), adopt a

different approach and reach different conclusions, asserting that regulators are more aggressive enforcers than courts).

CONCLUSIONS

In Europe the interplay of public and private enforcement has been recently investigated in the field of antitrust law, as it is clear that European antitrust rules are under-enforced in comparison with their US equivalents: see Basedow,WhoWill Protect Competition in Europe?

With reference to company law and capital markets law, this interplay has been largely neglected. In fact, the European system has been influenced by corporate governance debates and has sought to respond to the demands of modernization by acting on substantive rules.

The problem is that there was no serious effort to reshape the enforcement system. Generally speaking, the civil procedure system is not efficient as far as the protection of collective (public) interest is concerned.

There is no effective interplay between public enforcement and private one. The result is, once again, under-enforcement. These issues have been recently covered in Ferrarini – Giudici, Financial Scandals and the Role of Private Enforcement: The Parmalat Case, in McCahery (ed.), After Enron, 2005, forthcoming.

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ETICHS IN MODERN MARKET ECONOMY

ETICA ÎN ECONOMIA DE PIAȚĂ MODERNĂ

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Abstract. *Judge once as a trifle, ethics is seen today as a fundamental aspect of management. Management ethics-determination is what means "fair", "correct" and "just" in decisions and action that will affect others –passes the simple problems like corruption, steal and swindle. Management ethics focuses attention on human relations-with employees, clients, shareholders, creditors, distributors or with community members from our department. Solving the ethics dilemmas in management, does not represent just a delimitation between good and bad, correct and incorrect, but also is a complex aiming a balance between economical and social performance of the firm, tacking in consideration all what could happened. Solving ethics dilemmas by the managers is not easy, and the decision will depend all the time of their personality, experience, education, his feelings, and attitude and personal values. Thomas W. Dunfee, professor in Ethical bussines, Pennsylvania, identifid eight* ***practical fundamentals in ethical business****.*

Rezumat. *Considerată cândva ca un moft, etica este văzută astăzi ca un aspect fundamental al managementului. Etica managementului - determinarea a ceea ce înseamnă "drept", "corect" sau "just" în deciziile şi acţiunile care îi afectează pe alţii - depăşeşte simplele probleme cum ar fi corupţia, furtul sau înşelăciunea. Ea se concentrează pe natura relaţiilor interumane - cu angajaţii, cu clienţii, cu acţionarii, cu creditorii, cu distribuitorii sau cu membrii comunităţii în care ne desfăşurăm activitatea. Soluţionarea dilemelor etice în management nu reprezintă doar o delimitare între bine şi rău, corect şi incorect, ci este vorba despre o judecată mult mai complexă vizând obţinerea unui echilibru între performanţele economice şi cele sociale ale firmei, cu luarea în considerare a tuturor variantelor şi consecinţelor ce pot apărea. Rezolvarea dilemelor etice de către manageri nu este deloc uşoară, iar decizia va depinde întotdeauna de personalitatea acestuia, de educaţie, experienţă, de sentimentele sale, atitudinile şi valorile personale. După Thomas W. Dunfee, profesor de Etica Afacerilor, Pennsylvania, pot fi identificate opt* ***principii practice ale eticii în afaceri.:***

Judge once as a trifle, ethics is seen today as a fundamental aspect of management.

Given been the leading positions, ethics must be "a way on", a way of progress. An ethical conception is essential in drawing support and positive involvement of all whom participating in that specific business: successful employees, clients, shareholders, creditors, distributors or with community members.

This is mentioned as the main problem in management ethics: permanent conflict between economical performances of firm, measured trough incomes, costs, and profits to the shareholders, firm social performances, clients, shareholders, creditors, distributors or with community members from our department. So, management ethics dilemmas in management, do not represent

just a delimitation between good and bad, correct and incorrect, but also is a complex judgment, taking in consideration all that could happened.

Every enterprise has a certain **responsibility** in economical and social plan; this point of view is accepted by all the business "actors" of the world. In a classical way of speaking about the ethics –the firm is to bring benefits to the shareholders; maximum profit is the second priority of the firm, first being the well being of everybody involved in the business.

In this respect, the manager's **ethical obligations** would be addressed:

- To the shareholders: fair administration, loiality, information, transparency, confidentiality;
- To the employees: fair payment, professional development, respect to them personal life, respect to them petitions;
- To the clients: quality services/products, guaranty, information;
- To the community: protecting the environment, helping in solving the social problems, respecting the culture diversity.

Business ethics is essential for successful on long term.

Confidence means as a matter of fact trying to lower the taken risk and is referring to:

- Confidence in contractors relationships;
- Confidence in consumers relationships: a salesmen will win the client confidence when is honest, competent and nice. Clients expect for the salesmen the deliver quality and the correct information about the product;
- Confidence in employee's relations: confidence must be taken to superiors and to subalterns, too. A confidence environment means a good communication, employee fidelity, confidence, diminishing the conflicts between employers.

It is impossible, in conditions of increase competition in business area, to decide all the time favoring of social performances.

On another way, isn't possible to decide every time in favoring economical performances.

For these problems-in fact ethical dilemmas-**the law** can be helpful; it is *referring at a serial of norms given by the society*, to guide the person conduct into society.

It isn't easy for managers to solve these ethical dilemmas, and the decision will depend all the time of his personality, experience, education, his feelings, attitude and personal values.

Thomas W. Dunfee, professor in Ethical bussines, Pennsylvania, identified eight **practical fundamentals in ethical business**:

1. Confidentially ;
2. Sensibility in approaching conflict;
3. Respecting business laws and rules;

4. Professional consciousness, professionalism;
5. Loyalty and good faith;
6. The sense of responsibility;
7. Respecting the rights and freedom of others;
8. Respecting the human being.

In many situations in business it was proved that ethics represent a necessity and respecting the ethics fundamentals we'll bring good results, in every area. Business practice demonstrates that ethics in business represent a good investment on long terms, because is *creating a favorable image and long lasting for every firm or personality*. Ethics is the best advertising that a company can do for itself.

The fundamental relation on which ethics focus her attention in business is the due between the economical performances of enterprise measured trough incomes, costs, profits and due to the shareholders, firm social performances, clients, shareholders, creditors, distributors or with community members.

When we talk about ethics in a firm we must think at all dimensions what involve this:

- Personal ethics;
- Fellows ethics like organization members (achieving the purpose respecting the internal rules);
- Organization ethics;
- Enterprise ethics in his relation with contractors, clients, mass-media, society;

Business strategy and ethics are creating an ensemble at organization level. We can conclude that developing good ethics is profitable; must be seen as an investment on a long terms.

Advantages in apply ethics in business:

- Market advantage ;
- Superior performances ;
- Higher earnings in management reputation;
- Legal and financial advantages.

The ethics is driven by relationships between employees and their dependence on qualities and leading capacities of their managers.

Ethics and employees. Generally, activities regarding leading human resources (as recruiting and selecting personal, formal evaluation, record analysis, remuneration etc.) are those who frequently confront the ethic dilemma. To encourage ethics, in administration area of human resources, managers can sustain some activities like:

- Recruiting employees in departments whit a sensitive ethics, this persons will know all what involves this domain, ethically speaking;
- Recruiting people who's personal ambitions are temperate of other

objectives; excessive ambition can make employers to brake the law and to ignore ethics;

- Encourage his trust and his total loyalty; this will make the employers to feel good when in that firm persist ethics;
- Growing the relation between personal and superiors will improve communication;
- Dividing work tasks so that employer be motivated and to feel appreciated;
- Establish internal mechanisms against illegal behavior and without ethics; who is at the same level with a small productivity and theft;
- Creating some norms to give awards after the performances is achieved;
- Establish some moderate sanctions, but frequent after the case, moderate sanctions are a good solution rather then strict and rare.

Ethics and consumers are in relationship with marketing policy, quality and safety products.

At level of individual consumer, critics are regarding disinformation and cheating, with the purpose to denigrate some companies and firms. At social level, the main concerns are regarding social and cultural impact unit of marketing communication.

Roll of ethical codes in organization management

Frequently, the levels of a managerial ethics apply are clear mention in codes ethics.

At the beginning, the codes were develop by professional groups as deontological rules and only after this it was seen an explosion of this into organization.

The ethic code is available only if all the members of organization respect it; when the manager doesn't give the proper attention to it, for sure even the employees won't respect it.

Ethics codes are the one who give status, norms and faith to the organization. This norms and believes are in general suggested, discussed and definite by the leading border and then published and distribute to the employers. Norms express the way in which the organization members must act in a given situation.

So, through ethical codes, the border tries to encourage that way of thinking and attitude who lead to the wanted conduct.

The importance of ethic codes of organization is given by the:

- A biggest involvement and loyalty coming from the employers and superiors;
- A most stricter selection and promoting the personal, in what regards the values of firm;

- A biggest trust and cooperation, from the moment that team work is in them interest.

Objectives of a behavior code

Regarding the objectives of one code, it is a behavioral agreement that trough ethics they try to promote professional values. In addition to this desideratum, Samuel Mercier remarks also other objectives like:

- Ending a moral contract between beneficiary and organizations, and with the members of that organization, too;
- Protect the organization from the unfair acts;
- Promote a positive image of the organization;
- Offer a way of establish the members devotion;
- Show a conduct of employment of the managers;
- Make agreements based on trust and responsibilities;
- Guide behavior in case of some ethical dilemmas.

If we would make a hierarchical system of the importance of ethical standards we could say that the most elementary rules that must be respected by the organization are tie to clients and employers.

In what concern the client, a negotiation must start from the idea that both parts have power of discernment, that they could see the risks, that they are responsible and with good intentions. In what concern employees, we must remember that people often are like a work force and a purpose. Relationships between employees and employers on ethic bases are necessary for existence of the most active values of work process –human resources. Generally speaking, with moral ethic operate are, after Professor Marian Liviu, society, groups of benefit, internal and personal problems.

Even if the importance of code ethic increases, very few companies are counting ethics considerations in their programs of managerial development, very few are firms who establish ethical and social responsibilities at Directory Council or at every other level of the organizations.

The existence of an ethical code of organization isn't a guaranty that the employees will act proper, but could reflect a certain level of culture organization.

Some codes are only a policy for some organizations, trying to give a ton for some employee's ethical conduct. Some others are making rules for establish a proper conduct into business meetings and establish the procedures for a normal act.

Nobody can say exactly which cod is more efficient and even if a certain code guaranty a proper conduct of employers. It seems that a general rule is that this ethic codes to be more simply; how much more complicate there are so could have a negative effect.

Whoever are the ethical opinions about an efficient ethic code, he must have the following properties:

- Codes must be strict. The code must establish clearly witch elements are ideals and witch are obligations;
- Codes mustn't be used in once interest. Codes wouldn't be used to served interests against public interest;
- Codes must protect public interest and of the pupil who serve this ethical codes;
- Codes must be honest and specific.

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THE ADMINISTRATION OF ORGANIZED STRESS

GESTIUNEA STRESULUI ORGANIZAȚIONAL

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Abstract. *All of us are victims of the stress considered like a disease of the XX-th century. But not all the types of stress affect our performances in a negative way. We can manage this pressure and become powerful recognizing the stress symptoms and prevent it. Our active way of living and the material aspects of the present life induce much more frequent and powerful pressure that in the past. The people are now used to live under the pressure and they want to do more things in a shorter period of time. In order to manage our life, we all need a "positive stress" (or eustress) acting like a motivating factor. Under this pressure we became more active until we touch the highest level of performance, when we touch the highest efficiency. The "negative stress" (or distress) develops when we can not manage the overwhelming feeling of being stressed. In order to manage this stress the correlation stress-risks should be taken into consideration.*

Rezumat. *Cu toții suntem victimele stresului considerat ca boala secolului XX. Dar nu toate tipurile de stres ne afectează în mod negativ performanțele. Putem împiedica presiunea să devină prea puternică recunoscând simptomele stresului şi acționând preventiv. Viața trepidantă din zilele noastre şi aspectele materiale tuturor ne provoacă presiuni mai frecvente şi mai puternice decât în trecut. Oamenii s-au obişnuit să trăiască sub stres şi se străduiesc să facă tot mai multe în timp mai puțin. Pentru a lua ce este mai bun de la viață, cu toții avem nevoie de "stres pozitiv" acesta acționând ca un factor motivator, sub influența lui devenim mai energici până atingem nivelul optim de performanță, când randamentul tău este maxim. "Stresul negativ" (sau distres) apare când presiunile din viață devin copleşitoare şi nu mai le faci față. Acesta este tipul de stres la care se referă oameni atunci când sunt stresați şi care necesită luarea în considerare a riscurilor multiple pe care le implică. Reacțiile la stres reprezintă consecințele comportamentale, psihologice şi fiziologice ale stresului. Stresul negativ este cumulativ deoarece capacitatea organismului de a-i face față scade progresiv.*

The stress reactions represent the behavioral, psychological and physiological consequences of stress. The negative stress is cumulative because the human capacity to resist it is slowing down progressively. Slowing down the way of thinking and the concentration, the radical way of acting and the anxiety are the consequences of a long lasting stress that can be followed by seriously illness.

We try to present stress stages and the importance of identifying stress. An important aspect of our life is the occupational stress at work. The relationship between occupational stress during working hours and professional performances have generated a serial researches in USA and Europe, clarifying the causes of occupational stress and classifying them over the source –at managerial level, at subordinal level and common causes.

The most important aspect of the above mentioned researches is referring to the factors which affect the stress resistance: personality, age, qualification, professional categories. Stress involves an economical impact (the productivity of person and firm) and social one (conflicts, improper behavior with clients).

Improper stress management stress revolves in higher cost for person, firm and society. Based on several studies, Jonas and Crocq suggest the following definition: S*tress is a psychological and physiological reaction, mobilizing and protecting the body (the human being) from aggression due to a stressful event.*

According to Selye the tensions producing stress are a part of our daily life.

The stress is part of our daily life. At different levels the stress is not a new concept. The main difference between the modern period and the previous ones is **the number and the intensity of stressed factors**. Modern human being is still limited in acting and managing stress.

The reactions at stress represent the behavioral, psychological and physiological consequences of stress.

For most people stress has different interpretations. In fact, there are two type of stress:

- **Positive stress – acts** like an impulse, like an imbold factor; under pressure, the person acts more active until she touches the highest level of performance. Competition at work acts as a positive stress.
- **Negative stress – acts** when life events became overwhelming and to affect the true capacity of thinking.

The positive stress can easily become the negative stress. It becomes a matter of individual capacity of resistance. The resistance capacity to the above mentioned types of stress is different from person to person, and even at the same person from one moment to another according to the psychological and physiological dispositions and the situation. Usually people do not realize that their feelings and performance are caused by stress. Not recognizing these signs does not give them any chance to improve their own situation. There are people that can not cope with stressful events and eventually they are getting sick, performing with a lower productivity. The most important thing to realize is that **the person reaction at the stress factor is the one who create the stress, not the stress factor itself**.

"**Not what is happened with us is important, but the way we are acting**" Hans Selye said, the author of stress model. Philosopher Epicnet said, two century ago, that the reality is not the one that scars people, but just the reality image that they have about it.

In these terms-experts affirm-**is much better that the stress will be known and controlled, rather than unknown.** First step in solving the problem is to **identify the stress sources** (stress factors).The origin of these stress sources is split into three categories:

1. **Personal caused factors.** When is not a stressful situation, the causal factors are useful but other way they affect the way of acting in a negative way. And this caused factors are categorize as following:
   a) urgently-lead to do several things in a short time;
   b) professionalism- likely to reach higher standards;
   c) ability to be appreciated
   d)"hard" work;
   e) empower-the way of feeling strong and motivate.
2. **Pressure at work place.** The most common stages of professional stress are:
   a) setting very high standards-work after hours;
   b) unsure of work permanent changes;
   c) uncertainly of the work place;
   d) teamwork with unpleasant other workers;
   e) high standards of responsibility.
3. **Personal events:**
   a) important events - separation, changing homes. This is a stress situation leading to strong emotions;
   b) small daily sorrows;

c) age - affecting physical shape.

The well being, second step of stress, is referring to emotional answers to excess, noticed in the way of acting and talking and having certain consequences into psychological and physiological behaviors.

The body's well being is characterized by three stages: *alarm stage*, including a shock stage (hypotension), followed of a contrary shock stage when we can develop defending reactions; *resistance stage* or recovery in which the body tries to recover, backing up to normality; *exhaust stage*, appears when the shock stage can't be stopped.

C.Reactions at stress

If an event is evaluated as being stressful, the person may have different reactions copying with stress.

1. Physical/physiological reactions: Heart pain, palpitations; Lower or higher appetite; Indigestion; Insomnia; Convulsions and muscular pain; Headache; Excessive sweating and dizziness, stage of general illness; Chronic tiredness; Tegument irritation; Allergy; Recurrence of some anterior diseases.
2. Cognitive reactions: Shortage of making out the actuality; Lower ideation flexibility; Decrease in creativity; Difficulties in taking a decisions; Negative thoughts about himself, world and future; Cognitive pessimistic.
3. Emotional reactions: Higher irritability; Lower interest into old hobbies ; Lower interest for friends; Emotional instability; Anxiety; Depression; The feeling that you are neglected; Repressing the emotions; Difficulties in finding relation; The feeling that you are a loser in your family and in your profession; The feeling that you can't trust anybody; Inability to get to finish a task; The fear to live alone; The fear to get sick.
4. Behavior reactions: Lower performances at work place or at school; Excessive smocking; Excessive drinking; Insomnia, sleep difficulties; Inefficient management of the time; Isolate from the friends; Excessive preoccupations for certain types of activities; Aggressive behaviors.

The employer and the employee think that the stress at work place is something normal. USA and European Union, during 2001-2002 years, were giving special attention to the Occupational Stress. The employee noticed a highest stress rate which made him feel tired, exhausted, anxious, antisocial and in the end supporting the consequences of loosing his job without the possibility to become employed again.

The employer noticed that the most common consequences of stress were: lower productivity, decreasing of the profit and the higher cost with the replacing the employees.

For each government the stress effects from above are raising the cost of health care.

The main causes of occupational stress are the following:

- Major changes of occupational work procedures;
- Working after hours;
- Major changes in required activity speed;
- Major reorganizations;
- To much to work in a short period of time;
- Criticize the employer when the results aren't good and the absence of reward when the result are good;
- Conflicts between the employees who work at the same project;

Occupational stress effects are the following:

a) Lower intellectual, emotional and physical capacity;

b) The International Organization of Work estimates that the occupational stress is responsible for 10% of unprofitability

c) Higher number days of sick leave;

d) Higher rate of absence due to sickness;

e) over 95% of the visit hours to the family doctor are caused by the stress, and over 80% of the affections of those who are in the hospital on USA are determined by stress.

The occupational stress is one on the main causes of decease: cardiovascular affections, cancer, lungs affections, accidents, cirrhosis, and suicide.

f) getting older much earlier and diminishing the hope of a long life caused by the chronically diseases and the deceases trough fast death.

The stress factors at the work place are in total depended with:

The management style:

- The absence of clear objectives;
- Lower communication and the missing information inside the organization;
- The absence of consultation and involvement of the workers in the changes from the place of work;
- The absence of support from the leaders.

Organization rules:

- Uncertain organization rules;
- Contradictory objectives and priorities;
- High level of responsibility at workplace.

Career:

- Uncertainty concerning the career evolution;
- Defrauds in career ;
- Lower experience;
- Job uncertainty ;
- Insufficiency of training program;
- Changing the organization rules.

Decisions and control:

- Weak participation decisions making process;
- The absence of control work.

Work assignment and work speed:

- The absence of control on our personal work.
- Work assignments above loaded:
- The absence of a prioritizing activity.

Work schedule:

- An inflexible schedule;
- The after works hours;
- After work hours not planned;
- Work in shifts;
- Excessive work after hours.

Categorizing stress:

- Normal stress;
- Cumulative stress;
- Traumatic stress.

The consequences can be classified in:

- *Subjective effects*: anxiety, aggression, apathy, boredom, depression, tiredness, indisposition, losing the confidence in yourself, irritability.
- *Behavior effects*: predisposition to accidents, alcoholism, excessive use of coffee, emotional impulse, nervous laughter.
- *Cognitive effects:* decrease of the ability of taking the right decisions, weak concentration, decrease of attention, and hypersensitivity at criticism.

- *Organizational effects*: absentness, resignation, lower productivity, isolation, insatisfaction at work, diminishing the responsibilities concerning the organization.
- *Physiological effects: higher levels* of sugar, cardiac f pulse, of arterial tension, dry mouth, heat or cold waves.

Fortunately, the stress effects are diminished trough any way of making stress *predictable* or ensure the potential for *personal control* of stress factors. The combination of different stress factors can be leading to intellectual overworking, physical exhaustion.

Stress indicators on the organization:

Stress can lead to:

- High level of absenteeism;
- Decrease of focusing to the objectives and the incapability to reach the target;
- Increase of the rate accident and error rate;
- Higher level of conflict between the employees;
- Higher level of fluctuation in personnel.

The costs induce for the organization could be substantial, so the people who lead have the right to implement measures for diminishing the level of stress, all this that the organization will have a normal functionality. The measures needed to be implemented by the leaders to diminish the stress between employees, can be split in two categories:

A) Preventing the stress by the organization

Preventing the stress is very is a measure hard to be reached, for any healthy and active organization. There are measures that can be taken for stimulating the employees too, without stressing them. Some examples would be:

- Defying every position according to the employee competences, implementing in the same time changes to make every time his interests awake;
- Defying each employee activity in a way that the he will have a certain level of responsibilities allowing him to have the same authority and to take part at the decision who will influence his life;
- Encourage any specialist to adopt a participation style of leading;
- Encouraging the team spirit;
- Encouraging communication between the departments, as well between the management team, as well the realization of a feedback to every employee (concerning the work results, employee evaluation);
- Authorize the decisional department in a way that every department of the employee to be part at the decisions process who influence his job;
- Development of a cultural organization with a positive attitude.

B) Necessary measures to prevent the stress at the place of work

- Decreasing the number of changes mandatory to the employee level;
- Restricting the procedural complexity and of other nature in performing;
- Providing the possibility that the employee will address someone at the superior level, colleague, member of a council;
- Providing social and sports facilities;
- Providing medical service facilities;
- Decreasing the work period at 35 hours and even less at places with a high level of occupational stress;
- Dividing into fragments the vacation , special to the employees with work with high level of occupational stress;
- Advertising professional training in each work department;
- Each employee will have him personal record with his time work and his attributions;

- Cooperation and fair competition
- Realizing a balance between activities and between the liked and compulsory activities;
- Establishing every day priorities and examining the activities;
- Exercise and physical activities;
- Lunch rest and 6-8 hours of sleep thru the night;
- Allocating enough time for family and friends;

Counseling services on stress issues

Counseling at work is the situation in which a person uses different methods for help another person to think systematic and to achieve the facts of his decisions, even if are on his personal life or from work.

D. Counseling represents a process in with one person help another to: identify the problem; to realize what the better solution is for him; to rethink which are the proper solutions for him.

Given the situations above we can conclude:

- Investing in employees and in their family, to create new places of work and good relation at place of work trough a continue education for choosing the optimum life styles, is an investment with benefits on long terms for the company, for employees and them families;
- No company and no country can't afford to:
  - to disperse the health resources;
  - to make use of the work forces in the conditions that is too difficult;
  - to lose a gained position on national and international economical market due to low performance and a low health level of the employees.

Smocking, alcoholism, drug addiction and the absence of exercise are indicators of person incompatibilities to cooperate with daily stress factors.

Active methods of "Stress management" must be implemented and promoted. This could include: the abilities to solve daily problems; the balance between rest and work and between activity and pleasure; capacity to be relax on difficult periods; sport; meditation; other responsibilities. A special attention must be taken to the personal training of each person for a good cooperation with daily stress factors.

Stress management

The first step in is to succeed in to the stress programs is to admit it.

The main managerial causes creating stress are: new managerial techniques-payment of the performance function, overloading information, and a long after hour program, post record, harassment of the employee, and work in shifts, supply on work market and unemployment, personal and general financial instability. For establishing the optimum level of development, stress tolerance is necessary that the employees to: know their duties, to acknowledge employer demands, to know that they can manage to fit into.

In conclusion what we put down reflect the stress complexity, necessity of an individual broach and finding methods to control stress at individual and organizational level.

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RISK ADMINISTRATION

GESTIUNEA RISCURILOR

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Abstract. *The market economy characteristic and modern life have determinate both individual level and organizations increasement of number of risk who can affect us, of their dimensions and of the consequences, but in the same time a highest need of firm security. In the financial department was develop an entire area –management risk and many financial instruments for reducing risk. The behaviour of economical agents respectively of the enterprisings and managers is different according the risk in many categories: risk adversaries unaffected to risk and risk belovers who leave mark on decisions take it. Risk management risk is a ciclical process with distinct stages: risk identification, risk analyses and risk reactions. The management of this fenomen goes from this context and the firm objectives, analyse the risk factors into a security conception haveing the purpose to minimize the risks and the cost.*

Rezumat. *Caracteristicile economiei de piaţă şi coordonatele vieţii modeme au determinat atât la nivel individual cât şi al organizaţiilor creşterea numărului de riscuri care ne pot afecta, a dimensiunii acestora si a consecinţelor pe care le provoacă dar şi nevoia crescândă de securitate a firmei. În lumea financiar-economică s-a dezvoltat un întreg domeniu - managementul riscului şi o multitudine de instrumente financiare pentru a reduce sau transfera riscul. Comportamentul agenţilor economici respectiv al întreprinzătorilor si managerilor este diferenţiat în funcţie de atitudinea faţă de risc în mai multe categorii: adversari ai riscului indiferenţi la risc şi iubitori ai riscului (curajului) ceea ce îşi pune amprenta aspra deciziilor luate de aceştia. Managementul riscului este un proces ciclic cu etape distincte: identificarea riscului, analiza riscului şi reacţia la risc. Managementul acestui fenomen pleacă de la context şi obiectivele firmei, analizează factorii de risc într-o concepţie de securitate în vederea minimizării riscului asumat şi a costurilor necesare. În analiza riscurilor care afectează agenţii economici au fost evidenţiate un număr de 17 riscuri şi s-au prezentat metode de evaluare şi analiza cu grade diferite de complexitate şi utilate pentru cei care desfăşoară activităţi de management.*

In analysing risk that affects the economical agents were distingueshed 17 risks and were presented evaluation and analizing methods with different complexity degrees and fitted out for them with management activity.

A first signal of market economical maturity is the quality of economical agent to think strategically in what concern risk. **So, economical agents from Romania are astonished by the risk dimensions in business.**

To initiate a business, we take upon certain risks. Some are inherently from development of business, other appear as unknown causes. Enterprising must know how to manage in this situations for the risks trough an efficient system.

Risk is define in general terms, as a posibility to expose to danger, to support losses.

Generally, the risk is an economical, social, political category distinguish as:

- Is an uncertain event but possible with his consistence in incertitude;
- Is an element who produce material or moral damages;
- The risk appears in human, political and economical activities;
- The risk effect can be removed.

Excepting the incertitude, **risk is characterized trough the possibility to describe a probability law given results**, and trough being aware of this law for the specialists and economical agents.

Objective probability and the associated risk, reflects the reality events and is related on statistic data.

Subjectiv probability and the associated risk has the personal mark of the fellow (optimistic or pessimistic), reflecting the mentality of the person who takes decisions, based on intuition or observations of the decisions he had taken.

Objective risk is a independente variable .

Subjective risk is an estimation of objectives once influenced by the perception. Perception is influenced by the preparation, experience, age, health, temperament.

The taken risk depends on the financial efforts wich are assumed by the manager to obtain the future results, in corelation with the cash flow.

Risk is influence and determine by many objective causes:

- Changeing the economical condition in time (fail interest, foreign currency, inflation, import);
- Technological changes;
- Invalidation of anterior experiences;
- An imperfect knowledge of exogene variables;
- Pessimist or optimist team attitudes;
- Errors of economical or technical analysis;
- State intervention (taxes and inputs);
- Price changes.

Pure risk is the consequence of some accidental activities who are a menance for firm, losses being hard delimitate.

Speculative risk appears on the manager wish to realize objectives who will increase the economical power of firm. Could be realise in time and could be controled trough administration, marketing and management technics.

Clasic economy combat the two risk techics who in reality are interdependent. The increasement of firm vulnerabilities is the result of the interdependence between the two category of risk.

From the point of view of the possibilities assuring, we meet insure risks or assure risks.

The causes who cause them are named events (hail, polish, avalanche, innundation, robbery).

From the point of view of them nature, risks can be:

- Risk concerning market;
- Risk concerning propriety;
- Risk concerning personal;

- Risk concerning clients, contractors.

After the events who make it, risks are: climatic risks; technical risks; technological risk, commercial or marketing risk; financial risk; economical or failure risk; investment risk; social risk; political risk; informational risk; exchange risk; state risk; conjectural risk; accidental risks and professional risk.

Manager's attitude given by risk

"*Inside developed markets the individuals are risking time and money hopping that they will get some profits and benefits. While some don't win anything, others succeed. The market system work trough trials and errors and assign recourses for what seems to be a moment innovation."*(1)

The conduct of economical agents is different after the types of risk: risk rivals, indifference at risk, risk lovers. *Tolerance at risk of the business men, is putting its mark, too. In this context bankruptcy represent the juridical-economical attempt to take part of these situations in which the potential risk is certitude for some firms.*

Risk in business depends of the strategy of each economical agent, of his capacity to anticipate the evolution.

Business men tendency to risk is different, driven by attitude and context. This is correlated with the business environment inside the company.

Without risk they were not be benefits and profit.

There are three essential motivations in calculating decision taken process:

- Assuming the risk you have to take in getting success;
- Assuming a professional obligation rather than a personal one;
- Assuming the risk has on emotional characteristic thru the danger it involves Many are whose who are saying that the pleasure of success is invigorating by risk taken.

Other studies show that managers avoid risk, seeing risk as something that can be controlled. They don't accept that the risks can be control them, trough their capacity. When they take the risk, they do it changing the conditions to be sure that they don't fail. *Before of any other decision, they think at a good strategy of controlling the situation.*

France physician Louise de Broglie says,"We must follow the risk because that is the key of successful business".

The risk lives inside us because we live in a risk society. Risk development creates crises that are thought as some fractures in business system.

Evaluation of risk means establishing the following values of risk: neglectful risk, minor risk, medium risk, major risk, disaster.

Risk management

Managing projects inside an enterprise assumes some risk, caused by:

- Internal changes;
- Unrealistic strategies;
- Errors in production and execution.

Risk into a firm is referring at the probability of wouldn't respect the terms:

- Performance(the quality standards);
- Program (not respecting the terms of execution);

- Cost (passing the budget).

Risk management is a cyclical process, with different stages: identify the risk, analysis and reaction of risk. Contains series of activities, which start from the context and firm objectives, analysis the risk factors and in minimize the risk and cost.

Economist Raymond Barre evidence two important characteristics of market economy:

- Tendency to increase the risk –because of the development of technological process, dimensions and interdependency of activities, social transformations;
- The increase need to develop a secure business.

Practically, the risk management involves a systematic process of knowing potential factors which attend at firm security, measuring the danger level, effect trough protection and preventing, in the end, the transfer of that causes who can't be administrate by the firm, insurance society specialized in risk administration.

The financial theory shows two important effects:

- Economical-over the patrimonial elements from a firm;
- Financial-about firm abolishment and solvency.

Indifferent of policy firm, risk administration have two important dimensions:

1. factor variability and the consequences of negative results;
2. different administration cost, depending on risk consequences and his fluctuation manner.

The cost of risk administrating is the total of some external expenses. *Based on the two dimensions: the total injury and the cost of administration risk could happen the action decision factors to the risk trough the*:

- preventive measure which can reduce the consequences and the increasment of cost risk, minimize repetitions and realizations of the events;
- transfer of some partial or total risk to assurances, determine the cost increasment, but diminish the consequences of lowering risk. *So, the objective of risk management is the placement into an area in witch the risk is assume, and the cost is reasonable and the firm permit them.*

Pointed out the risk in decisional process involves a process managment between general management and risk management, even in the occidental firm exist a department for evaluation, analysis and administration risk.

The new made function is an intermediary between the tradition firms of firm management.

This process is managed by persons who communicate all the information to the border members. This person is named by Anglo-Saxons "risk-manager" and in France "auditeur des risques" meaning bookkeeping risk.

Risk evaluation is divide in three segments:

a) **estimate the business area** –national economy, activity sectors and firm;

b) **study of firm organization** –functions, strategy, budget, administration control;

c) **the general analysis of the financial situation and results** –investments, analysis of internal and external financial sources, analysis of cost, profit and expenses.

All this are put into a periodic report that the border members can have access, especially the general manager and the financial directory.

Risk analysis includes:

- *Phase of identify the risk*

Identification of the risk can be made using some methods:

- Making some list witch involve the risk potential: medium conditions, expected results, employment, estimation of cost etc;
- Using the experienced personal to identify risks. Often the field employers know better the risks that the one from the office. With the help of communication from this two the risk will diminishing.

Identify the external risks, with the need of one person who will participate at meetings and who will know all what is published.

- *Phase of evaluation*

We take into consideration the risk from the first phase and to realize a quantification of that.

For risk analysis we are using a mathematic instrument that must be adjusted at the necessities and at base date.

- *Phase of analysis* is referring at the identification of needs, causes and establish the managerial measures of lowering and elimination of risk. A risk can be provoked by many causes who must be treated, and the causes can be preventive or curative, on short, medium or long time.

Relation at risk

Is the action phase from the management risk in witch they try to lower, eliminate, and distribute risks.

Risk elimination has the purpose to move away the risks. The managerial team can:

- Not to initiate a business transaction;
- To establish a high price to eliminate the risks;
- To conditioned the offer.

The companies who apply the project of risk management had the advantages that:

- A better assignment of resources;
- Lower cost of risk transfer;
- Company, firm expose to risk.

Some companies **administrate the risks into individual department of management**. So, the treasurer is the one who take care of determinate the effect, fluctuations.

Even the superior of the company could be a risk, because he manages the firm capital.

Another risk manager is the one who chooses an assurance program on many years to prevent the company of some risks.

In all this situations the risk will be taken after a decisional process.

The treasurer analyzes the financial and operational risk and the president the political, economical and financial risk.

Every risk manager takes decisions on administration of risks for who he's responsible for the other risks that can appear. And this can goes to a inefficient risk of administration.

Trough the motives who determine some companies to administrate the centralize risks could be:

- Expansion in many countries, subdue the company to variation, rules and different affair medium.
- Expansions can take to the company big losses, financial losses, affecting the activity for other countries;
- Modifications into company;
- Proactive management and a proactive attitude to risks.

Managers who can NOT take his risks should not be involved in this field.

Recently, the risk represents not the impossibility of assuring the expected result, but his costs. This observation confirms two values: the performance level and the survive level.

All what we noticed above lead to the next conclusions:

- **Business without risk wasn't and wouldn't be. The difference is that some business is more risky. Managers who try to ignore risk and others that are doing all what they can to lower it. However will be the risk is present. So, faster you get use to the managerial risk faster you will succeed**.
- The dimensions and the form of risk in market economy is biggest that in central economy;
- Necessity of some strict instruments to calculate the risks;
- Risk get a function of managerial competence, don't have to do anything with the destiny, but only of the manager to establish the evolution of it;
- Economical agents and them managers have lower information concerning the types of risk and them dimensions;
- Risk analysis must permit a hierarchy;
- The increase of risk roll in decision area is the main element in activities development of managerial risk who will permit to form a mentality of market economy;
- Risk generate crisis who are considerate as fractures in the normal function of the system;
- Concentrate, risk area is resuming at three expressions:

- ANALYSIS: to identify the risks and to evaluate the direct and indirect consequences;

- REDUCTION: to prevent them to diminish or to eliminate. To assure in the respect with the apparition of new risks and to diminishing the unexpected effects trough the respective means of protection;

- FINANCE: to control the costs and the potential losses.

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SOCIO-DEMOGRAPHIC ASPECTS OF POPULATION FROM PLUGARI COMMUNE, IAŞI COUNTY

ASPECTE SOCIO-DEMOGRAFICE ALE POPULAȚIEI DIN COMUNA PLUGARI, JUDEȚUL IAŞI

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Abstract: *The labor force is a main component of resources system which mobilizes the other resources and agricultural production factors. Trough dynamic characters of his behavior, the labor force consists the productive capacity which creates and continue improves the production accessories used in agriculture. The study wants to analyze the population of Plugari commune, with aspects of population structure on sex, age groups, the percentage of active population on area, the percentage of labor force from agriculture and the property structure on an active from agriculture, in comparison with the Iaşi County average. In genre, the population represents an important indicator in economic analyze of a production unit, locality or a group of localities, territorial administrative unit, area or natural region etc. Population, specially the labor force (active population), is imposed as main production factor which assure the mobilization and utilization of the other factors. As economic indicator and production factor, population can be studied from different points of view, from which is the reproduction of population, life average, the structure on average, sexes, age groups, activities domains, training and culture degree, work potential etc.*

Rezumat: *Forța de muncă constituie componenta principală a sistemului resurselor prin care sunt mobilizate şi celelalte resurse şi factori ai producției agricole. Prin caracterul dinamic al comportamentului său, forța de muncă constituie capacitatea productivă care creează şi perfecționează continuu mijloacele de producție utilizate în agricultură. Studiul îşi propune să analizeze populația din comuna Plugari sub aspectul structurii populației pe sexe, pe grupe de vârstă, ponderea populației active pe zonă, ponderea forței de muncă din agricultură şi structura de proprietate pe un activ din agricultură, compa Populația, în general, reprezintă un important indicator în analiza economică a unei unități de producție, localitate sau grup de localități, unitate administrativ-teritorială, zonă sau regiune naturală etc. Populația şi în mod deosebit forța de muncă (populația activă) se impune ca principal factor de producție care asigură mobilizarea şi utilizarea tuturor celorlalți factori. Ca indicator economic şi factor de producție, populația poate fi privită din numeroase puncte de vedere, între care reproducția populației, durata de viață, structura pe medii, sexe, grupe de vârstă, domenii de activitate, gradul de instruire şi cultură, potențialul de muncă etc.*

MATERIAL AND METHOD

For identification of socio-demographics aspects were used statistic dates from the townhouse of Plugari Commune and from Statistic Annual of Iaşi County. The present study is made from the analyze of Plugari commune population under the aspect of population structure on sexes, on age groups, active percent of population, the percent of labor force from agriculture and property structure.

RESULTS AND DISCUSSIONS

Plugari is a commune from Iaşi County, Moldavia, România, situated at the North-East border of Iaşi County. His neighbors are: Şipote (Iaşi County) at East and Prăjeni (Botoşani County) at West.

Plugari commune has an total surface of 5502 km. and hers structure is composed by the villages Boroşoaia, Oneşti and Plugari (commune centre), being situated at 68 kilometers from Iaşi.

The population is regarded as a people collectivity which lives on a specific geographic space. From socio-demographic point of view, the population can be describe as an social subsystem which has in view the number of habitants, density, age and sexes structure, births and deceases, the feminization, migration and other things.

A society specific is given by the size of population and by hers characteristics (demographics, socio-economics and training). It has to be known a population from qualitative and quantity point of view (men's, women, kids, youths or older people, their training level, where they live, etc.) to adjust the development politics to actual society pulse.

Table 1

The evolution of Plugari commune population in 1997-2007 periods

YEARS	1997	2000	2005	2006	2007
TOTAL POPULATION, from which:	3507	3688	3725	3732	3741
PLUGARI VILLAGE	1807	1815	1843	1845	1848
ONEŞTI VILLAGE	234	249	265	267	269
BOROSOAIA VILLAGE	1466	1624	1617	1620	1624

Source: County Direction of Statistics Iaşi

The analyze of dynamic demographic situation of Plugari commune, founds that, hers population has growth in the last 10 years with about 200 persons because, after 1990 year rural migration has become a characteristic phenomenon, specially from the cities where working places was reduced, the attraction force of the city has decreased, because the rising of life costs, specially the price of residence and life maintenance. In this context, if in 1997 year the

population was 3507 people, ten years later, in 2007 it grows reaching 3741 persons (table 1).

The population structure on age and sexes has a powerful influence on locality definite by the evolution of human collectivities, as well by its demographical implications and by economic and social consequences.

The proportion occupied by the population on those two sexes, orientate us on population balance, on reproduction capacity, on the foundation society nucleus – family and on other aspects with social character (table.2.).

The inclinations that are in entire world, including in our country, reflects, on long term, a bigger percent of female sex population, this was in 1997 year in Plugari commune at the level of 50.8 percents. In 2005-2007 period was a decrease tendency, reaching at 50.5%. Yes, instead of this tendency, the phenomenon, on the whole, attests the bigger reproduction capacity of the population.

Table 2

The population structure on sexes

Total population, from which:	1997		2005		2006		2007	
	nr.	%	nr.	%	nr.	%	nr.	%
	3507	100	3725	100	3732	100	3741	100
Men`s	1725	49,2	1843	49,5	1847	49,5	1851	49,5
Women	1782	50,8	1882	50,5	1885	50,5	1890	50,5

Source: The Plugari Townhouse

One more important aspect that characterizes the population of one territory is regarding the age category structure, this aspect is express of work capacity of population, ageing degree or juvenility of population, reproduction capacity and further.

In this study the population was divided in three age groups as following: 0-14 years (the youth out of working age), 15-65 years (population with working age), and over 65 years (third age population) (table 3).

Table 3

The population stucture on age groups

Years	Age groups					
	0-15	%	16-59	%	60 and over	%
1997	820	23,38	1713	48,85	974	27,77
2000	853	23,13	1878	50,92	957	25,95
2005	881	23,65	1913	51,36	931	24,99
2006	885	23,71	1906	51,08	941	25,21
2007	895	23,92	1909	51,03	937	25,05

Source: Adapted dates from Plugari Townhouse

From the analyze of the Plugari commune population structure on age groups is observing a balance between youths – 23.9% and full age people – 25.05%, both groups represents over 48.0% from total population.

The biggest group is represented by the grown up population, which is involved in economical and social activities, respective the 16 to 59 years group. This group in the past ten years has registered a percentage rising from 48.85% to 51.03% from total population. The persons over 60 years and over registered an small decrease from 1997 year, from 27.77% to 25.05%.

It is important to mention that the youth population 0-15 years remains at one almost constant level in the last ten years, approximately 23.50%, in the conditions of numeric increase of this group, from 820 persons in 1997 to 895 persons in 2007.

We shown in the upper text that from all age categories, the active population represents the biggest importance in economy, it is the part that assure the material and spiritual goods fabrication for the society, assuring the society existence itself and his level of living. In following text we will show the proportion from the total active population, occupied population and active population from agriculture (table 4)

The percentage of occupied labor force from total active population represents almost 90.0%. We appreciate that this percentages represents the normal limits for actual conditions in our country. The rise percentage of labor force from agriculture is justified by the presence in considerable measure of agricultural activities.

Table 4

The labor force from Plugari Commune

Years	Active population		Occupied population		Occupied population in agriculture	
	Nr.	% from total population	Nr.	% from total active population	Nr.	% from total active population
1997	2200	62,7	1962	89,2	1700	86,6
2005	2565	68,7	2151	83,8	1881	87,4
2007	2225	59,5	1984	89,2	1734	87,4

Source: County Statistical Direction Iaşi.

On a traditional agricultural country background and over 1990 the agriculture has absorbed, year over year, the biggest part of occupied population. In this context, and from the table 4 dates, we can say that even the Plugari commune is mostly agricultural.

From property structure on an agricultural active in limits of 2.9 and 3.6 hectares, result that labor force from this area is insufficient used, that we confront our self with an excess of labor force, fact that determinate a very decreased work productivity, that is caused and by the terrain configuration which doesn't allow the mechanization of works.(table 5)

Table 5

Property structure on an agricultural active

Years	Agricultural surface (hectares)	The labor force from agriculture (Nr.)	Agricultural surface on an agricultural active (hectares)
1997	4884	1700	2,9
2005	6029	1881	3,2
2007	6287	1734	3,6

Source: The Plugari Townhouse

We mention that the almost total lack of nonagricultural activities, as following the absence of other resource than land, establish the under privileged area character from economical point of view. For the improvement of actual situation, one possible way to follow, having as background the resources from agriculture, will be the radically change of the agriculture structure, in main direction of intensive embranchments development, such as viticulture, fruit growing, animal breeding, embranchments that are modest represented in area.

Starting from the actual situation, is recommended a durable rural development strategy in which the economical and social environment to become attractive for investors. The development, mainly of commercial activities, in the lack of other more active preoccupations for the intensification of agricultural embranchments, doesn't assure the economical increased desired by the commune.

Although today the rural development becomes a part of national politics, the actions for rural economy diversification at Plugari commune level are shy. These actions must has as a purpose the generation of new work places and life conditions that are necessary for retaining the rural population, specially of youths and of women and to allow to those that are at the third age to let the agricultural activities for younger peoples.

CONCLUSIONS

Plugari commune in a locality with an agricultural economy because the biggest part of population is occupied in agriculture and the main incomes comes from this embranchment.

The decreased level of population in rapport with surface unit has direct consequences over the work productivity and over the life level of population.

The positive aspect that results from the analyze of population structure on age groups, is the fact that the biggest part of population is represented by the population from 15-65 years group, this is the population at work age in percentage of approximately 55.0%. This thing demonstrates the increased level of commune human resources.

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OUTSTANDING FIGURES IN THE STATISTICS WORLD

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Abstract. *After year 1850, as for the publication of Hermann Conring, G. Achenwall, John Graunt and William Petty paperwork the statistics domain has extended quite rapidly both as a social influence and regarding the approached contents and domains. Along the further decades, there have assessed a great number of specialists in statistics theory and practice, and also a impressive number of world magnitude reference papers. Beginning with year 1859, in our country, sets up the first Rumanian Statistics Office in Bucharest, and this fact enabled the elaboration of some statistical series of indexes which reflect social life conditions and specific of the moment. Commencement with year 1922 there has been published an annual Rumania's statistic and various statistic branch studies. The published studies regarding the Rumania's general population census (in 1930) and the agricultural census (1941) had a positive influence on the Rumanian statistics development.*

Rezumat. *După anul 1850, datorită publicării lucrărilor lui Hermann Conring, G. Achenwall, John Graunt si William Petty, domeniul statisticii a început să se extindă rapid fiind influentat atât de sfera socialului cât si de cotinuturile si domeniile abordate. În perioada următoare s-a remarcat un număr mare de specialiati în domeniul statisticii, a teoriei si practicii din acest domeniu. Începând cu anul 1859 s-a înfiintat în Bucuresti primul Birou de Statistică, acest lucru conducând la realizarea unor buletine statistice ce reflectau aspecte specifice din viata socială a momentului. Din anul 1922 s-au publicat, pe lângă un anuar statistic al României, diverse studii statistice. Realizarea recensămintelor privind populatia României din 1930 si cel agricol din 1941 au reusit să aibă o influentă pozitivă în dezvoltarea domeniului statistic din România.*

Keywords: *statistics, demography, information, social*

"Science is the most precious thing that humanity gained along its historical development", says our famous Rumanian mastermind statistics specialist Alexandru Barbat in his reference paper in the 1970's ("Theory of Social Statistics"). Indeed, the evolution, the individualization and automating of the various science domains has evolved quite slow along time. Firstly, the explicit separation between the exact and socio-humane sciences happened relatively slow in the humanity history, approximately two centuries ago. We can locate the first extended application of technical sciences and the individualization of science as a production factor during the Renascence and the Industrial Revolution period, so to say after 1800. Today it is almost a fact that *information* has become a distinct resource in the modern economy, namely that *information*

has individualized as a distinctive production (output) factor; similar affirmations about the science individualization role as an output factor were defined approximately two centuries ago. After the 1850, says J. D. Bernal, the science began to bring divvy. Towards the end of the 18th century, has appeared the first *Economics* distinct paperwork that was a foundation for the industrial capitalism and it became a very argued basic fundament of the liberal philosophy of the nation's economic growth (we obviously speak about Adam Smith famous work *The Wealth of Nations,* 1776).

But how can we quantify the information? How ca we compare the relative power of two countries and/or two companies under the information exploitation aspect? What instruments do modern statistics offer for the quantification of various quantitative / qualitative information components as a resource?

Without any aspiration for the complete answers at these questions, we'll try to succinctly sketch the learning process evolution in the humanity modern history. So, a series of inventions / innovations with a social character, as the same Peter Drucker shows, have favored almost an exponential evolution of information learning / assimilation by the young generations during the past four centuries. Innovation, says Drucker, is more likely a social term then a technical one and it derives mostly from a change of options or the of two destinations effective power possibilities. "Any practice is based on theory, even if practicians themselves are not conscious of it". Jean Baptist Say, Joseph Schumpeter or J. Keynes, and later Paul Samuelson and Peter Drucker have made their references to Adam Smith work, *The Wealth of Nations*. Without referring to Adam Smith paperwork we must catch the following moments in the process evolution of knowledge learning and spreading in all social media:

- Since Aristotel time (III century b.c.) and until XV century the essence of various knowledge domains has frequently restrained itself almost unanimous for the philosophy domain. This was and remained for a long period of time the domain which awarded the first Ph.D.(Philosophy Doctor);
- Approximately in the middle of the XVII century a great Czech reformer in the education problem, namely J. Amos Comenius, projects and uses the first Latin primers. Essentially, he invented that thing that today we name *textbook* and which for the social aspect represented a major invention, an invention that allowed the development and generalization of the educational system, generated the systematic preparation of the teachers and prefigured the further pattern of the German university. Without this invention, apparently minor, a brilliant professor can't teach simultaneously but 1 to 3 children; but using the textbook, even an inexperienced teacher can "force" 50 students to assimilate a knowledge volume, either in a general domain – as management, or in a more technical domain, as statistics. "Innovation, says Drucker, mustn't be absolutely technical and mustn't be by all means a thing." According to the same analyst, the hospital as a social innovation or the management as a distinct institution had each one of them a major impact in their reference domains. During the last century, management allowed that for the first time employees with various qualifications / knowledge

to be unitarily directed within an organization, a fact that generated an unprecedented efficiency in the economic evolution of the countries.

- The meaning that it has today, the *modern university* concept was invented by a German clerk, Wilhelm von Humboldt, in 1809, who founded the Berlin University, putting forward two major objectives:

- to take over the intellectual and scientific leadership that France was displaying at the moment;
- to induce to the Germans the energies that were released by the France Revolution, whether a successful action, with half a century later.

This *Humboldiane University* pattern was further "borrowed" by USA (approximately around 1850), and only after half a century to came back after the Europeans. Nowadays, the undeniable economic superiority of USA, both in its relations with Japan, and EU, mostly derive from the daily processed information in those over 3400 American universities. The initial starting pattern itself became relatively old-fashioned, especially after introducing the education in the OMC agenda; the new pattern to be is that of an *entrepreneurial university*, that deals with education as a common service and that functions / organizes accordingly with the newest management principles.

- Approximately around the year 1500, Gutenberg invented printing, and the printing process, although difficulty and asking for skills to be manipulated enabled during four centuries the knowledge storage in book pages and their remittance from one generation to another. After almost four centuries, in 1885, Ottomar Mergenthaler has invented the linotype for the letters cropping, and for the next period of time, after almost 5 years, the number of printed newspapers, magazine and books grew almost exponentially since the linotype became standardized and eliminated the old printing processes.
- Around 1900, a *Bell Telephone System* statistician has projected, for the next 50 years, two curves – one for the American population growth and one for the growth of necessary operators in order to manage the telephone calls volume – and the conclusion was that between 1925-1930, all American women aged between 17 and 60 years old would have to work in the manual system of the telephone calls. As consequence, two years later, the Bell engineers projected and installed the first automatic control panel.

Approximately around the year 1800 we encounter, under a historical aspect, the first obvious signs of the statistics development as a distinct discipline. Until this moment, various statistical information have been used across centuries in a formulation / evaluation predominant empirical (the population number of a country, quantitative elements expressing the strength of some empires etc.). The statistics individualization roots as a distinct discipline are to be found, beginning with the XVIII century, in the so called "descriptive school" and "politics arithmetic's" school.

NAMES AND REFERENCE PAPERWORKS IN THE WORLD STATISTICS

After year 1850, as for the publication of Hermann Conring, G. Achenwall, John Graunt and William Petty paperwork the statistics domain has extended quite rapidly both as a social influence and regarding the approached contents and domains. Along the further decades, there have assessed a great number of specialists in statistics theory and practice, and also a impressive number of world magnitude reference papers.

From all these statistics specialists and world reference works we name the following:

- French Math man Antoine Deparcieux, author of "Sur la probabilité de la durée de la vie humaine" ("About the probability of human life duration"), elaborates mortality tables that are named after him, and serve the France General Pension House, created in 1850, at tariffs calculation (today is called *life duration*).
- German statistician Karl Knies, in his work „Die Statistik als selbständige Wissenschaft" ("Statistics as an autonomous science"), published in 1850, gives a suggestive image of the unique statistics through its comparison with "a river that has two springs", namely the descriptive school and the politics arithmetic.
- German statisticians Gustav V. Rümelin (1815-1889), Ernst Engel (1821-1896), have numbered over 100 statistics definitions; this demonstrates the fact that this discipline had some unsolved issues, that left some space for elucidation research and trials; in 1875, Rümelin talks about the statistics ramification as a social science, emphasizing the fact that it can't be a social and a political science at once. The same Rümelin is the first one that recommends the statistics division in three parts: population statistics, economic statistics and cultural statistics. Due to the fact that statistics methods have encountered across time their applicability also in natural science (meteorology, astronomy, biology etc.) the issue of the unique or multiple statistics study object has preoccupied various theoreticians for the further decades also.
- At the middle of the XIX century statistics was defined as "science of social acts" (1840-Dufau; 1847-Moreau de Jonnès) and later it will be considered as a "research method of mass phenomena". Generally speaking, statistics object has included big number collectivities or series from demography, economy, culture, public administration, psychology, pedagogy and some exact sciences.
- German statistician and sociologist Georg V. Mayr, throughout his work "Statistics and Society Science", (a four volume work, but only three published), presents statistics only as a "method science", based on the statistics duality idea namely as a formal statistics and a material statistics. So, this statistician suggests that branch statistics are meant to solve various problems in application domains

and that there exists a single science of statistics; yet he didn't finished his conclusions reserved for the last chapter of this paper work.

- Between the years 1880-1930 appeared a great number of works dedicated to the statistics domain, either globally, or for application branch.
- In 1929, the German sociologist Ferdinand Tönnies elaborates a statistics concept inserted into sociology under the form of "sociography", a concept that had quite a lot of adherents;

NAMES AND REFERENCE PAPERWORKS IN THE RUMANIAN STATISTICS

Beginning with year 1859, in our country, sets up the first Rumanian Statistics Office in Bucharest, and this fact enabled the elaboration of some statistical series of indexes which reflect social life conditions and specific of the moment.

Synthetically the main names and reference works in the Rumanian statistics history are:

- **Nicolae Șuțu** has published at Iasi, in 1849, the "Moldavia Nations Statistics", translated by Teodor Codrescu; he bring information referring to the territory, population, agriculture and industrial output, trade, consummation and productive forces of Moldavia at the moment;
- **George Barițiu** published at Brasov, in "Transylvania newspaper" 1838, important statistical data referring to *products price, stocks course price, Transylvania trade, population, cultural, social and political life of this principality;* at the middle of the XIX century he will create a veritable statistics school in Transylvania, being preoccupied mostly by the demographic, economical, political, national and cultural issues of this province;
- **Dionisie Pop Marțian,** he is one of the advocates of the first Rumanian Statistical Office; he organizes and creates the first population census from 1859 until 1860 in the Romanian Country (Țara Românească); he publishes in 1860 "The Statistics Annals" and, in connection "The Economy Annals"; bring to light his personal idea about statistics and emphasizes his scientifically believes towards the conscience development regarding the theoretical and applicative statistics significance in our country;
- **Ion Ionescu de la Brad** leads the organization of the 1859-1860 census in Moldavia, and throughout his work "Povățuiri pentru catagrafia Moldovei, precedate de oarecare elemente de statistică" creates the first real statistics textbook, the first one of this kind published in Rumanian. Ion Ionescu de la Brad is also the one who contributed to some notions terminological clarification in the Rumanian Statistics and published during 1866-1869 three complete monographs of Dorohoi, Mehedinti and Putna counties.
- Some contributions to the Rumanian statistics development ought to **Mihail Kogălniceanu,** whom in 1870 tried to introduce by law means the decennial compulsoriness of the population census.

- **Leonida Colescu** had indisputable merits in the statistics development through the census realized in 1899 and the one from 1912; regarding especially the later census, Leonida Colescu introduced new data registration rules and principles. In the period 1901-1902, Leonida Colescu organized the first industrial investigation through which he registered the development level of Rumania's industry at the end of the XIX century.
- **I. N. Angelescu** professor from Trade Academy in Bucharest realized important statistical studies in the demographic, economic and population health domains, studies which were published in 1915.
- Beginning with 1919, in Rumania there has been organized the Central Statistics Directory, which structure included County Statistics Offices. Beginning with year 1922 there has been published an annual Rumania's statistic and various statistic branch studies. The published studies regarding the Rumania's general population census (in 1930) and the agricultural census (1941) had a positive influence on the Rumanian statistics development.

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OPTIMIZATION OF THE DIMENSION OF FRUIT GROWING PLANTATIONS IN THE BACĂU COUNTY, IN ORDER TO INCREASE THE ECONOMIC EFFICIENCY OF PRODUCTION

OPTIMIZAREA DIMENSIUNII PLANTAȚIILOR ŞI A PRODUCȚIEI DE FRUCTE ÎN FERMELE POMICOLE DIN JUDEȚUL BACĂU ÎN SCOPUL CREŞTERII EFICIENȚEI ECONOMICE A PRODUCȚIEI

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Abstract. *A determining factor in increasing the economic activity at the Joint-Stock Company of BENEŞTI is the dimension of fruit growing areas within the whole sector for the main species. As regards the optimum dimension of fruit growing plantations, from the analysis of technical-economic indicators during 2004-2006, we had in view the following criteria: minimization of production expenses per fruit growing hectare, minimization of production expenses per plum tree cultivated hectare, minimization of production expenses per apple tree cultivated hectare. The paper had in view only the whole dimension of the fruit growing farm and the dimension of the main fruit tree species cultivated at the agricultural farm.*

Rezumat. *Un factor determinant în creşterea performanţelor activităţii economice la S.C. BENEŞTI S.A îl reprezintă dimensionarea suprafeţelor pomicole, pe ansamblul sectorului şi în cazul principalelor specii. În ceea ce priveşte dimensionarea optimă a plantaţiilor pomicole, din analiza indicatorilor tehnico-economici, în perioada 2004-2006, s-au avut în vedere următoarele criterii: minimizarea cheltuielilor de producţie la un hectar pomicol; minimizarea cheltuielilor de producţie la un hectar cultivat cu prun; minimizarea cheltuielilor de producţie la un hectar cultivat cu măr. Analiza s-a limitat la dimensionarea de ansamblu a exploataţiei pomicole şi la dimensionarea principalelor specii pomicole cultivate de societate agricolă.*

MATERIALS AND METHODS

The methodology of calculating and optimizing the dimension of fruit growing farms, cultivated intensively, was applied to the Joint-Stock Company of BENEŞTI - Stănişeşti, Bacău County, a farming company known for its fruit growing production in the area of the Zeletin Basin.

RESULTS AND DISCUSSIONS

The fruit growing company is an important fruit supplier, supplying the market of the Bacău County and of the neighbouring counties, as well as for exportation. The great and diversified demands for fruits, as well as the availability of fields and soil climatic conditions, have contributed to the introduction and extension under intensive system, of fruit tree species and varieties, very valuable from the nutritional viewpoint, and extremely solicited on market.

We refer in this study especially to plum tree growing, but also to apple tree and cherry tree cultures. Since setting up, such an assortment structure has brought important benefits to the farming societies.

During the analysed period (2005-2007), the fruit growing area was the same, with certain prospects of increasing the area occupied by fruit growing plantations.

The first approach for setting up a fruit growing plantation is choosing properly the field.

The practice pointed out the factors of fruit agro-productivity, which one may take into account in choosing the fields for orchard setting up, such as: climatic, soil and relief conditions, biological peculiarities of plants and growing technological systems.

The fruit species (varieties) have specific biological demands to the climatic and soil factors, which must be met by choosing the fields meant to their growing. The achievement of this fundamental condition for the harvest level requires both the deep knowledge of fruit tree needs and tolerances to different climate and soil factors, and the knowledge of the regime of these factors, of reciprocal relations and of the relations to the fruit trees, under different climate, soil and water conditions.

Although in the fruit growing structure of the Joint-Stock Company of BENEŞTI- Stănişeşti, Bacău County, apple trees and cherry trees occupy insignificant areas after plum trees, these species were not extended at the level of possibilities. The ratio between young and fruitful orchards is not proper, knowing that a good perspective fruit growing must have permanently in its structure 25% of young orchards. This case was not found at the Joint-Stock Company of BENEŞTI, where young areas occupied by apple trees or cherry trees represent 2-3% of the total fruit growing area, situation determined by extremely high costs of setting up fruit tree plantations.

A determining factor in increasing the performances of the economic activity at the Joint-Stock Company of BENEŞTI is dimensioning the fruit growing areas, on the entire field and in case of main species.

As concerns the optimum dimensioning of fruit growing plantations, during 2004-2006, from the analysis of technical-economic indicators, we had in view the following criteria: minimising the production expenses at one ha of fruit trees; minimising the production expenses at one ha cultivated with plum trees; minimising the production expenses at one ha cultivated with apple trees.

The analysis was limited to the dimensioning of fruit growing farm and to the dimensioning of main fruit tree species cultivated in the farming company.

The economic-mathematical optimization model refers to the parabolic regression, of the following type: $y = ax2 + bx + c$, where: x = dimension of the fruit growing area, respectively of the area cultivated with plum trees and of the area cultivated with apple trees; y = dimension of production expenses per ha.

The obtained parabolic regressions are the following: For the fruit growing area of the farm $y = 2.2129466x2 – 1781.016942x + 381934.0039$; Correlation ratio *) (R) = 0.8906

*) Coefficient expressing the intensity of connections between the variables of the model in case of non-linear models. For the area cultivated with plum trees$y = 4.14444765x2 – 2357.11475x + 364184.4317$; Correlation ratio (R) = 0.8344 ; For the area cultivated with apple trees $y= 150.69848x2 – 29854.8816x + 1484549$; Correlation ratio (R) = 0.9787.

From the analysis of the models of parabolic regression, we may draw the conclusion that intensifying the connection between the dimension of fruit tree areas and the level of production expenses per ha is very tight, the correlation ratio having values comprised between 0.8344 and 0.9787. It means that the degree of determining the expenses per ha is almost entirely influenced by the size of fruit tree

areas: 79% in case of fruit growing plantations; 69.6% in case of plum tree plantations and 95.8% in case of apple tree plantations.

The high level of the correlation ratio also pointed out that the connection between the size of fruit growing areas and the level of production expenses per ha was correctly described by the chosen parabolic regression. Any other model could not describe correctly the dependence between dimension and expenses per ha of the fruit growing plantation.

Related to the chosen criterion of minimising the production expenses at the area unit, the optimum dimension was established in case of fruit growing plantations from the Joint-Stock Company of BENEŞTI. Thus, the optimum fruit growing area is of **120 hectares**, dimension that minimises the expenses per ha at only 43586.215 thousand lei, a more reduced level than the one registered in case of smaller or larger sizes than this dimension, which is the best.

If we consider the dimension according to fruit tree species, we must point out that the agricultural exploitation must resize its structure on species and to promote those that find favourable climatic conditions; these are plum trees and apple trees. As concerns the plum tree growing, the established regression equation has indicated as optimum the area of 64 ha, meaning a more reduced area cultivated with this crop by 13% than the real one (80 ha). If this size is promoted, one may get a level of expenses per ha of 29,038.412 thousand lei, more reduced with 43% than in case of a dimension of 50 ha and by 19% than in case of a dimension of 70 ha.

This case emphasises the need to optimise the dimension of fruit farms.

The optimization of the structure of fruit tree plantations according to species, under conditions of certain areas, limited as size, is very important, allowing the establishment of the optimum ratio between various species having positive economic effects, and it represents a very complex problem that can be solved by means of calculation mathematical models.

Taking into account the above-mentioned, we are going to present the economic-mathematical model of optimizing the fruit tree plantations according to species, within the Joint-Stock Company of BENEŞTI, Bacău County.

The elaboration of the mathematical optimization model was done in the following stages:

1. **Determination of variables .**We have taken into account the species that meet natural and economic conditions, the most favourable within the area (apple tree, cherry tree and plum tree). Considering that within the company there are areas planted only in intensive system, two or three variables were established for each species, according to the earliness of the production: X_1 – area with intensive apple trees, late varieties; X_2 –area with intensive apple trees, summer varieties; X_3 –area with intensive cherry trees, late varieties; X_4 –area with intensive cherry trees, late varieties ;X_5 –area with intensive plum trees, late varieties; X_6 –area with intensive plum trees, semi-late varieties; X_7 –area with intensive plum trees, late varieties; X_8 – other species in intensive system (sour cherry trees, apricot trees).

2. **Determination of technical and economic coefficients.**The technical and economic coefficients were extracted from the production technologies established for each species, representing values reported to the area unit (ha).

Based on the technical and economic coefficients from table 1 and on those mentioned in the working stages, the following restraints were formulated: 1) The entire area meant for fruit tree plantations should be occupied: $X_1 + X_2 + X_3 + X_4 + X_5 + X_6 + X_7 + X_8 = 120$ ha; 2) Area cultivated with intensive apple trees, late varieties; 3) Area cultivated with intensive apple trees, summer varieties; 4) Area cultivated with intensive cherry trees, late varieties; 5) Area cultivated with intensive cherry trees, late varieties; 6) Area cultivated with intensive plum trees, early varieties; 7. Area cultivated with intensive plum trees, semi-late varieties; 8) Area cultivated with intensive plum trees, late varieties; 9) Area cultivated with other varieties; 10) Limiting the labour consumption: $120 X_1 + 100 X_2 + 230 X_3 + 185 X_4 + 125 X_5 + 142 X_6 + 156 X_7 + 180 X_8 \geq 0$ days/man; 11) Limiting the fuel consumption:$300 X_1 + 280 X_2 + 230 X_3 + 210X_4 + 250 X_5 + 260 X_6 + 270 X_7 + 200 X_8 \geq 0$ litres; 12) Limiting the chemical fertilizer consumption: $300 X_1 + 250 X_2 + 350 X_3 + 300X_4 + 350 X_5 + 400 X_6 + 400X_7 + 250 X_8 \geq 0$ kg a.s.; 13) Limiting pesticide expenses: $1000X_1 + 850 X_2 + 800 X_3 + 650 X_4 + 600 X_5 + 650 X_6 + 700 X_7 + 500 X_8 \geq 0$ thousand lei; 14) Limiting the expenses with different materials :$50 X_1 + 60 X_2 + 60 X_3 + 60 X_4 + 60 X_5 + 60 X_6 +60 X_7 + 50 X_8 \geq 0$ thousand lei; 15) Limiting total production expenses :$34150 X_1+28180 X_2+16490 X_3+16200 X_4+16740 X_5+18550 X_6+19750 X_7+9860 X_8 \geq 0$; 17) Non-negativity conditions: $X_1 \geq 0$; $X_2 \geq 0$; $X_3 \geq 0$; $X_4 \geq 0$; $X_5 \geq 0$; $X_6 \geq 0$; $X_7 \geq 0$; $X_8 \geq 0$; $X_9 \geq 0$; $X_{10} \geq 0$; $X_{11} \geq =0$. Function objective – profit maximising:$15250 X_1+51134 X_2 + 7510 X_3 + 8800 X_4 + 3580 X_5 + 6270 X_6 + 7150 X_7 +3250 X_8 \rightarrow$MAXIM.

As concerns the above – mentioned restraints, we must explain the following: The 120 ha represent the area of fruit tree plantations the company proposed to exploit in the prospect of year 2010 and which resulted after the action of optimizing the fruit tree areas from the Zeletin Basin. From this area, about 20 ha are trained for planting with different species, the exploitation being done in intensive system; The company has in exploitation significant areas of plantations with different species. Taking into account their relatively young age, some of them will be kept under exploitation until reaching the minimum profitableness threshold. The prospect strategy of the company has in view that all the areas should be done in intensive system; The level of mean yields and the incomes for each species are found at a high level, for ensuring a corresponding mass of the total profit, in order to achieve the economic competitiveness of the company. This made that the size of the technical coefficients (consumption of chemical fertilizers and manure, fuel and labour) and the economic ones (total production expenses) should not be restrictive within the mathematical relations. This consumption of factors corresponds to the technological demands, which will be used for ensuring the established production levels.; The prices for the capitalization of production, which are found at the level of total incomes for each product, were established according to the prices practiced by the company in 2007, with different economic agents, both in the country and at exportation, taking into account the trend of the price evolution of the production factor and of the fruits; e) The Joint-Stock Company of BENEŞTI has as aim, by the total volume of the estimated profit, to insure its own funds, both for the periodic

running of the production cycle and for the development, restructuration and modernization of the production structures within the company.

Data comprised in the economic-mathematical model have been ordered, being found in its design (tab. 2).

After solving this model, in which the function objective was maximising the profit, it resulted the structure on species of fruit tree plantations (tab. 3).

Table 3

Structure on species of fruit tree plantations– optimized variant

No.	Species / variant	Area - ha -	Structure - ha -
1	Intensive apple trees, late varieties	10	8.3
2	Intensive apple trees, summer varieties	30	25.0
3	Intensive cherry trees, early varieties	6	4.6
4	Intensive cherry trees, late varieties	7	5.4
5	Intensive plum trees, early varieties	25	19.2
6	Intensive plum trees, semi-early varieties	40	30.8
7	Intensive plum trees, late varieties	0	0
8	Other species	2	1.5
	Total	120	100.0

Of the total area of fruit tree plantations, the seed species represent 33.3 % (apple tree), while stone species (cherry tree, plum tree) have the highest percentage.

Table 1

Technical and economic coefficient for the optimization of fruit tree plantation structure on species

Specification		MU	Intensive apple trees winter	Intensive apple trees summer	Intensive cherry trees		Intensive plum trees			Other species
					Late	Early	Early	semi early	Late	(cherry trees apricot trees)
VARIABLES			X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8
MEAN YIELD		t/ha	32	27	10	8	12	14	15	8
CONSUMPTION	Labour	d.m.	120	102	230	185	125	142	156	180
	Manure	ton	15	15	12	12	12	12	12	10
	Chemical fertilizers	Kg s.a	300	250	350	300	350	400	400	250
	Fuel (gasoil)	litres	300	280	230	210	250	260	270	200
	Insectofungicides and herbicides	RON	1000	850	800	650	600	650	700	500
	Diverse materials	RON	50	60	60	60	60	60	60	50
TOTAL PRODUCTION EXPENSES		RON	34150	28180	16490	16200	16740	18550	19750	9860
PRODUCTION COST		RON /kg	1.06	1.93	1.95	2.02	0.97	1.03	0.88	1.0
VALORIZATION PRICE		RON /kg	1.72	2.1	2.5	3.0	2.2	2.0	2.4	1.3
VALUE OF THE PRODUCTION AT VALORIZATION PRICE		RON	49400	39520	24000	25000	20320	248210	26900	13110
RAW PROFIT		RON	59000	50000	16000	55200	51200	12000	30500	10000

Table 2

Design of the economic-mathematical model of optimization on species of fruit tree plantations

No.	NAME OF RESTRAINT	V A R I A B L E S								Sign	Size of restraint	MU
		X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8			
1	Total area	1	1	1	1	1	1	1	1	=	120	ha
2	Minimum area with intensive apple trees- winter	1	0	0	0	0	0	0	0	≥	7	ha
3	Maximum area with intensive apple trees- winter	1	0	0	0	0	0	0	0	≤	10	ha
4	Minimum area with intensive apple trees- summer	0	1	0	0	0	0	0	0	≥	27	ha
5	Maximum area with intensive apple trees- summer	0	1	0	0	0	0	0	0	≤	30	ha
6	Minimum area with intensive cherry trees- winter	0	0	1	0	0	0	0	0	≥	6	ha
7	Maximum area with intensive cherry trees- late	0	0	1	0	0	0	0	0	≤	12	ha
8	Minimum area with intensive cherry trees- winter	0	0	0	1	0	0	0	0	≥	4	ha
9	Maximum area with intensive cherry trees-early	0	0	0	1	0	0	0	0	≤	10	ha
10	Minimum area cultivated with intensive plum trees -early	0	0	0	0	1	0	0	0	≥	25	ha
11	Maximum area cultivated with intensive plum trees -early	0	0	0	0	1	0	0	0	≤	30	ha
12	Minimum area cultivated with intensive plum trees- semi-early	0	0	0	0	0	1	0	0	≥	40	ha

13	Maximum area cultivated with intensive plum tree- late	0	0	0	0	0	0	1	0	≤	15	ha
14	Area cultivated with other species - classic	0	0	0	0	0	0	0	1	≥	2	ha
15	Consumption of manure	15	15	12	12	12	12	12	10	≥	0	tons
16	Consumption of chemical fertilizers	300	250	350	300	350	400	400	250	≥	0	kg a.s.
17	Consumption of gasoil	300	280	230	210	250	260	270	200	≥	0	litres
18	Consumption of labour	120	102	230	185	125	142	156	180	≥	0	d.m.
19	Total production expenses	34150	28180	18490	16200	16740	18550	19750	9860	≥	0	RON
20	Total income	49400	39520	24000	25000	20320	24820	26900	13110	≥	0	RON
F.O.	Maximising the profit	15250	11340	7510	8800	3580	6270	7150	3250	->	Max	RON

CONCLUSIONS

The optimization of the dimension of the fruit tree area from the Joint-Stock Company of BENEŞTI means an increase by 20 %, compared to the present size (100 ha), and the promotion of only two fruit tree species, which are fit for an intensive fruit growing: plum trees, on the optimum area of 64 ha and apple trees, on the optimum area of 56 ha, that is with 46 ha more than today.

Under conditions of an optimum size-farm, its manager can monitor directly the development of the main technological works, know the coverage degree of the execution possibilities of these works and take urgent measures in case of appearing some discordances. It is ideal for the manager to be involved in organizing and ruling the fruit tree farm, starting with the decision of setting up the fruit tree plantation, establishing the objectives and continuing the selection of species and varieties assortments, growing systems , land preparation and planting, until harvesting and valorization of fruit tree production.

Because at the Joint-Stock Company of BENEŞTI, the rational use of production factors may be done only within a certain field area, the rational organization and rule of the activity should have in view the dimensioning of field areas, which allow the efficient use of production factors , specific to the fruit tree farm. This dimensioning of the cultivated areas may be solved by two modalities: either by using more compact areas, for the application of modern and rational technologies, which reduce at maximum the production expenses, or by placing crops on optimum size-areas, for increasing the profitableness of the produces.

Our study has shown that the proposed changes concerning the way of using the land fund and the structure of cultures represent not only the rational use of land but also its protection, and of the environment, generally

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SOME ASPECTS CONCERNING THE DISTRIBUTION CIRCULATION OF THE HORTICULTURAL PRODUCTS

CATEVA ASPECTE PRIVIND CIRCUITELE DE DISTRIBUȚIE ALE PRODUSELOR HORTICOLE

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Abstract. *In the developed countries, the market and the competition determine what assets and services are produced, the ratio between the demand and the offer establishes the priority principles in the assets production and in which the market plays a decisive role in the regulation of the whole activity. Thus, the distribution and the sale activity acquire new representations in the market economy, linking in time and space the producers and the customers.The distribution represents one of the main elements of the marketing mix, defining the way through which the products are brought from the producer to the customer. In Pierre Dubois' perspective, the distribution "covers the range of actions through which an asset that comes out of the production machinery is placed at the customers' disposal".*

Rezumat. *În ţările dezvoltate, piaţa şi concurenţa hotărăsc ce bunuri şi servicii se produc, în care raportul dintre cerere şi ofertă determină principiile de prioritate în producerea bunurilor şi în care piaţa joacă rolul decisiv în reglarea întregii activităţi. Astfel activitatea de distribuţie şi vânzare capătă în economia de piaţă noi valenţe, legând în timp şi spaţiu producătorii şi consumatorii.Distribuţia reprezintă una din componentele principale ale mixului de marketing, definind calea prin care produsele sunt aduse de la producător la consumator. În viziunea lui Pierre Dubois, distribuţia" acoperă ansamblul operaţiunilor prin care un bun ce iese din aparatul de producţie este pus la dispoziţia consumatorului sau a utilizatorului"*

The distribution represents the "total amount of the economic and technical-organizatory processes concerning the leading and the delivering of the assets and services flow from the producer to the customer, with maximum efficiency".

MATERIAL AND METHODS

In the modern marketing's perspective, the distribution is a complex concept that reflects: the process of the physical circulation of the commodities, the relations that appear on the market and the activities which mark the passing of the assets from the producer to the customer, including:

- the line that the merchandise covers until the final customer;
- the economic operations that accompany, condition and complete the line;
- the series of operative processes that the assets are submitted to in their way to the purchaser;

- the technical machinery, the unit network, endowments, staff.

RESULTS AND DISCUSSIONS

The distribution process represents a series of flows, such as:

- the negotiations flow – the transactions that take place between the producers, agents or final customers in order to establish the way on which the assets will circulate, the technical and economic transformations that they will suffer;
- the flow of property titles transfers refers to the documents that allow the successive passing of the property titles from one partner to another;
- the information flow contain those activities that suppose transmitting all the information that is necessary in the distribution process;
- the promotional activities flow includes the messages and the information needed in the distribution process;
- the product flow refers to its physical shifting from the producer to the final customer.

The concept of distribution can be seen from two points of view: the economy and the enterprise. From the macroeconomic perspective, the distribution is based on the relationship between the production, the assets delivering and the consumption. At the enterprise level, the distribution process must involve special activities related to marketing and destined to answer the following questions: To whom, where and how do the products sell? Which are the proper distribution networks? What are the marketing and the sales structures that the company needs? What transport, depositing, conditioning and storing means must be used?

The distribution emphasizes, first of all, the way covered by the products, the operations that mark the passing of the products from one economic agent to another and the products logistics. Among the distribution elements we can mention: the distribution channels, the physical distribution, the en-gros and en-detail sale. The distribution can be accomplished through direct contact between the producer and the customer, and if they do not reach in contact, the distribution can be achieved through specialized channels. In order to distribute their products, the producers have the possibility to choose between the direct sale, the sale through agents and the mixed sale. In the countries with market economy, the sale through marketing specialized firms (agents) represents the most prevalent method. In Romania, almost every little enterpriser has adopted the direct sale of the products on the market, and the big enterprisers resort to the agents or the mixed sale.

The three forms of distribution have advantages and disadvantages. Rosebloom argues the advantage of the specialized distribution's existence, namely the advantage of the commercial enterprises' existence, through the analysis of the "contactual efficiency", which refers to the level of the efforts for exchanges between the salespersons and the customer, in relation with the attaining of the distribution objectives, respectively an input-output relationship. The argumentation of the analysis can be presented relying on the example of some producers who want to launch their product on the market and must choose

what distribution methods have to be employed. In the case of the direct sale, the main advantage is represented by the fact that it allows the salesperson to keep the control over the whole commercialization process, its employment being favoured by the existence of a limited number of potential customers and a raised degree of geographical concentration of the potential customers.

If the direct sale's inefficiency results from the costs' analysis, the producer uses an agent. This fact has the advantage of minimizing the costs related to the organizing of the sales, the depositing, the financing of the stocks, the advantage of facilitating the producer's contact with all the potential clients without the involvement of additional costs and of ensuring the immediate availability of the product. The disadvantage of this specialized distribution consists of losing the control over the links that form the distribution channel of the product.

Many producers have adopted the dual distribution, through which the producer sells some of the products directly and entrusts others to an agent.

In conclusion, we can say that the distribution has a very large content, which includes the time and space that separate the consumption production, when a series of technical economic processes take place. Also known as the marketing channel, the distribution channel is the essential element of the distribution submix.

The distribution channel manages the changes that the product suffers in its way from the producer to the final customer, appearing as a "combination of utilities and functions ensured by the enterprise", as a network of organizations and persons that have the responsibility to ensure the availability of the assets at the customer's level. It reflects the itinerary, as well as the ways that ensure the assets' flow from the producer to the customer. The distribution channels have traditionally been named as representing assets and services flows, putting the accent on the economic aspect of these flows. Thus, the distribution channel must be seen as a system whose elements (producer, customer and agent) are mutually conditioned. Also, the distribution channel hints not only at the displacing circulation, the route it follows, but also at the sequence of property titles' transfers between the links of the distribution range, extended until the final customer.The term "distribution channel" refers, in fact, to the commercial agreements concluded in order to ensure the flow of a product from the production to the final customer.

The diversity of the markets' and the clients' needs have generated the evolution of four structures of the distribution channel:

- the traditional standard channel (en-gros / en-detail producer);
- the company's channels, where the successive stages of production and distribution are carried out by only one firm;
- the administrative channels, in which the successive stages of production and distribution;
- channels stipulated by contract, in which a group of independent members of the channel integrate the marketing programs in order to have a greater impact on the market.

Any distribution channel is characterized by three dimensions: length, width and breadth.

1. the length – represents the number of stages, interjacent links through which the product passes from the producer to the customer;
2. the width – represents the number of units through which the product's retail is ensured in every stage of the circulation;
3. the breadth – reflects the spreading degree of the sale spot in space, the proximity of the consumption spots.

The distribution flow of the fruits and vegetables from the producer to the final customer appears as a dense network with multiple specific channels for each product.In the countries with market economy, in the case of the fruits and vegetables, the distribution channels have at least one agent.

The distribution flow includes the achievement of the three objectives: fresh internal consumption, internal worked out consumption and exports. Generally, the line of the horticultural products' distribution begins with the crop, a series of activities being carried out, among which filling and discharging of the wrappers in the vehicles represent 25% of the crop cost. The horticultural products suffer some operations, such as sorting and calibration. The sorting is absolutely necessary in order to display horticultural products that are as uniform, attractive and healthy as possible. The sorting is performed in the vegetable growing, in orchards, but also in the sorting halls.

Some of the sorting operations refer to washing and waxing (apples), cleaning the down and furbishing (peaches). The calibration is manually performed on the field and mechanized in the greenhouse.

The wrapping and especially the pre-wrapping is specific to any type of product, representing the operation of finishing a technological flow. The types of wrappers are different, depending on the products' characteristics (for the internal consumption, apples and pears are wrapped in boxes, peaches for exports in wood or plastic boxes, cherries and sour cherries, for internal consumption, in bulk). In choosing the type of wrapper, physical, chemical, environmental factors that can affect the products must be taken into account.

The decision concerning the employment of a certain type of wrapper becomes a very important economic decision, taking into account the fact that the wrapper represents an additional cost, but a wrapper that is commercially good is also profitable.

On the horticultural products' trajectory the next "stop" is the depositing. The purpose of the depositing is to answer a continuous demand of the customers, having in view a continuous offer. In our country, the depositing in controlled conditions is achieved only for a small part of the production and consists of taking delivery and conditioning. In the case of the products that are destined to immediate consumption, the storage room makes the connection between the producer and the customer.

The products must reach the final customers, on the markets, in different geographic spots, and so they move from the farm, at the purveyance spot, to the

market or the storage room and from there to the final customer. At each conveyance, they suffer different shocks, thus affecting negatively the products' quality. All these lead to the reduction of the number of a product's shiftings. The conveyance costs have a big weight in the price paid by the customer, which sometimes is higher than the value of the gross product.

As we observed, in Romania, from the point of view of the horticultural production's structure, the private sector prevails and, taking into account the sales' volume, the cost of the distribution, the shifting speed of the products, there are the following distribution channel is:

1. the direct distribution, also known as "general retail shop business" – it represents a classic form of distribution and it is practiced especially by the private producers, who consider it as being a magnet of the quick incomes. This method is based on the conveyance of the horticultural products with personal means;
2. the distribution through short producer, agent and customer channel is specific for the en-detail sale by retail shops, which take over the horticultural products directly from the producers; in our country, the variant "autointerjacent (speculator) producer customer" is frequently found;
3. the distribution through long channels (having at least two agents), practiced by the commercial companies with state majority funds and by the producers associations and commercial societies that have the en-gros trade as an object. The weight of the sales through this channel is continuously decreasing.
4. the above distribution specific to the en-gros markets is characterized by a big number of agents, resulting a long distribution channel, created with the purpose of provisioning the medium and big size cities.

In Japan, there are numerous marketing channels for fruits and vegetables. The distribution model for each product points out the strategy of those who perform the conveyance in order to maximize the profit. Depending on the demand and delivery conditions, they can choose a central market with en-gros sale or a local one. In any of these two cases the price is established for each trade stage, from the en-gros sale in the moment of the auction, until the negotiation at the interfacing level and at the en-detail sale shops. In Italy, for example, complex channels with many interjacent links are used.

CONCLUSIONS

The distribution channels are chosen depending on many elements, taking into account the conflicts that frequently appear in the channel, the trends that manifest in the marketing systems etc.

The factors that influence the activity of a distribution channel are internal or external, the most active seem to be:the customers – number, concentration, buying frequency, placing demands;the producers – resources, objectives, organizational culture and characteristics, financial power, position on the market, the quality of the marketing information;the competition – offers the possibility to

choose a cheaper channel, which often represents an excellent competitive advantage. The distribution methods, the relationships with the channels' members, the information system are very important;the product – its characteristics: price, perishing, life cycle, services that it supports (wrapping, labeling) and offers (warranty, reparations);the environment – which imposes legal restrictions (of territory, exclusiveness) or offers advantages, especially for exports;the agents – costs, positions, traditions, restrictions, special agreements.In a market economy, each horticultural products producer is free to choose the distribution channel's type that brings the anticipated profit, and so the four channels of distribution will continue to co-exist.

In the future, the producers' ability to overthrow the general retail shop distribution system in en-gros markets distribution system's favour is expected.

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SOME ASPECTS CONCERNING THE ACKNOWLEDGEMENT METHODS OF THE INCOMES AND EXPENSES ACCORDING TO THE ACCOUNTANCY INTERNATIONAL STANDARDS

CATEVA ASPECTE PRIVIND MODALITĂȚILE DE RECUNOAȘTERE A VENITURILOR ȘI CHELTUIELILOR, CONFORM STANDARDELOR INTERNATIONALE DE CONTABILITATE

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Abstract. *The variety of the incomes and expenses acknowledgement methods provides to all the managers and other persons who are interested the possibility to advance their managerial abilities, choosing that method which presents the most accurate image of the company. When the firm comes upon difficult periods of time which might affect its image, these methods become real bookkeeping engineerings. The incomes and expenses represent straight elements of the profit measurement. Hence, the interest in defining the concepts of incomes and expenses and in presenting their content, according to the new accountancy standards*

Rezumat. *The variety of the incomes and expenses acknowledgement methods provides to all the managers and other persons who are interested the possibility to advance their managerial abilities, choosing that method which presents the most accurate image of the company. When the firm comes upon difficult periods of time which might affect its image, these methods become real bookkeeping engineerings. The incomes and expenses represent straight elements of the profit measurement. Hence, the interest in defining the concepts of incomes and expenses and in presenting their content, according to the new accountancy standards*

The accountancy has a clear and complex image over the incomes and the expenses. It is the result of the efforts made by IASB who, in the General framework for the drawing up and presentation of the financial situations, points out the definitions of the two concepts:

- the incomes represent growths of the economic benefits registered along the accountancy period of time under the shape of inputs or growths of the actives or diminutions of the debts which materialize in growths of the own capital, others than those resulted from the shareholders' contributions.
- the expenses represent diminutions of the economic benefits registered along the accountancy period of time under the shape of outputs or diminutions of

the actives or growths of the debts that materialize in reductions of the own capital, others than those resulted from their distribution to the shareholders.

MATERIAL AND METHODS

The incomes contain the incomes from current activities, as well as profits from other sources. Although the incomes and the expenses are elements of the profit and loss account, we must distinguish between the incomes and profits.

The profits refer to "a favourable net outcome from a transaction, as a result of the compensation's effects (received money) with adequate efforts (the asset's cost). The incomes from the company's ordinary activities are also known as sales, allowances, rents, dues, interests.

RESULTS AND DISCUSSIONS

The profits are growths of the economic benefits that can appear or not along the current activity of the company.

The same approach method is also valid in the case of the expenses.

The expenses include the current expenses, but also the loss.

The current expenses are occasioned by the carrying on of the company's current activity, finding them under the shape of the sales', the wages' and the liquidations' cost.

The loss represents diminutions of the economic benefits that can appear or not along the current activity of the company, such as the loss generated by floods, fires, from the going out of the actives on long term.

Also, the expenses include the unachieved loss, such as those generated by the discounts conferred to the clients or by the growth of the exchange rate.

The profit and the loss are usually pointed out at the net value, without being associated to the afferent incomes, respectively the afferent expenses.

Given their importance in the decision making process, the profits and the loss, once acknowledged in the profit and loss account, they are presented separately.

Out of the classification criteria of the expenses in the managerial accountancy, we will address the criterion of the inclusion in the production cost. The mentioned criterion classifies the expenses in the following categories: incorporable, non-incorporable and suppletive.

- *The incorporable expenses* are found in the financial accountancy, as well as in the managerial accountancy and "are normally included in the cost of the manufactured production".

As a consequence, they are elements of the period's cost, but also the products'. In this category we include the exploitation expenses and, in part, the financial expenses (expenses with interests afferent to the bank credits for the production with long cycle manufacture).

- *The non-incorporable expenses* are reflected only in the financial accountancy, not being included in the cost of the product. Such

expenses include: general administration expenses, sale by retail, extraordinary expenses, financial expenses generated by losses.

- *The suppletive expenses* are pointed out only by the administration accountancy and, as a consequence, they are included in the cost of the product. They are considered "costs without equivalent in the expenses".

In the accountancy's perspective, the acknowledgement represents the process of incorporation of an element in the financial situations, with the condition of achieving two criteria: the probability that any associated benefit has to enter or come out of the enterprise and the probability that the element has to have a cost or a value that can be assessed in a credible way.

There can be cases where an element, although it does not accomplish the acknowledgement criteria, is relevant for the users who are interested in measuring the financial position and the company's performances. In such situations, the presentation of the element in the explaining notes is recommended.

The conceptual framework of IASB has established the criteria for the acknowledgement of the elements that describe the company's performance.

Thus, the **incomes** are acknowledged in the profit and loss account, if the following criteria are achieved:

- future economic benefits growth associated to the growth of an active or the diminution of a debt and
- the credible assessment of the economic benefits' growth.

This means that the incomes are acknowledged simultaneously with the acknowledgement of the actives' growth or the diminution of the debts, such as the net growth of the actives as a result of the assets' sale or services' carrying out or the diminution of the debts as a consequence of the annulment of a debt.

In the case of the **expenses**, the criteria for their acknowledgement in the profit and loss account are:

- reduction of future economic benefits simultaneously with the diminution of an active or the growth of a debt and
- the credible assessment of the economic benefits' reduction.

The incomes' acknowledgement criteria, as IAS 18 "Incomes" prescribes, must be separately applied for each transaction or for two or more cumulated transactions, when these are connected, and the commercial result can be understood only if the transactions are analyzed on the whole.

In order to emphasize the way of acknowledging the incomes and the expenses depending on their nature, we present a few examples:

The incomes from the assets' sales are acknowledged when the following conditions are simultaneously accomplished:

a) the company has transferred to the customer the significant risks and advantages that result from the assets' property;

b) the company does not administrate the sold assets at the expected level, in case of holding their property and does not hold the effective control over them;
c) the size of the incomes can be reasonably assessed;
d) it is probable that the economic benefits that are associated to the transaction be generated to the enterprise and
e) the costs of the transaction can be reasonably assessed.

The incomes from services carrying out are acknowledged according to the "*execution percentage method*", which means that along the execution of the contract, only when the result of such a transaction can be reasonably estimated.

The incomes and the expenses associated with constructions contracts are acknowledged by resorting to two methods recommended by IAS 11 "Constructions contracts": "*the contract finishing off percentage method*" (*the percentage advance method*) and "*the method referring to the final stage of the contract*".

The contract finishing off percentage method (percentage advance) involves the acknowledgement of the incomes and expenses stipulated by the contract, according to the stage of the contract's accomplishment.

Thus, the incomes and the expenses stipulated by the contract are acknowledged in the profit and loss account, as incomes, respectively expenses, at the closing of each financial exercise, depending on the stage of the work's execution.

The incomes from dues are acknowledged having as a base the obligations accountancy, according to the economic reality of the contract.

The incomes from divvies are acknowledged when the shareholder's right to receive the payment is established.

The incomes from interests are *periodically, proportional acknowledged, relying on the effective output of the active*.

The cost of the stocks must be acknowledged as expense in the following situations prescribed by IFRS 2 "Stocks":

a) when the stocks are sold, their accountant value must be acknowledged as an expense during the period of time in which the adequate income has been acknowledged;
b) when a diminution of the stocks' cost until the net possible value level as a result of the devaluation appears. The devaluations value is acknowledged as expense during the period of time in which they were reckoned;
c) when a stock loss appears: stocks whose warranty period has expired, without the capitalization possibility, deteriorated stocks.

The expense with the interests and other expenses sustained by the enterprise with the loan of funds are designated by IFRS 23 "The debts costs". According to this international accountant standard, the debts costs entail two

bookkeeping methods: *the expenses' reflection in the period of time in which they appeared* (fundamental accountant treatment) or their *capitalization*, as part of a long term active.

The differences in the exchange rate represent a purpose of the IFRS 21 "The effects of the exchange rate variations" which prescribe two methods of acknowledging them.

The incomes assessment is made according to the stipulations of the paragraph 9 from IFRS 18, "at the just value of the received or receivable payment method.

Usually, the value of the incomes generated by a transaction is established relying on an agreement between the company and the customer or the active user, taking into account the commercial reductions granted by the company.

The payment method that will be received is generally represented by the cash or cash equivalents, and the incomes sum represents the cash sum or received/receivable cash equivalents.

Postponing situations of the cash inputs or cash equivalents can appear, having as a result the diminishing of the payment method comparatively with the nominal sum of the received or receivable cash.

In order to surpass such situations, IFRS 18 recommends establishing the just value of the payment method, by updating all the future receivable sums, using an established interest rate.

The difference between the just and the nominal value of the payment method will be acknowledged as income from interests.

The presented method is made through the agreement established between the purveyor and the client, and the established rate of the interest can be: the rate that is prevalent for a similar instrument of an issuing, having credits which have the same risk degree or the interest rate that updates the nominal sum of the instrument at the present prices in cash for the sale of assets and services.

Related to the assessment of the expenses, this is made "at the just value of the granted or grantable payment method in the exchange of the received or transferable labour conscription".

CONCLUSIONS

A cost system depends on the followed objectives. As a result, the system will be simple if we have in view only the reckoning of the costs or elaborated if we want to get information that can serve the management in the exercise of the control and the substantiation of the decisions.

As far as the expenses and the incomes are concerned, they need a complex analysis, independent on the manner in which they are regarded.

The variety of the incomes' and expenses' acknowledgement methods gives the managers the possibility to advance their managerial "mastership", choosing that method that presents an accurate image of the company.

Yet, when the company faces difficult periods of time that can affect its image, these methods become real accountant engineerings.

That is why we consider that the relativity of these notions, as well as the relativity of the performances is obvious, on one hand, because every actor-partner has his own perspective over the enterprise's functioning and performances, and on the other hand, because every indicator privileges one image or another of the obtained results.

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TOURISM IMPACT ON ECONOMICAL ENVIRONMENT DEVELOPMENT

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Abstract: *International tourism has quickly become one of the most important economic industries in the world. The principal motivation for a business or region to serve tourists are generally economic. An individual business is interested primarily in its own revenues and costs, while a community or region is concerned with tourism's overall contribution to the economy, as well as its social, fiscal and environmental impacts. A good understanding of tourism's economic impacts is therefore important for the tourism industry, government officials, and the community as a whole. Tourism economics is unfortunately a technical area, involving concepts, methods, and models that are unfamiliar to most non-economists. In this bulletin I've attempted to define the key concepts and explain the basic methods for estimating the economic impacts of tourism, hopefully in as "non-technical" way as the subject allows. It is equally important to understand who is investing in tourism development and who is profiting.*

Rezumat: *Turismul internațional a devenit rapid una dintre cele mai importante industrii economice din lume. Principala motivație a unei afaceri sau a unei regiuni în a oferi servicii turistice este în general de ordin economic. Un om de afaceri este interesat de profitul său şi de costuri, în timp ce o comunitate sau o regiune este preocupată de contribuția turismului la nivelul economiei şi, de asemenea, de impactul social, fiscal şi de mediu. O înțelegere temeinică a impactului economic realizat de turism este importantă pentru industria turismului, oficialitățile guvernamentale şi pentru comunitate. Economia turismului este din păcate o zonă tehnică, ce implică concepte, metode şi modele ce nu sunt cunoscute de persoanele din afara sferei economicului. În această prezentare s-a încercat definirea conceptelor esențiale şi explicarea într-o manieră non-tehnică a metodelor de bază de estimare a impactului economic indus de turism. Este la fel de important de înțeles cine investeşte în dezvoltarea turismului şi cine profită de pe urma acestui lucru.*

Keywords: *economic impacts, benefit cost analysis, multiplier effects, capture rates, induced effects by tourism*

INTRODUCTION

Tourism is now a global industry involving hundreds of millions of people in international as well as domestic travel each year. The total economic impact of tourism represents more than just the euros a visitor spends in a community. Tourism contributes to sales, income, jobs, and tax revenues. Tourists spend money on a variety of things in a community – lodging, attractions, food and

other services - creating a direct effect on the businesses and economy in the form of income that pays wages and taxes. The tourism businessmen in turn are buyers of goods and services required to meet the needs of the visitors, and the direct tourism business receipts are then spent on investments or purchase of goods and services. This spending by tourism businesses as a result of increased tourist visits creates indirect effects by contributing to wages and employment in other local businesses that supply the goods and services to the tourism business.

Public organizations and businesses are increasingly interested in the economic impacts of tourism at national, state, and local levels. One regularly hears claims that tourism supports ***A*** jobs in an area or that a festival or special event generated ***B*** million euro in sales or income in a community. „Multiplier effects" are often cited to capture secondary effects of tourism spending and show the wide range of sectors in a community that may benefit from tourism.

Tourism activity also involves economic costs, including the direct costs incurred by tourism businesses, government costs for infrastructure to better serve tourists, as well as congestion and related costs borne by individuals in the community. Community decisions over tourism often involve debates between industry proponents touting tourism's economic impacts (benefits) and detractors emphasizing tourism's costs. Sound decisions rest on a balanced and objective assessment of both benefits and costs and an understanding of who benefits from tourism and who pays for it.

ECONOMIC IMPACTS OF TOURISM

Tourism has a variety of economic impacts. Tourists contribute to sales, profits, jobs, tax revenues, and income in an area. The most direct effects occur within the primary tourism sectors - lodging, restaurants, transportation, amusements, and retail trade. Through secondary effects, tourism affects most sectors of the economy. An economic impact analysis of tourism activity normally focuses on changes in sales, income, and employment in a region resulting from tourism activity.

Supposing that a region attracts an additional 100 tourists, each spending €100 per day. That's €10,000 in new spending per day in the area. If sustained over a 100 day season, the region would accumulate a million euro in new sales. The million euro in spending would be distributed to lodging, restaurant, amusement and retail trade sectors in proportion to how the visitor spends the €100. Perhaps 30% of the million euro would leak out of the region immediately to cover the costs of goods purchased by tourists that are not made in the local area (only the retail margins for such items should normally be included as direct sales effects). The remaining €700,000 in direct sales might yield €350,000 in income within tourism industries and support 20 direct tourism jobs. Tourism industries are labor and intensive investments, translating a high proportion of sales into income and corresponding jobs.

The tourism industry, in turn, buys goods and services from other

businesses in the area, and pays out most of the €350,000 in income as wages and salaries to its employees. This creates secondary economic effects in the region. It might be used a sales multiplier of 2.0 to indicate that each euro of direct sales generates another euro in secondary sales in this region. Through multiplier effects, the €700,000 in direct sales produces 1.4 million euro in total sales. These secondary sales create additional income and employment, resulting in a total impact on the region of 1.4 million euro in sales, €650,000 in income and 35 jobs. While hypothetical, the numbers used here are fairly typical of what one might find in a tourism economic impact study. A more complete analyze might identify which sectors receive the direct and secondary effects and possibly identify differences in spending and impacts of distinct subgroups of tourists (market segments). One can also estimate the tax effects of this spending by applying local tax rates to the appropriate changes in sales or income. Instead of focusing on visitor spending, one could also estimate impacts of construction or government activity associated with tourism.

There are several other categories of economic impacts that are not typically covered in economic impact assessments, at least not directly. Some of these would be:

- Changes in prices - tourism can sometimes inflate the cost of housing and retail prices in the area, frequently on a seasonal basis.
- Changes in the quality and quantity of goods and services - tourism may lead to a wider array of goods and services available in an area (of either higher or lower quality than without tourism).
- Changes in property and other taxes - assess to cover the cost of local services may be higher or lower in the presence of tourism activity. In some cases, taxes collected directly or indirectly from tourists may yield reduced local taxes for schools, roads, etc. In other cases, locals may be taxed more heavily to cover the added infrastructure and service costs. The impacts of tourism on local government costs and revenues are addressed more fully in a fiscal impact analysis.
- Economic dimensions of „social" and „environmental" impacts - There are also economic consequences of most social and environmental impacts that are not usually addressed in an economic impact analysis. These can be positive or negative. For example, traffic congestion will increase costs of moving around for both households and businesses. Improved amenities that attract tourists may also encourage retirees or other kinds of businesses to locate in the area.

Benefit cost analysis and economic impact analysis are frequently confused as both discuss economic "benefits". There are two clear distinctions between the two techniques. B/C analysis addresses the benefits from economic efficiency while economic impact analysis focuses on the regional distribution of economic activity. The income received from tourism by a destination region is largely off-set by corresponding losses in the origin regions, yielding only modest contributions to net social welfare and efficiency. B/C analysis includes both market and non-market values (consumer surplus), while economic impact

analysis is restricted to actual flows of money from market transactions.

An economic impact assessment (EIA) traces changes in economic activity resulting from some action. An EIA will identify which economic sectors benefit from tourism and estimate resulting changes in income and employment in the region. Economic impact assessment procedures do not assess economic efficiency and also do not generally produce estimates of the fiscal costs of an action. For many problems economic impact analysis will be part of a broader analysis. Environmental, social, and fiscal impacts are often equally important concerns in a balanced assessment of impacts.

THE TYPICAL APPROACHES FOR AN ECONOMIC IMPACT ASSESSMENT

At the simple, *"quick and dirty"* end of the spectrum are highly aggregate approaches that rely mostly on judgement to determine tourism activity, spending and multipliers. Such estimates can be completed in a couple hours at little cost and rest largely on the expertise and judgement of the analyst. At the other extreme are studies that gather primary data from visitor spending studies and apply the spending estimates to formal regional economic models for the area in question. In between are a wide range of options that employ varying degrees of judgement, secondary data, primary data, and formal models.

Different levels of detail and corresponding expense (time and money) and accuracy are possible for each of the three steps - estimating tourist volume, spending, and multiplier effects. Four typical approaches illustrate the levels of detail that are possible and the associated methods (see *Table 1*).

- Subjective estimates that rely mostly on expert opinion
- Secondary data in aggregate form, adapting existing estimates to suit the problem
- Secondary data in disaggregate form, permitting finer adjustment of data to fit the situation

Primary data and/or formal models, usually involving visitor surveys and regional economic models.

Table 1.

Approaches to Tourism Economic Impact Assessment

Level	Tourism Activity	Spending	Multipliers
1- Judgement	Expert judgement to estimate tourism activity	Expert judgement or an "engineering approach"	Expert judgement to estimate multipliers
2	Existing tourism counts for the area or total estimates from a similar area or facility	Use or adjust spending averages from studies	Use or adjust aggregate tourism spending multipliers from a similar

		of a similar area/market	region/study
3	Estimate tourism activity by segment or revise estimates by segment from another area	Adjust spending that is disaggregated within particular spending categories & segments	Use sector-specific multipliers from published sources
4- Primary data	Visitor survey to estimate number of tourists by segment or a demand model	Survey random sample of visitors to estimate average spending by segment & spending category	Use an input-output model of the region's economy

One can employ different levels of aggregation in visitor segments, spending categories, multipliers, and economic sectors to finely tune the data and models to a particular application and also yield more detailed information about the economic impacts. For example, spending data from previous surveys may be adjusted over time using consumer price indices (CPI). If spending is itemized in several categories, distinct CPI's may be used for food away from home, lodging, or gasoline. If not, an aggregate CPI, which may not reflect the mix of goods that tourists purchase, must be used. Data for distinct tourism market segments is also valuable in tailoring secondary data to a particular application. For example, separate estimates of the average spending for day users and overnight visitors allows one to adjust the spending estimate to reflect a given mix of day users and overnight visitors.

CONCLUSIONS

The most important information for estimating tourism impacts is a good estimate of the number of tourists. This requires clearly defining what one wishes to include as "tourism" and the region of interest.

Secondly, that tourists must be divided into distinct subgroups (segments) with distinct spending patterns and likely reacting differently to various policy and marketing actions. In particular, local customers should be distinguished from visitors from outside the region and day users from overnight visitors.

Thirdly, focus most of your effort on estimating the direct effects of tourism, usually as tourist spending in the area. Multiplier effects are not nearly as important in most cases, as their use in tourism would suggest and multipliers tend to introduce complexities that most users of the results do not fully

understand. Even if multiplier effects are important to the study purpose, remember that any errors in estimates of the direct effects will also be multiplied by any multiplier.

Finally, I recommend income or value added as the best measures of economic impacts to report. Sales and job impacts can be quite misleading, as sales may go largely to buy parts from outside the region and job estimates are distorted by part time and seasonal positions, not to mention quite different wage rates across industries. Income or value added are the best measures of the economic gain to the region from tourism. It follows that income multipliers (of the Keynesian type) should be used instead of sales multipliers.

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STATISTICS' CERTANTIES AND DILEMMAS

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Abstract: *Today it is almost a fact that information has become a distinct resource in the modern economy, namely that information has individualized as a distinctive production (output) factor. Innovation, says Drucker, is more likely a social term then a technical one and it derives mostly from a change of options.*

There isn't any doubt that evolved technology it has either the form of computers, of telecommunications, of robots fixed on the factories bridging or of the offices automations, either is biogenetics or bioengineering, it has an incommensurate qualitative importance. Although, for the information economy associated with the globalization processes that for nowadays world is a specific phenomena, the exploitation of information as a distinct resource remains the exception chance of any nation.

Rezumat: *Astăzi este o certitudine faptul că informaţia a devenit o resursă distinctă în cadrul economiei moderne, devenind astfel un factor distinct al procesului de producţie. Inovaţia, precizează Drucker, este un termen mai mult social decât tehnic şi provine, în principal, din schimbarea de opinii.*

Nu prezintă niciun dubiu faptul că tehnologia modernă, sub forma computerelor, tehnologiei telecomunicaţiilor, roboţilor industriali şi noile descoperiri în domeniile biogeneticii şi bioingineriei au avut o importanţă calitativă incomensurabilă. Chiar dacă economia bazată pe informaţie este asociată cu procesul globalizării, care în perioada actuală reprezintă un fenomen specific, exploatarea informaţiei ca o resursă distinctivă rămâne şansa excepţională a oricărei naţiuni.

Keywords: *statistics, demography, Kondratieff's cycle, extrapolation, entropy law*

During human society evolution, men of science have noticed and explained an impressive number of aspects regarding nature sciences and social sciences. Although, some theories / phenomena that were or were not statistically noticed have involved various explanations of their production essence, without reaching a mutual point of view. We recall the following problematic phenomena:

MALTHUS THEORIES

Malthus' work, *An Essay on the Principle of Population, as it Affects*, published for the first time in 1798, generated a wave of contestations / critics against the author, as well as against the basic idea that he sustained. In reality, we can say nowadays that Thomas Mathus was at the most mordant or cynic in some of his interpretations of the individual-nature relation. More than this, relying on the data basis offered by statistics after 1800, we can say that Malthus opinion,

namely the idea of planet population exponential growth, meanwhile the natural resources are and remain limited, wasn't confirmed (we'll encounter another famous paper with a negative conclusion, from a opposite angle at Nicolas Georgescu-Roegen, who sustained until the last moment the basic idea of the entropic process). In essence, it is all about the famous Malthus theory:

-statistical argumentation of the population geometrical growth of a country / globe;

-logical argumentation of the idea of arithmetic progressive growth of the natural resource of a country / globe;

Based on some public opinion rejection tendencies there has been created a legend around the Malthus theory, that outshined his work. In reality, only after 1980, after the conference organized in Paris regarding Malthus work and the publishing of the book "Malthus Reconsidered" by W. Petersen it has been achieved a majority point of view regarding Malthus' ideas validity. First edition of Malthus work from 1798 emphasizes the differences between the two growth rates:

a) geometrical progression population growth:

1, 2, 4, 8, 16, 32, 64, 128, 256, ...

b) arithmetic progressive growth of the subsistence means / natural resource :

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 ...

Accordingly to Malthus: "Supposing that the actual population that is a thousand million, the human species will grow like this: 1, 2, 4, 8, 16, 32, 64, 128, 256, and the subsistence means: 1, 2, 3, 4, 5, 6, 7, 8, 9. In two centuries from now the population would be, related to the subsistence means, in proportion of 256 to 9, in three centuries of 4096 to 13 and in two thousand years from now, the difference it is almost incalculable." However, even if Malthus theory hasn't been verified yet for the population growth at the world level, it has been demonstrated extremely suggestively for the situation statistically registered in countries as China or India. For instance, China actual economic growth, accumulated with the population number and demographic growth generate big question marks in many business / financial circles from USA and occidental world. Although Malthus' statistical documentation was extremely modest, the demographic explosion registered in some countries offer sufficient basis on behalf of some of his ideas.

ANALYSIS OF A STATISTICALLY NOTICED PHENOMENON IN THE DIFFERENTIATED EVOLUTION OF SEXES BIRTH RATE

Based on the statistical registrations, essentially emphasized after the first and the second world conflagration on different countries as *major participants* in the conflict, it has been remarked the fact that the common trend of birth rate previous to the conflict, on a series of 10 to 20 years (commonly, total new born, this trend includes regularly 52 to 53 % new born of feminine sex and the

difference of 47 to 48 % new born of masculine sex), registered a modification in the two sexes constitution. The statistical data for Rumania, in the period 1930-1940 and 1946-1956, doesn't reflect a very obvious similar modification, even if our analysis hasn't been sufficiently well-informed. According to the Statistical Yearbook for 1958, the births registered by the medical units after world war two were only partial (from 5-6% of total births to 50-55% at the 1957 year level). This could be the main cause for which the processed statistical data are somehow atypical in comparison with the statistically noticed phenomenon at a national level and previously invoked.

Table1. Rumania population evolution during the 1930-1956 periods

Years	Probable population at July 1st (thousands of habitants)	Proportions of:		
		Born (alive)	Still-born	Natural spore
		at 1000 habitants		
1930	14 141	*34,1*	*19,3*	*14,8*
1931	14 355	*32,9*	*20,5*	*12,4*
1932	14 554	*35,1*	*21,1*	*14,0*
1933	14 730	*31,2*	*18,5*	*12,7*
1934	14 924	*31,4*	*19,9*	*11,5*
1935	15 069	*30,1*	*20,1*	*10,0*
1936	15 256	*31,6*	*19,3*	*12,3*
1937	15 434	*30,5*	*18,9*	*11,6*
1938	15 601	*29,5*	*19,1*	*10,4*
1939	15 751	*28,3*	*18,2*	*10,1*
1940	15 907	*26,0*	*18,9*	*7,1*
1946	15 791	*24,8*	*18,8*	*6,0*
1947	15 849	*23,4*	*22,0*	*1,4*
1948	15 893	*23,9*	*15,6*	*8,3*
1949	16 084	*27,6*	*13,7*	*13,9*
1950	16 311	*26,2*	*12,4*	*13,8*
1951	16 464	*25,1*	*12,8*	*12,3*
1952	16 630	*24,8*	*11,7*	*13,1*
1953	16 847	*23,8*	*11,6*	*12,2*
1954	17 040	*24,8*	*11,5*	*13,3*
1955	17 325	*25,6*	*9,7*	*15,9*
1956	17 579	*24,2*	*9,9*	*14,3*

Source: Statistical Yearbook of R.P.R., Bucharest, 1958, p. 266, Statistical Yearbook of R.P.R., Bucharest 1956, 1960

Still if we analyze the data from table 1, cumulated with the statistical analysis, it results a series of interesting conclusions:

- in the period 1941-1945 there are missing all statistical data, and this puts a question mark over the formulated conclusions;

- the natural population spore suddenly diminished from 10% in 1939 to 7% in 1940 and down to 1,4 % in 1947;

- the new born number of feminine sex was with 2 % bigger than in 1941 and after that this difference grew to 7% in 1948 (the trend composition change for sexes is supposed to have happened in 1944-1947).

STATISTICS IN KONDRATIEFF'S WORKS

The Kondratieff 50 years cycles, still are the most vividly disputed and raise some question marks among the economy researchers. Was Kondratieff right or not? The majority of those who dealt with this question incline to formulate a positive answer, even if as Peter Drucker does, there have been discussed some manifestations in economy that contradict "the Kondratieff wave" or, in other words, there have been atypical manifestations. Actually, this type of cycle has a manifestation in time of approximately 45-60 years and it was studied for the first time by Van Gelderen, who identified in 1913 *a long wave* o about 50-60 years, so:

- the output, prices and economic activity in general have substantially grew in 1850-1873 period;

- after 1873, the economy registers a recession and reaches the lowest level in 1890, for the main sectors of activity.

We don't know if Nicolai Kondratieff has red or not Van Gelderens' papers. In the '20es, N. D. Kondratieff works at the Economical Research Institute and Agricultural Academy in the former URSS. He was designated to study and to demonstrate the capitalist economies recession – according to the communistic view of the moment. The result of Kondratieff research was published for the first time outside the URSS in German (*Die langen der Wellen des Konjunktur*, 1926), then in Englsih (*The Long Waves in Economic Life*, 1935).

But Kondratieff's research conclusion was in a total opposition with the initially nominated task. So, he concludes that socialistic planning will register a great failure – firstly in agriculture – meanwhile the capitalist countries will suffer a recession of activity in the '30es, *but will register another period of progress and prosperity in the businesses domain*. Later, Kondratieff had at his disposal supplementary statistical data regarding England and France for domains such as trade, agriculture, cotton industry, coal, iron etc. Based on these data he will calculate **three cycles**, each having two components: "… one upward part of the cycle, where predominates prosperity between some recession periods; after which follows a downward part of the cycle with a general decline of the economic activity". N. Kondratieff hasn't finished his woks, as he was successively removed from his jobs and further killed from Stalin's order. But the **three cycles** can be extrapolated until the present, and the correspondence that results from *the real events that took already place in the world economy* and *the ideal variant of Kondratieff waves* becomes thrilling and certifies the extraordinary visionary capacity of the Russian researcher.

It is true that at the moment, into the world economy – and we refer to those countries with the most developed economy – there is a series of new economic sectors and industries that escape to Kondratieff's structure. Mainly, we think about the informatics reform described by Toffler and / or Druckers' entrepreneurial

economy, within which the new sectors and industries that are based on high technologies follow apart from Kondratieff's predictions for the main fact that they couldn't have been anticipated. But for other sectors and industries "… that have fed the long economic expansion after world war two – automobiles, steal, rubber, electrical equipment, common use electronically equipment, telephone, oil" – the results show that these fit perfectly to "Kondratieff's Cycle". For the future of the processing traditional industries, Kondratieff's theory must be accepted as a serious hypothesis, if not as the most plausible of all the explanations we have at our disposal".

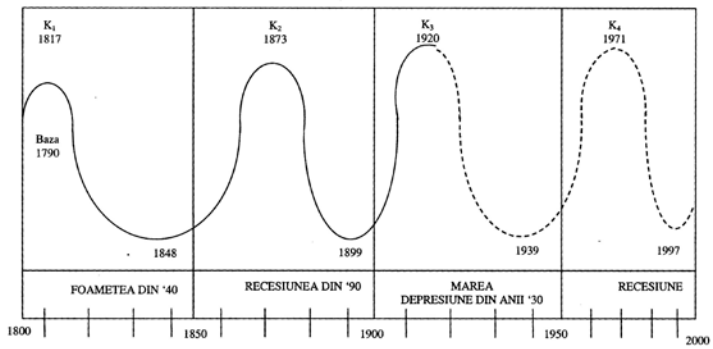
As it results from Houston's paper *Riding the Business Cycle*, as an idealistic variant the Kondratieff's cycles would be represented as in the below figure (the three K_1-K_3 cycles and the fourth K_4 cycle as result of the extrapolation). The extreme points of the four Kondratieff cycles, K_1- K_4 are:

* **K_1** = the progress begin from 1789, it reaches the peak in 1814, after which the recession period reaches the lowest level (the base) in 1849;

* **K_2** = progression begins in 1849, reaches the top in 1873, and it follows a recession until the 1896;

* **K_3** = the cycle begins in1896, it reaches the top in 1920, and the recession phase will continue until 1939;

* **K_4** = the progress begins in 1939 and it continues until 1971 when it reaches the top, after that will follow the recession phase from 1971 until 1997, approximately.



*Sursa: William Houston - **Riding the Bussiness Cycle**, Little, Brown & Co., 1995, pag. 165, Copyright © All rights reserved.*

STATISTICS IN NICHOLAS GEORGESCU RONGEN WORKS

The famous American economist of Rumanian origin has definitively related his name to the entropic law and economic process through the paper published in 1971, *The Entropy Law and the Economics Process.* However, Rongen has begun his affirmation as a world wide valuable economist in the statistical studies domain. This way, under Octav Onicescu's influence, he

decided to get his doctoral degree in statistics at Paris and finalized his thesis in mathematic statistics under the title *Research Issues on the Cyclical Components of a Phenomenon*; his paper work was published in 1930 in The Statistic Society Journal in Paris. In essence, throughout his doctoral thesis, Rongen dealt with the problem of finding out a spectral analysis method for discovering the specific cycles of irregular phenomena. Further, he studied at London with Karl Pearson, the father of mathematical statistics, for a period of almost 2 years over the same statistical domain. When he returned to Rumania in 1932, Georgescu Rongen functioned as a statistics professor within the Bucharest University. Rongen published in 1933 the work "Statistical Method. Mathematical Statistics Elements", paper in which he applies in great detail the probabilities calculation and which remained until nowadays extremely present.

Nicholas Georgescu Rongen was attracted by J. Schumpeter and P. Samuelson works achieving further on to develop the well known economic processes entropy law. In parallel with this theory, Rongen achieves to argue extremely pertinently the fact that, for all the living systems, the low energy (the order) tends in an inevitable way to transform itself in high energy (disorder) as in a long period of time it manifests a tendency towards thermal death and chaos of each and every system (the whole energy becomes useless). Rongen says that entropy law ruthless rules upon all the economic processes.

However, as Rongens' somehow negative conclusion towards the humanity evolution on long term didn't registered any sign of confirmation, it can be admitted the hypothesis that on the way of order's transformation into disorder, a process associated to the normal functioning of the economic systems, it accumulates that distinct resource called information / knowledge (a resource without a visibly material content and difficult to statistically quantify).

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THE ANALYSIS OF PERFORMANCES AND RISKS IN THE COMMERCIAL SOCIAL ACTIVITY

ANALIZA PERFORMANȚELOR ŞI A RISCULUI ÎN ACTIVITATEA SOCIETĂȚILOR COMERCIALE

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Abstract: *Many investigators and financial bodies have been dealing in elaborating prediction methods of bankruptcy risk. A proper model for the Romanian economic conditions is the one elaborated by the Romanian Commercial Bank, where a decisive role is played by the economic and financial performances. The evolution in time of these indicators contributes to detect the weak and strong areas of the company and then to establish a score by attributing a weight to each ratio.*

Rezumat: *O serie de cercetatori si institutii financiare au incercat elaborarea unor metode de previziune a riscului de faliment bancar. Unul dintre modelele aplicabile conditiilor economice din Romania este cel realizat de Banca Comerciala Romana, in care un rol central este detinut de performantele economice si financiare. Evolutia in timp a acestor indicatori contribuie la detectarea domeniilor slabe si puternice ale companiei si mai apoi la stabilirea unui scor prin atribuirea unei valori fiecarui raport.*

The evolution of any company occurs under the conditions of technological changes. The achievement of technical advance supposes a massive infusion of capital, besides a performing management.

The bankruptcy risk was and is under managers' attention. They are interested in the good going of the production cycle and the investors in recuperating the respective credits and interests. Many investigators and financial bodies have been dealing in elaborating prediction methods of bankruptcy risk. The manner used is the statistical technique of analyzing the financial features of normally functioning societies and of the companies with difficulties in economic and financial administration. All analysis models of the bankruptcy risk have at their basis a score function according to which it is determined with approximation whether the company would get bankruptcy or would have performing economic results, in a period immediately following the analysis (Pahone, 2005).

The selection of the rates is carried out on the basis of the factorial analysis of the main components, after which a score function is determined through the method of multiple differences. Independent between them, the rates (ratios) eliminate the risk of recording within the score function, certain repeated influenced of the same phenomenon. The optimum level minimizes the classifying errors of the companies. Within the western economic practice, a series of models based on score function have been elaborated; among them, the best known are: Altman model; Conan and Holder

models; the model of the Central of Balance Sheet of the Bank of France; the model of Romanian Commercial Bank.

Altman model of estimating the bankruptcy risk

Through the discriminatory analysis of the rates, E. Altman (Altman, 1968) revealed the possibility of a collective using of selective indicators in predicting bankruptcy and elaborated an index of bankruptcy by the weight of the following selective indicators:

X1 = Working capital / Total assets

X1 is a measure of company's flexibility and reveals the weight of the working capital in the total assets. Large values of this report points out to the efficient use of working capital.

X2 = Reserves / Total assets

X2 is a measure of the inner financing capacity of the company, an as high value as possible being recommended.

X3 = Gross Profit / Total assets

X3 represents the ratio of efficiency in using the assets, an as high value as possible of this ratio being recommended.

X4 = Equity Capital / Debts in the long term

X4 represents the degree of debts of the company through long term loans.

X5 = Total turnover / Total Assets

X5 represents an indicator of the efficiency of the assets, the rotation of the total asset through the total turnover respectively.

The bankruptcy index is represented by the composed financial variable (Z sector), calculated as an average sum of several financial characteristics of the company:

$$Z = 1.2\,X1 + 1.4X2 + 3.3X3 + 0.6X4 + 0.1X5$$

If one introduces the numerical level of the financial characteristics X, specific to the analyzed company, into the score function, two cases are possible:

- If $Z > 2.675$ the company is not menaced of bankruptcy, therefore it has available a sound financial situation;
- If $Z < 2.675$ the company is exposed to bankruptcy, due to a precarious financial situation.

According to Altman's opinion, the decline of a company advances five stages (Ciolacu, 1996):

- The appearance of the signs of decline, what, in many cases, are disregarded: the decrease of profitability, the decrease of the total turnover and the increase of debts and the decrease of liquidity;
- The existence of the clear signals for which no measure are adopted hoping that they would disappear without intervention;
- Powerful action of declining factors with aggravated financial situation;
- The collapse and the managerial team's impossibility to act through correction measures;
- The intervention, either through recovering measures, or bankruptcy declaration.

The indicators used in calculating significant ratios for Altman model in S.C. "X" S.A. (thousands lei) are shown in table no. 1.

Table no. 1: The indicators used in calculating significant ratios for Altman model

Indicators	**2007**
Revenue assets	1,046,405
Total assets	1,738,938
Debts under 1 year	522,797
Total debts	667,867
Equity capital	1,035,797
Reserves	414,796
Total turnover	1,214,950
Gross profit	160,775

Based on these data, the Altman ratios of S.C. "X" S.A. are calculated in table no. 2.

***Table no. 2:* The Altman ratios are calculated on the indicators from table no. 1.**

Ratio	**2007**
X1	0.0830
X2	0.2385
X3	0.0924
X4	7.1399
X5	0.6986

The score function associated to these data has the value $Z = 5.09126 > 2.675$ that shows that the company's financial situation is possibly recoverable in 2007.

This Z function is very sensitive to noteworthy changes of the company's situation and draws the attention upon company's economic and financial state. This model provides prediction possibilities of remarkable quality, Altman model classifying 95% a year ahead the bankruptcy companies, the bankruptcy in 72% two years ahead and 30% five years ahead.

The analysis of the contribution of the ratios for the score function brings in a complex of information that allows the attention drawing of the decision makers department of the company with companies from the same branch and contributes in estimating the conjectural character of a given situation.

Conan-Holder model of predicting bankruptcy risk

Conan-Holder elaborated a discriminating analysis model through which the probability that a company can reach a bankruptcy status is determined. The respective score function of this model is made peculiar according to the branches of activity and is applied to the industrial companies with 10 – 500 employees. The model was made in 1978 by observing 31 ratios in a sample of 190 small and middle enterprises, 50% of which got bankruptcy between 1970-1975 years. For industry, the score function has got the following formula:

$Z = 0.24X1 + 0.22X2 + 0.16X3 - 0.87X4 – 0.10X5$ where:

X1 – gross outcome of exploitation / debts;

X2 – permanent capital / total assets;

X3 – achievable and available values / total assets;

X4 – financial expenditures / total turnover;

X5 – personnel expenditures / total turnover;

Conan-Holder model has remarkable results in predicting the evolution in the short run of the western economic environment (Mereuta, 1994); it can be applied in our country only under the conditions of legal bankruptcy and annulling masked subventions, though the small number of the ratios included is a disadvantage within the context of Romanian realities.

The bankruptcy probability is established according to the value of the score function as the data are shown in table no.3.

Table no. 3: The bankruptcy probability is done on the value of the score function.

Score function (Z)	**The probability of bankruptcy (of industrial enterprises)**	
Negative 0-2 2-4	> 80% 75–80% 70-75%	Zone with an increased risk of bankruptcy
4-8.5	50-75%	Uncertainty zone
9.5 10.0 13.0 16	35% 30% 25% 10-15%	Zone with a low risk of bankruptcy

The data used for the analysis of the bankruptcy risk of S.C. "X" S.A. by Conan-Holder method are systematized into the table no. 4 and table no. 5.

Table no. 4: The Conan-Holder method.

Indicators	**2007**
Revenue assets	1,046,405,336
Inventories	221,405,267
Total assets	1,738,938,792
Permanent capital	434,281,550
Financial expenditures	35,487,004
Personnel expenditures	275,200,990
Total turnover	1,214,950,516
Added value	34,627,964
Surplus of exploitation	126,427,398
Total debts	667,867,407

The main ratios of Conan-Holder model are shown in table no.5.

Table no. 5: The main ratios of Conan-Holder model.

Ratio	**2007**
X1	0.2407
X2	0.2497
X3	0.6986
X4	0.0292
X5	0.2265

Replacing in the score function formula we obtain the following value: Z = 0.1763, which, in the model of Romanian economy, is pessimistic due to the fact that the re-estimation super-dimensioned the total assets and the bank loans in the average and long term. Since that in Romanian companies is atypical, the Conan-Holder model points out a very high bankruptcy probability.

The score function value, Z respectively, taken according to table no. 5 for 2007, indicates the fact that the company is in an area of high bankruptcy risk of over 80%.

The comparative application of Altman and Conan-Holder models in the analyzed society resulted in divergent outcomes due to the non-typical phenomena that manifest in the Romanian economy of transition.

The model of Romanian Commercial Bank in estimating the bankruptcy risk

The Romanian theoreticians appreciate (Stancu, 1994) that the score function cannot be used for the Romanian companies due to their specific characteristics. A proper model for the Romanian economic conditions is the one elaborated by the Romanian Commercial Bank, where a decisive role is played by the economic and financial performances.

In order to estimate the companies in Romania, some specific models are recommended to be used and they are used as a calculation basis as data reported by the companies in the accountancy balance sheet. The economic and financial indicators taken for calculation within this model are (Bran, 1994):

1. *Patrimonial liquidity:*

in which:

RA – revenue assets

I_{wpe} - inventories without possibilities of evaluation;

C + L - credits and other loans;

L – losses;

D - debts;

A_{st}, L_{st} - assets and liabilities on short term.

2. *Solvancy:*

Ec - Equity capital;

TL -Total liabilities

3. *Financial return:*

Pb - Profit before taxation;

Ec - Equity capital.

4. *Rotation of revenue assets:*

TT - Total turnover;

RA – Revenue assets.

5. *The dependence on supply and selling markets:*

In practice, the following situations appear:

At > 50%; De > 50%

Ai > 50%; De > 50%

At > 50%; Dt > 50%

Ai > 50%; Dt > 50%

where:

At = Supply from the country;

Ai = Supply from imports;

De = Sales to export;

Dt = Sales inside the country.

6. *Guarantees* that may consist of:

a) Deposits in lei / currency;

b) Plegdes, mortgages;
c) Wares purchased with credits;
d) Cession of claims.

The analysis of the company's economic and financial performances is carried out according to the above mentioned criteria with points for each criterion. Based on Romanian Commercial Bank (RCB) grill, any company may enter one of the categories given in table no. 6.

Table no. 6: Categories established on the basis of RCB indicators.

Category	Points	Economic situation
A	Over 20	Very good, credits may be given
B	16-20	Good, credits may be given
C	11-15	Balancing, shows high risk
D	6-10	High risk, without guarantees for credit giving
E	0-5	Company in a very precarious financial situation, no guarantees for credit giving

The companies that accumulate over 16 points (categories A and B) show a good economic and financial situation and consequently, a credit is recommended. The ones that accumulated 11 – 15 points show a high degree of risk, a possible credit implying a relatively high risk premium. These companies will have to be followed up from the point of view of solvability aiming of adopting measures for credit recuperation at the first signs of distrust. The D and E categories do not show sufficient guarantees to be given credits.

The studies carried out by W.H. Beaver (Beaver, 1967) and E.I. Altman (Altman, 1968) revealed the fact that a synthetic indicator consisting of a battery of ratios allows an early detection of the difficulties of a company and, consequently, facilitates preventing measures at the first sign of vulnerability.

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ASPECTS OF RISK IN ROMANIAN FINANCIAL SECTOR

ASPECTE ALE RISCULUI DIN SECTORUL FINANCIAR ROMÂNESC

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Abstract: *The profitableness and the firms' liquidity continued to improve in 2006, but the efficiency of the economical activity had contradictory developments. Good performance of firms without debts to banks made them eligible for bank financing with no negative consequences upon financial stability. The credit risk of the banking system remained moderate. Debt service capacity has reduced and the level of credit concentration has raised. On the other hand, the probability of default is becoming low and the creditors perception regarding the credit risk has improved. Bank resource alocation has improved, but the discipline in payments has mixed evolution: default credits have reduced to a historic low level but payment incidents have slightly raised. Risks generated by population upon financial stability have raised, on active side, but on liabilitiy side. Incomes kept their tendance of rise beeing the main element that led to higher risks assuming by the population in 2006. Taking into account the population balance sheet, the value of real estates hold by population have raised due to higher prices but not of the quantity, the financial assets become more liquid with mixed risk, and financial liabilities are presenting a higher risk profile. The foreign money position of the population sector has deteriorated, raising the negative impact in the case of foreign shock. The events of leveraging has generated two main risks: debt service has raised with a slow pace, but the population position of net creditor has significantly reduced. Financial infrastructure, mostly the financial frame regulation, has consolidated in 2006, ensuring by the primary and secondary legislation the convergence to the european standards.*

Rezumat: *Rentabilitatea şi lichiditatea firmelor au continuat să se îmbunătăţească în anul 2006, dar eficienţa activităţii de exploatare a avut evoluţii contradictorii. Performanţa pozitivă a firmelor fără credite bancare, le-a făcut eligibile la finanţarea bancară, fără consecinţe negative asupra stabilităţii financiare. Riscul de credit indus în sectorul bancar se păstrează moderat. Pe de o parte, capacitatea de onorare a serviciului datoriei s-a diminuat, iar gradul de concentrare a creditelor a crescut. Pe de altă parte, probabilitatea de nerambursare este în scădere şi percepţia creditorilor cu privire la riscul de credit s-a îmbunătăţit. Alocarea resurselor bancare către companii s-a îmbunătăţit, dar disciplina în plăţi a avut evoluţii mixte: arieratele s-au redus la un minim istoric, însă incidentele de plată au crescut uşor. Riscurile generate de populaţie asupra stabilităţii financiare au crescut, atât pe partea de activ, cât şi de pasiv bilanţier. Veniturile băneşti şi-au păstrat tendinţa ascendentă, pe fondul unor aşteptări optimiste, fiind elementul principal care a condus la asumarea de riscuri mai mari de către populaţie în 2006. În bilanţul sectorului populaţiei, valoarea deţinerilor de active imobiliare s-a majorat aproape în exclusivitate pe seama preţului şi nu a cantităţii, activele financiare au devenit mai lichide cu evoluţie mixtă a riscului, iar*

pasivele financiare au un profil de risc superior. Poziția valutară a sectorului populației s-a deteriorat, crescând impactul negativ în cazul unui şoc valutar. Dinamica îndatorării a generat două riscuri principale: serviciul datoriei a crescut într-un ritm foarte alert, iar poziția de creditor net a populației s-a redus semnificativ. Totuşi, gradul de concentrare a creditelor şi rata restanțelor s-au diminuat. Infrastructura financiară, îndeosebi cadrul de reglementare aferent sistemului financiar, s-a consolidat în anul 2006, asigurând, prin legislație primară şi, în mare măsură, prin cea secundară, convergența cu standardele europene, la nivelul principalelor componente ale sistemului financiar.

The risk of the enterprise's sector remained at an average level. The performance improved in comparison with 2006, consolidating the capacity of the real sector to face of a systemic shock. Most likely, the greatest negative implications re on the exchange rate, because the value of the exposures naturally covered is small. The risk of credit induced in the banking sector is kept to an average level. Allocation of bank resources to companies had improved, but the payment discipline had mixed evolutions: pending payments has diminished, while the payment incidents had slightly increased.

MATERIAL AND METHOD

Concerning the economical and financial performance it can be seen that the company profitableness and liquidity continued to improve than 2006, consolidating the capacity of the real sector to face with a systemic shock. The efficiency of the exploitation activity has different evolutions. Thus, return on equity has grown to a level of 14,9% in 2006, than 13,4 % in 2005. In structure, the return of equity is focused in two bends of profitableness (0-15 %) and over 50 %. The main explanation for the last bend is because of reduced level of small companies' capitalization, these ones owning a significant position in the economy. The weight of the companies with positive return financed by banks is declining.

Liquidity constraints had diminished in 2006, current actives were greater than current liabilities with 7 % at a global level. Quick ratio remains at 0, 18, but the liquidity of the banks represents almost 5 % from the balance sheet, being over the euro zone. The efficiency of the exploitation activity had mixed evolutions. It has deteriorated in the sector of no tradable goods and had improved in manufacturing industry and energetic sector. The reduced operational margin in the context of a growing profitableness is explained through a greater speed of actives and by the presence of the leverage effect.

RESULTS AND DISCUSSIONS

The indebted companies had profitableness and cost efficiency smaller than companies without indebt ness. The most important differences are in the sectors of non tradable goods. This situation could be favorable to financial stability because the extention of credit basis to these companies will not lead to risk growing.

The sentiment of trust of management in the evolution of the economical activity had improved in the second part of the year 2006, especially in construction and services.

The number of the new established companies is superior to the number of registered bankruptcies, so enlarging the number companies in the economy. The number of active companies is smaller, because only 540 000 of firms had reported the results.

About the repayment capacity of banking debts it can be said that the risk credit induced in banking sector by the companies is keeping moderately. On the other hand, the repayment capacity has diminished and the credit concentration rate had grown.

The capacity of domestic debt service has diminished slightly in 2006, because of the slower pace of profitableness grow in comparison with debt service. But there are sufficient resources for debt payment. Aside the important money resources, the companies have access to credit lines unused of 7, 5 billiards RON, representing 35 % of total current money.

Institutional concentration of bank credits to firms has grown in 2006 but under the critical level. Credit concentration is higher in the case of corporations than small and medium enterprises.

The banking sector perception on firms'capacity to fulfill the debt service has improved, leading to prime risk reduction mostly to credits in RON. Nevertheless, this change is due to improved competition and growing the role of bank revenues, other than interests.

The risk of not repayment has diminished in the last years, as a result of improving the majority of the repayment determinants probability: interest expenditures in total revenues and the margin of debt unpaid has reduced, return on actives, liquidity margin, and national currency has appreciated.

CONCLUSIONS

Bank resource allocation to the firms had improved, but the payment discipline had mixed developments: pending debts has reduced, but the payment incidents had slightly grown.

The firms have grown the financing weight through banking resources. The credit from domestic banks own 11,5 % in the balance sheet of the firms, comparatively with 10,4 % in December 2005. But, the majority of the firms had no credit, the small and medium enterprises a part of 86 % of them are not accessing banking sources.

The risks generated by the population on financial stability had grown than the previous year. Financial liabilities had a superior risk profile, debt service growing into a rapid pace, the value of real estate assets had grown rapidly on the back of price exclusively, and the currency position and of net creditor for population had deteriorated. On the other hand, the incomes are growing, financial assets became more liquid, and the rate of credit concentration and the rate of unpaid debts had diminished.

The population income are dominated by wages and other incomes (money transfer from workers from abroad). Annual net average wage has risen in 2006 with 11 % in real terms. Transfer flows raised, but with a pace much diminished

(40 % in 2006 in comparison with 160 % in 2005).The majority of the flows (82 %) are owned by the residents working abroad more than one year. Generally, these flows are diminishing while these persons are living abroad for a longer period of time.

The population net wealth continued to rise in 2006, more than the raise of the incomes. The main component of the net wealth remains the owned real residence. For those who acquired a real estate by credit, and also for crediting banks, potential risks are associated with the lowering of the residential of the real estate market.

The development of the population indebtness has generated two main risks: debt service has risen very quickly, and the population net creditor position has diminished significantly.

Population financial intermediation has accentuated in 2006, which is reflected by the weigh of credit in GNP. The liabilities have risen more quickly than financial assets, leading to a close monitoring of the event.

Bank indebtness of the population has risen more rapidly than saving. The number of debtors with high value credits (over 20 000 RON) doubled in 2006. The population is maintaining the position of net creditor upon banking sector, but the reduction of this position could generate risks on financial stability in the way that population will reduce their investments in other types of financial assets and redirect the incomes only to consume.

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ROMANIAN FINANCIAL SYSTEM AND HIS RISKS

SISTEMUL FINANCIAR DIN ROMÂNIA ŞI RISCURILE ACESTUIA

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Abstract: *The financial system has favourable evolved over the last two years leading to more financial depth and to gap reduction comparative to UE members. Banking sector has consolidated his dominanat position in the system. Nonbanking financial institution with financing activity in the field of credit are now under prudential supervision of the central bank, the intention of the authoritis beeing the reduction of the sector's risks and the incresing of the monitoring efficiency measures of the credit evolution. The main characteristics of the banking sector in the period took into consideration are: sustained performance of credit for private sector and keeping good indicatives of the financial stability, ensuring googd resistance to external shocks. Throughout the year 2006 it have been kept supplementary administrative and prudential measures, these ones beeing eliminated in the first part o the current year. The accession of Romania to EU will determine the emphasis of domestic competition on the banking market, taking into account the higher profitability in the romanian banking system, the low financial intermediary level and also the existence of a regulation framework harmonized with european standards. There are some trends that will consider a close watch to increasing population exposure and credit maturity rising. The risks generated by the nonfinancial banking institution are low and are tending to add to the existent ones in the banking sector. The concentration level and the exchange exposure are more higher in thsi sector but it is anticipated their reduction because of enclosing them in central bank monitoring. In 2006 it continued the positive process of romanian capital market convergence with other european markets, opn the evolution of market ratios but for infrastructure. Moreover, it have been enlarged a number of threats linked to the foreign markets sensitivity and to the stock exchange stabilisation in relative terms.*

Rezumat: *Sistemul financiar a evoluat – pe parcursul anilor 2006 şi 2007 – favorabil, conducând la adâncirea intermedierii financiare şi reducerea decalajului faţă de celelalte ţări membre UE. Sectorul bancar şi-a consolidat poziţia dominantă în sistem. Instituţiile financiare nebancare cu activitate de finanţare de natura creditului au intrat în sfera de supraveghere prudenţială a băncii centrale, intenţia autorităţilor fiind reducerea riscurilor specifice sectorului respectiv şi creşterea eficacităţii măsurilor de monitorizare a evoluţiei creditului. Caracteristicile principale ale sectorului bancar, pentru perioada analizata, sunt: dinamica susţinută a creditului către sectorul privat şi menţinerea indicatorilor de stabilitate financiară la niveluri confortabile, asigurând inclusiv rezistenţa la şocuri externe deosebite. Pe parcursul anului 2006 au fost păstrate măsurile prudenţiale şi administrative suplimentare de limitare a expansiunii creditului; acestea au fost eliminate în prima parte a anului curent. În aceste condiţii se impune creşterea exigenţei supravegherii prudenţiale. Aderarea României la Uniunea Europeană, va*

determina accentuarea competiției interne pe piața serviciilor bancare, ținînd cont de profitabilitatea mai ridicată în sectorul bancar românesc, nivelul încă redus al intermedierii financiare precum şi de existența unui cadru de reglementare şi supraveghere armonizat cu standardele Uniunii. Se disting unele tendințe ce vor presupune monitorizare atentă a: creşterii expunerii față de populație şi majorarea scadențelor la credite. Riscurile generate de instituțiile financiare nebancare sunt scăzute şi tind să se suprapună celor existente în sectorul bancar. Gradul de concentrare si expunerea valutara sunt însă mai ridicate în acest sector, dar se anticipează reducerea lor ca urmare a includerii acestuia în perimetrul de supraveghere al băncii centrale. În 2006 a continuat procesul, pozitiv, de convergență a pieței de capital româneşti cu celelalte piețe europene, atât sub aspectul dinamicii indicatorilor de piață cât şi al infrastructurii. Totodată, s-au amplificat o serie de vulnerabilități ce țin de creşterea sensibilității la piețele externe şi de stabilizarea creşterii bursei în termeni relativi.

In 2006 the most important component of the financial market contiued to be the banking system (with 83,3 % in total financial assets). Non banking financial instittions involved in credit activity are in undergoing process of notification and enroling in NBR regulations. Althogh the financing sorces are mostly from bank, their activity is not generating systemic shocks, de to their less weight in the system. The rate of financial deepening of the capital markets and insurance is still reduced, bt the integration with international markets is rising. From the perspective of financial stability, the probability of a systemic shock generated by these markets is still low, becase of the small role played in financing the real economy.

MATERIAL AND METHOD

The increasing evolution of the nongovernmental credit de to the positive predictions concerning the population's incomes was in 2006 the main factor of banking assets growth. Nevertheless, in Romania the financial intermediation is still low comparatively with other member state of UE. The favorable effects of financial development are accompanied with derivative risks from trade deficit extention, having in background finance through bank credits of the imported goods or from the pressure of demand on inflation.

In present, due to the new regulations, the non banking financial institutions involved in crediting activity are in full process of enrolling to the National Bank. The restrictive measures enforced in order to obtain the authorization are among the factors that have determined the position upon market share of these institutions.

The development of the insurance sector and the growth of the extent of the connection with banking market have strengthened the role of this activity in maintaining the financial stability. The capital rising made in order to respect the regulations regarding the insurer's solvency, the reevaluation of corporal assets, establishing of new insurance companies, and increasing the volume of undersign insurance primes had led to the growth of total assets of the insurance companies with a pace of 34 % than previous year.

Because of a high volatility, the stock exchange indices continued to rise also in 2006. The high volatility represented in this period a feature of the most stock exchanges in the regions. Superior yields offered by the Romanian stock exchange were favored by the trend of national currency appreciation over euro. It can be

obvious that the developments registered on financial markets in the region are tending to become more correlated, and this is reflected on stock exchange markets.

RESULTS AND DISCUSSIONS

The modifications registered in 2006 at the level of shareholders in the banking sector have produced important mutations in the structure of the Romanian banking sector. In 2006 entered on domestic banking market a large sum of foreign capital, derived from well known credit institutions.

The market shares owned by domestic banks have diminished significantly in favor of foreign investors. The development of the competitive environment in the context of EU accession of Romania will require important changes in the strategy of the small and medium banks in order to improve their financing capacity.

In Romania, the banks are continuing to be financed mostly from deposits attracted from resident population. The year 2006 is confirming the trend of increasing of the external liabilities contribution, represented by the loans and deposits from banks and nonresident financial institutions.

The investments of the Romanian credit institutions are headed to domestic market, mostly as nongovernmental credit, which in 2006 registered a good evolution from population side. In the same time, it took place a severe shrinkage of the net creditor position regarding the operations with non banking clientele. It is pointed out the high level of liquidity, attested by the great volumes of investment to Central bank.

Although in 2006 the descending trend of solvency indices continued, determined by the expansion of the nongovernmental credit, the Romanian banking system remains well capitalized. Moreover, the results of the stress test analysis are revealing the fact that the system is capable to resist at severe extern shocks. For next period is anticipated the prolonged descended trend of the solvency ratio, but maintaining important increased crediting. On the other hand, on short time the level of solvency will not be a problem, because of a good margin of this comparative with the level regulated.

Because of a good banks capitalization and consistent liquidity, the stress test analysis revealed the fact that the Romanian banking system has the capacity to absorb the negative effect of the shocks.

CONCLUSIONS

It’s remarkable that the level of capitalization of the Romanian banking system, being already on a descendent trend, which is permitting to continue the financial deepening. On short term it is estimated that the impact of possibly extern shocks will be absorbed by banks, these ones couldn’t be an amenity for banking system stability.

The credit risk remain the main risk at are Romanian banks exposed. On short term, it is anticipated an increased of this, in the context of maintaining on high pace of crediting and forwarding along the economic cycle. The quality of credit portfolio has preserved, taking into account the restrictive policy imposed by the Central Bank.

The liquidity of the Romanian banking system has maintained on a high level in 2006, although the banks have allocated more and more funds for credit activity.

The liquidity, although situated on a descendent trend, whiles the increasing the weight of assets on long term, remain over the level enforced by regulations. For the next period the liquidity of the banking system will not create major problems from the risk perspective, in the context of short term credit upon Central Bank continue to represent an important part of the assets portfolio.

At the Romanian banking system, the market risk continues to be, in general, the main trend. There are no signs concerning the possible systemic implications determinate by market risk.

The interest risk remains the most important source of vulnerability from the market risk category which is confronting the Romanian banking system. The weight of net revenue from interest in average asset, but the net revenue from other activities than those generating interests is tending to decrease.

Within the non banking financial system the insurance market continued to develop, because of increasing demand for insurance products and the advance of the financial intermediation in economy as a whole. The structuring of the capital taking into account the type of activity and the competition increasing on market has led to a strengthening of the insurance sector.

The risks generated by the non banking institution are adding, more and more, to those existent to the level of credit institution. The expansion of leasing into a high pace is partially explained by the measure of limiting the credit took b the Central Bank in the past two years.

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3. **UniCredit New Europe Research Network, July 2006**- *Banking in CEE and the role of international players*,

THE ORGANIZATION, IMPLEMENTATION AND DEVELOPMENT OF AGRICULTURAL SERVICES IN TELEORMAN DISTRICT

ORGANIZAREA, IMPLEMENTAREA ŞI DEZVOLTAREA SERVICIILOR ÎN AGRICULTURA JUDEȚULUI TELEORMAN

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Abstract. *Teleorman district has a convenient geographical position regarding the major development of agricultural activities. Agriculture represents an important field in the economy of this district, being represented in all 97 places, where most of the labor manpower is in this specific field. What is charateristic for this district is the vegetable production, orientated especially towards the cereals culture, the oleaginous plants, the forage plants and vegetables.*

For the organization and development of the agricultural field in Teleorman district it is needed a better implementation of all services that take part in the modernization of the exploitation and obtaining a growth in the quantity and quality of production. The accommodation of the structure of cultures to the requests of the market, the acquisition of technical advanced systems, the implementation of credit services, the development of the irrigation system, are only a few important direction for the agriculture of this district.

The implementation of the services in the agriculture of Teleorman district lead to the amalgamation of the fields and the appearance of some commercial exploitations with vegetal, zoo technical or mixed profile.

Rezumat. *Județul Teleorman beneficiază de o poziție geografică favorabilă dezvoltării majore a activității agricole. Agricultura reprezintă un important sector al economiei județului fiind prezentă în toate cele 97 localități, în care cea mai mare parte a forței de muncă fiind ocupată de acest sector. Caracteristic județului este producția vegetală, orientată în special spre cultura cerealelor, plantelor uleioase, plantelor de nutreț şi legumelor.*

Pentru organizarea şi dezvoltarea sectorului agricol din județul Teleorman este necesară o mai bună implementare a tuturor serviciilor care să contribuie la modernizarea exploatațiilor şi obținerea unor creşteri calitative şi cantitative de producție. Adaptarea structurii culturilor la cerințele pieții, achiziționarea de sisteme tehnice performante, implementarea serviciilor de creditare, dezvoltarea sistemului de irigații, sunt câteva direcții importante pentru agricultura județului.

Implementarea serviciilor în agricultura județului Teleorman a condus la comasarea terenurilor şi apariția unor exploatații comerciale cu profil vegetal, zootehnic sau mixt.

Sited in the Romanian Field, only 80 kilometres away from the most crowded foodstuff markets of the capital, Teleorman county is geographically favourable to the development of agricultural activities. The relief of the county consist mainly of plains with a mean elevation of about 100 metres. The soils of the county are chernozems (54% in the south of the county) favourable to a performant agriculture, but there are also soils sărace in humus and nutrients (brown reddish forest soils) situated in the north of the county. The climate is to a certain extent favourable to many crops, but the high frequency of the years with drought and extreme temperatures results in a low productive potential in comparison with the agricultural potential. The main irrigation source is the river Danube, as well as the irrigation arrangements in the county territory and under SNIF management.

Provided these characteristics, agriculture is an important sector in the county economy, being practiced in all 97 localities of the county, most labour being active in this sector. The county is focused on crop production, especially grains, oily plants, forage and vegetables.

Teleorman county has 499184 ha of agricultural land out of which 454.872 ha account for arable land.

MATERIAL AND METHODS

This paper resulted from a good collaboration with Teleorman County Bureau of Agricultural Consultancy. The data were gathered from the territory, from agricultural companies and then they were organised and processed.

The monitoring of the sown surface and of the obtained yields is done in the statistical papers AGR 2 A – sown surface and AGR 2 B – sown surface and obtained yields, this task being completed by DADR according to the Protocol between MADR and National Statistics Institute.

RESULTS AND DISCUSSIONS

In the autumn of 2007 the land use was the following: rape 32532 ha, barley 17045 ha, wheat 185.952 ha, two row barley 4923 ha, forage 2352 ha, other crops 758 ha.

The total surface sown was of 243562 ha, 11681 ha more than in the autumn of 2006.

The crop with a significant increase with respect to the program is rape, also due to the increasing use of biofuels. The granted financial support was welcome in the production cycle, given the weather conditions extremely unfavourable for crops in 2007.

Table 1

The cultivated surface and the obtained yield for the main crops is as Follows

Crop		Year 2006	Year 2007
Wheat + rye	Surface	192.462	188.604
	Mean yield	2.498	1.100
	Total yield	480.853	207.491
Barley + Two row barley	Surface	16.429	21.959
	Mean yield	2.282	1.215
	Total yield	37.491	26.674
Corn	Surface	93.389	70.706
	Mean yield	3.372	523
	Total yield	314.913	36.959
Sunflower	Surface	78.524	66.213
	Mean yield	1.511	474
	Total yield	118.687	31.412
Soy beans	Surface	4.110	787
	Mean yield	1.677	701
	Total yield	6.894	552
Rape	Surface	4.303	22.240
	Mean yield	1.593	1.245
	Total yield	6.853	27.684

In order to perform mechanized tillage, the farmers in Teleorman use agricultural tractors and machines as follows:

- Tractors – 7.367
- Disk harrows – 3.952
- Ploughs – 6.263
- Small grain sowers – 1.841
- Row crop sowers – 1.956
- Cultivators – 1.573

The agricultural loan for production is an economic-financial instrument of agricultural policy which sustains current activities of agricultural production.

Farmers, legal entities or individuals, who legally use agricultural fields or livestock in order to obtain agricultural production for trade can benefit from the advantages offered by Law of Agricultural Credit. If the aforementioned

people take a loan and reimburse it at the deadlines set by the bank, the state grants MADR „subsidies" which are called public funds and represent percentage quota from the loan taken and reimbursed. Another regulatory document covered the diesel subsidy to perform mechanized tillage for crop establishment in the spring of 2007. The beneficiaries of the support are legal entities and/or individuals provided at art.6 in O.U.G. 123/2006, and in order to be eligible, the applicants need to prove the use of the tract of land as owner, tenant, franchiser or in other forms of association.

Table 2

Husbandry in Teleorman county has the following stock in 2006 and 2007.

Specification	2006	2007
Total cows	57.667	58.083
Out of which core	38.609	39.404
Total pigs	119.207	114.514
Out of which core	9.899	8.230
Total sheep	134.657	153.906
Out of which core	111.010	111.559
Total goats	38.023	43.755
Out of which core	30.072	35.073
Total poultry	2.654.884	3.075.388
Out of which egg laying	1.597.984	1.432.300
Total horses	27.858	28.552
Out of which mares	8.076	8.436
Bee families	29.530	32.164
Rabbits	2.661	1.744

The purchase of diesel 1 leu cheaper resulted in a total saving of 6.453.250 lei for the farmers in Teleorman county, in 2006, and respectively 1.421.020 lei in 2007. To benefit from subsidies grant from state budget so as to cover expenses necessary for the activities of land improvement, legal entities or individuals that own tracts of land in irrigation systems can establish an organization of land improvement.

Out of the surface of 95.000 ha arranged for irrigation and with functional infrastructure, Teleorman had 28.560 irrigated ha in 2006, and 30.695 irrigated ha in 2007.

The subsidies benefiting those who applied at National Agency for Land Improvement in Teleorman and who also asked for water were the following:

- 2006 = 8.568.000 lei,
- 2007 = 11.971.050 lei.

In order to benefit from subsidies, farmers need to be organised in agricultural units. Agricultural units are those represented by economic agents, namely a legal entity, an individual or a group of legal entities and/or individuals.

In 2007 countywide the following units were registered according to their domain:

1.Trade units with crops = 353 units with a surface of 171.455 ha.

2.Trade units with livestock = 97 units (mainly sheep = 3.047 heads and 42.147 pigs, hives = 7.529 fam.).

3.Mixed trade units = 110 units with 14.588 ha;124.249 goats + sheep ; 2.396 pigs; 18.460 fam hives and 67.526 poultry. Total trade units in 2007 = 560 units.

CONCLUSIONS

- Teleorman county has the third largest agricultural surface in the country, with 499184 ha, agriculture being an important sector in the county economy

- Characteristic of the county is crop production, focused on grains, oily plants, forage and vegetables

- The endowment with agricultural tractors and machines enables farmers in Teleorman to establish agricultural crops at the right moments required by the technology of each crop.

- Yearly physical-chemical analyses are performed for wheat breeds. The quantity was 1.398 kg/ha smaller than in 2006, but the quality was superior, almost all the amount of wheat being bakeable in 2007.

- Little rainfall and temperatures exceeding normal thresholds in the winter, spring and summer of 2007 resulted in smaller yields than in 2006: 1.398 kg/ha smaller in wheat; 1.067 kg/ha smaller in barley; 2.849 kg/ha smaller in corn; 1.037 kg/ha smaller in sunflower; 348 kg/ha smaller in rape.

- Two Guvernment Orders, 636 and 1202 respectively, declared the year 2007 hazard for crops established in the autumn of 2006 and the spring of 2007.

- The maximum amounts of money granted by the Romanian state for the crops established in the autumn of 2006 were of: 750 lei/ha (wheat, rye, triticale), 700 lei/ha (barley, two row barley), 600 lei/ha (rape). For these autumn crops, the agricultural farmers in Teleorman submitted files and requested the amount of 24.725.353,9 RON, representing losses on 80.166,72 insured ha. All 491 applicants were granted the requested money.

- For the crops established in the spring of 2007, the maximum level of damages was as follows: 750 lei/ha (corn), 700 lei/ha (sunflower). For 54.173,94 insured ha cultivated with corn and sunflower 24.435.709,59 lei was requested, out of which 14.500.000 lei went to those affected by drought.

- The advantages offered by the law of agricultural loan mounted to 1.865.135 lei in 2007.

- The purchase of diesel 1 leu cheaper resulted in a total saving of 1.421.020 lei in 2007 for the farmers in Teleorman.

- The subsidies benefiting those who applied to National Agency of Land Improvement in Teleorman and who also asked for water were of 11.971.050 lei in 2007.

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ROMANIA – EAST EUROPEAN TIGER ON RETAIL MARKET

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Abstract: *The drivers of change active in the commerce sector also influence the methods by which retailing is carried out and the activities undertaken by companies in the sector, thereby altering the scope of retailing. Retailers have become very good at managing all aspects of their business and developing their own business systems, approaches and practices.*

While during the middle 90's the most attractive markets for foreign retrials were Poland, Czech Republic and Hungary, lately the situation begins to change. Even though the Romanian retail sector is in its first steps of development, only last year three chains of stores have jointed this market- Auchan, Real and Spar.

Related to the investments value in retail per capita, Romania is going to occupy this year the first place in Central and Eastern Europe, with an average of €30.9. The Romanian market retrial has the biggest growing rhythm from the region and will be able to cross over €100 billions until 2010, only if the mean growth of 50 percent from the late years will be maintained. The Romanian retail future sounds bright.

Rezumat: *Modificările apărute în cadrul sectorului comercial influenţează atât metodele prin care retailul evoluează cât si activităţile realizate de companiile din sector, alterând astfel scopul retailului. Retailerii excelează în managementul tuturor aspectelor referitoare la afacerile din acest sector şi la modalităţile de dezvoltare a sistemelor, modalităţilor si practicilor de afaceri.*

În timp ce la jumătatea anilor '90 cele mai atractive pieţe pentru retailarii străini erau cele din Polonia, Republica Cehă şi Ungaria, în ultima perioadă situaţia a început să se schimbe. Cu toate că sectorul de retail din România este încă la începutul dezvoltării sale, doar în ultimul an trei mari lanţuri comerciale au pătruns în România: Auchan, Real şi Spar.

Referitor la valoarea investiţiilor realizate în sectorul retailului ce revine pe cap de locuitor, România va ocupa locul întâi, anul acesta, în cadrul Europei Centrale şi de Est cu o medie de 30,9€. Piaţa de retail din România are cel mai mare ritm de creştere în cadrul regiunii şi va depăşi valoarea de 100 miliarde € până în anul 2010, dacă ritmul mediu de creştere, în valoare de 50%,, înregistrat în ultimi ani se va păstra. Viitorul sectorului de retail din România sună bine.

Keywords
retail market, East Europe, economic tiger, hypermarket segment, cash & carry, increasingly aggressive expansion.

INTRODUCTION

The commerce sector in Europe faces several challenges, including increased competition, complex supply chains, changing demographics, increased migration, changing consumer and media trends as well as its ability to attract skilled labour. Additionally, the rise of economies in emerging Asia and continued economic out performance by the United States pose significant external challenges to the European Union. While these challenges do threaten the competitiveness and survival of some companies in the sector in the different EU countries, they also represent an opportunity for expansion and growth for others. In direct response to these new challenges, the European retail and wholesale companies increase their competitiveness through acquisitions and mergers, the introduction of new technologies, restructuring processes, new forms of shops and assortments, and innovations in personnel management.

Recent studies have shown a dramatic rise of supermarkets in several developing regions around the world in only the past decade (Reardon et al., 2003). The studies show that the rise of supermarkets have had a profound effect on agrifood systems via several important changes in the organisation and institutions of the food system, including centralisation of procurement from farmers, decline of traditional wholesale systems, and the rise of demanding private standards for product quality and safety. The supply-side implications of these changes are emerging: the changes have taken a great toll on smaller and under-capitalised producers unable to meet the new requirements, with a resulting exclusion of many small producers, in addition to the creation of new local dynamic markets for local farmers (Reardon and Berdegué, 2002).

THE RAPID RISE OF SUPERMARKETS

Over the past 10 years, the supermarket sector has developed very quickly in the CEE, taking the form of an exponential curve – starting slowly after liberalisation/privatisation of the former state-controlled retail sector, and then accelerating, with the main growth taking place in the past 5-7 years. This recent growth has been spurred by Foreign Direct Investment (FDI) which has created investment competition with domestic chains (in most places).

There have, in general, been three waves of development determined by socio-economic factors (income, urbanisation, infrastructure, etc.) and degree of advancement in policy reforms:

- the first-wave countries are in the northern half of Central Europe, with the supermarket share in food retail going from 10% in the early 1990s to 50% at present;
- the second wave countries include most of southern Central Europe, with supermarket growth starting in the mid/late 1990s and reaching on average 30% today;

- the third wave includes some of southern Central Europe and all of Eastern Europe, including the Russian Federation. In this third-wave area, supermarket growth started in the late 1990s and early 2000s, and has reached only about 5-10% of food retail, but is growing rapidly (Dries et al., 2004).

To put the above in international perspective, supermarket growth started in the US in the 1920s and in Western Europe in the mid-1900s, and has generally reached 70-80% of food retail today. The larger countries of South America underwent the retail transformation described in the first wave above, in the 1990s, and now stand at 50-60%. The first wave countries of CEE are closest now to the retail situations of, for example, Mexico, Thailand, and South Africa; the second wave to Ecuador, Guatemala, and Indonesia, and the third wave to India, Kenya, and Peru (the latter perhaps most like Russia or Romania in the sense that policy factors held back retail transformation, the potential demand for which was strong due to socio-economic factors). Keep in mind that all of these countries, including the US and Western European countries, started from the same base in the sense that the traditional retail system in all of them was made of small shops and open-air or central markets.

Supermarket growth starts in large cities among the upper and middle income groups, and then the typical pattern we observe in CEE as well as other regions, is that supermarkets spread into lower-middle and lower income groups as they spread into medium cities and then small cities and even rural towns. There is a correlation between this diffusion and the stage or wave: in first-wave countries supermarkets have been pushing into small towns for several years, while in third-wave countries they are only just now pushing into smaller cities. In general, supermarkets tend to spread well beyond the middle class as they make the kinds of procurement system changes we note below, thus reducing costs and prices. And intense competition and relative saturation in the big cities and certain countries drives the spread of supermarkets into the successive concentric circles of expansion in space and over consumer segments in the EU.

ON ROMANIAN RETRAIL MARKET FUTURE IS COMPETITION

As a result of this concentration of activities, the top retailers' market shares in EU countries are likely to decrease in the coming years. Modern grocery companies are now springing up all over the region's most underdeveloped markets, like Russia, Ukraine, Romania and Bulgaria.

Romania is one of the top targets in Eastern Europe for retailers like Metro**,** Carrefour or Selgros, whose local large-format stores provide the biggest sales increases for their chains.

Our country has a higher potential than Poland and the Czech Republic, where some retailers prefer to slow down expansion. Newly-entered players and expected names are putting more pressure on retailers' expansion plans. Western European retailers operating hypermarkets dominate the Central and Eastern

European markets. Romania is no exception, but what makes it different at this moment from countries like the Czech Republic, Poland or Hungary is the high.

For all the changes over the past 1 0 years, the next five are likely to witness even more rapid development. There is an aggressive retail property development pipeline which will significantly enhance infrastructure and stock for established domestic and overseas retailers, as well as new entrants. The retail market is undoubtedly poised for a period of accelerating development.

In the past, it has been difficult to monitor accurately Romanian retail sales on account of hyperinflation and wild fluctuations in the value of the lei. However, as the economy stabilises, retail sales are showing signs of sustainable, real growth. Romanian retail sales are now estimated to exceed €10 billion, with steady growth forecast for the next few years.

Table 1. Romanian retail sales 2004 - 2010

	€ billion	*% increase*
2004	10.2	–
2005	10.6	3.4%
2006	11.0	3.8%
2007	11.4	3.6%
2008	11.9	4.4%
2009	12.3	3.4%
2010	12.9	4.9%
Source: Mintel, National Institute of Statistics		

The local market has for several years been dominated by Carrefour and **Cora** on the hypermarket segment, while Metro and Selgros have competed on the cash & carry market.

Carrefour has been more focused on organic growth, opening more stores than Cora, the latter having only three stores in Romania at the moment. Metro group managed to stay ahead of Rewe, which owns Selgros.

While new competitors came to Romania – and there have been a few in the last two years: Real Hypermarket**,** Kaufland**,** Auchan and Spar **–** their strategy shifted a little to face competition and ensure bigger and bigger profits from Romanian shoppers.

Last year proved to be the best for retailers in Romania, as all major players accounted for historical increases in sales. If forecasts for 2007 come to fruition, this year might bring even better performances.

Hypermakets Carrefour and Metro occupy the first positions in a ranking of Romanians' favourite shopping places, each with a 7% share, followed by Billa with 6%, Artima with 4% and Kaufland with 3%, shows a market survey of the consulting company GfK.

Carrefour Romania is in an expansion period, with an unprecedented dynamic. The Carrefour strategy follows the openning of two more stores this year, to add to the existing eight. In 2008 we plan to open at least six more stores in Braila, Suceava, Pitesti, Arad, Bucharest’s Vitan area and Oradea. The target for the French retailer is to cover the majority of Romania’s regions, this fact

having its bases on the fact that Romania makes 2 percent of Carrefour's EU sales.

Carrefour, which is the third ranking retailer in Romania sales wise, after Metro and Rewe**,** is now competing with newcomers like Real, Auchan and Kaufland, which also have aggressive expansion policies. This competition is spiced up by land price rises even in secondary Romanian cities along with a labor force crisis, which all make it even tougher for retailers to open new stores. While Carrefour is taking up this rapid pace in new openings in Romania, the group has pulled out of the Czech Republic, by swapping stores with another giant retailer, Tesco, which is not yet in Romania. For its stores in the Czech Republic Carrefour received Tesco stores in Taiwan.

The French retailer's sales in Romania reached €608.9 million last year, around 2 percent of the group's sales in Central and Eastern Europe. It may achieve some €850 million in turnover at the end of this year, according to previous media reports. So far, Carrefour Romania has managed to increase its January to June 2007 sales by 43 percent on the same period of last year, to some €362 million. The group's sales in Europe, excluding France, Spain, Belgium and Italy, reached €16.6 billion, which means Romania accounts for around 2.1 percent of the region's sales.

Greece, Poland and Romania continued to drive the growth of our other European countries, with sales growth on constant exchange rates of 7.9 percent, 23.7 percent and 27 percent respectively, reads Carrefour's latest financial report. Out of these three countries with excellent growth, Romania ranks first in terms of sales increases. For comparison, Spain, Italy and Belgium accounted for sales increases of 5.9, 2.6 and 1.4 percent respectively in the first half of this year. So Carrefour gets most of its sales increases from Central and Eastern Europe, Latin America and Asian countries.

Metro Group, currently the top retailing group in Romania in terms of sales, is not expanding its network of stores, which is actually the widest in the country with 23 outlets. The German retailer is however renovating some of its existing stores. The group has brought in a sister company whose expansion it is currently taking care of. Hypermarket operator Real, which entered the Romanian market last year, is expanding in the country at a rapid pace. With nine units already opened, some six more planned for this year and another six for next year, Real is competing with Carrefour, Auchan and Cora.

Metro Cash & Carry's turnover last year in Romania stood at €1.42 billion. Out of the €12.6 billion turnover made by the group in Eastern Europe, Metro Cash & Carry Romania contributed 11 percent.

The first half of this year brought up Romania's and Russia's names among the countries which performed best in the Metro Group, according to the latest group financial report. Sales in Eastern Europe showed above average growth rates for the group, with a 23.5 percent increase in the first half of this year. Western Europe's sales increase was lower – 13.5 percent, which seems to

confirm the idea that Eastern Europe is becoming more and more important to large retailers.

Kaufland, part of Lidl & Schwarz Group, is the hypermarket operator with the highest number of stores opened shortly after market entry. Since 2005, it has opened 28 hypermarkets in Romania. The group is recognized for its fast and aggressive expansion policy once it has entered a new market. Kaufland types of stores are at the border between large supermarkets and hypermarkets.

CONCLUSIONS

Romania has become lately the scene of debates between great European retailers. With every year, the Romanian retail segment attracts more new and big names to the market, while existing players devise increasingly aggressive expansion plans. Thus, the potential of a market of nearly 22 million consumers does not always guarantee success for all who open stores on the market.

The most recent examples of this are Gamma and Profi. After having expanded to more than 20 stores by last year, the Profi network recently had to close its first two stores in Timisoara and Lugoj.

The failures are inevitable on the competitivity market. Many retailers are concentrating activities in the EU countries, exiting some and increasing their presence in others, but on the other hand, the majority of EU markets are already saturated.In these conditions, the extension on Eastern Europe market is more than neccesary. Future tendencies will be underlined by the retailer's activity from the Eatern Europe Tiger region

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FINANCIAL AUDIT VS ACCOUNTING

AUDITUL FINANCIAR VS CONTABILITATE

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Abstract. *The audit is a disciplin that seeks continous solutions to practical problems fundamenting it self on teories, concepts that deliver concrete explinations .The financial situations using audit tests to establish the conformity of the elaboration prezentation and publication of financial situation compared to the standars of accounting.*

Rezumat. *Auditul este o disciplina care cauta continuu solutii la problemele practice fundamentandu-se pe teorii si concepte care furnizeaza explicatii concrete in vederea asigurarii obiectivelor urmarite.Auditul financiar consta in studierea situatiilor financiare pe baza de teste de audit in vederea stabilirii conformitatii elaborarii, prezentarii si publicarii situatiilor financiare in raport cu standardele de contabilitate.*

The auditing of any business influences the information that is provided in financial statements, especially in terms of their correlation with reality, their compliance with legislation and the applicable regulations. Audit is regarded as the discipline that is derived from practice and seeks solutions, being based on theories and concepts that offer viable explanations in order to achieve the proposed objectives.

MATERIAL AND METHODS

Auditing provides additional credibility for the accounting information published by the respective business. Auditing constitutes a counselling or hearing before reaching an evaluation or appraisal, a critical review required to assess a particular financial statement. It utilizes a range of data collection and assessment techniques in order to produce a well-founded and independent judgment based on evaluation norms which seeks to appreciate the reliability and the efficiency of the systems and procedures employed by a particular business entity.

RESULTS AND DISCUSSIONS

Financial auditing is in effect an adjacent discipline of accounting that combines knowledge of accounting and law, analysis, finance and economy, and ethics. One of the chief feature of auditing is the careful and critical observation of financial statements.

These statements are constantly monitored by a series of end users such as:

1. Current and potential investors, who are interested in the profits generated by their investment and in the risk associated with the business,

considering that they look for higher dividends that facilitate a reduction of funding directed towards development.

2. Employees, who are interested in the profitability rate and especially the stability of the business

3. Financial creditors, who monitor the capacity of the business to pay back the loans it has received

4. Commercial creditors, who have a short-term interest, concerning to the payments made in due course

5. Customers, who are interested in the longevity of the business

6. The government, who focuses the allocation of resources

7. The general public, who has an interest in the job opportunities

8. The managers, who seek to enhance the activity.

Financial statements contain information about past events without referring to non-financial information that some users may need in the decision-making process.According to the vision of Bernard Colasse, there emerge three groups of contending users, namely the accountants, who are the actual producers of information, the managers and the external users. The data regarding the company's registered capital, its turnover, profit and methods of evaluation are satisfactory for the 3 categories, being controlled by accountants. The data referring to human resources and environmental issues are accepted by managers and external end users yet they are beyond the accountants' remit. The data of annual balances of accounts are accepted by managers for publication and are provided and administered by accountants, yet they are not relevant for external users. The data about salaries and management accounts are primarily of interest for external users, but managers want them to be handled with confidentiality. Accountants provide and control this information.

Information about staff turnover are provided by the accountants, yet managers do not prefer them to be publicly available. Such information does not concern external users. The information referring to the company's strategy are of interest to external users but mangers do not allow their public communication; accountants cannot provide or control such data. These contending interests have led to the emergence of two policies of information about the financial status of companies:

- the policy that completely serves the interests of users, an external policy that requires the surveillance of available information; the policy that serves the convergent interests of the different users.

Some users equate accounting and auditing because a large part of the auditing activity concerns information related to accounting and the majority of financial auditors are also chartered accountants. However, one must distinguish between accounting (which ensures the registration, ranking and summary of data on transactions performed, delivering them to the decision-making process; it requires the knowledge of and compliance with rules that are based on accounting processing) and the auditing activity (which ensures the establishment of conformity of recorded information with the actual economic events, requires the

knowledge of accounting rules by auditors and experience in identifying the audit evidence, their retrieval and interpretation as well as the evaluation of the results).

Financial audit focuses on the objectives of financial statements, i.e. the company's financial position, as presented in the balance sheet; accounting policies and treatments; the company performance in terms of the profit and loss account.

The goal of financial audit is achieved by the communication of the auditor's opinion on the image that the financial statements provide and in particular the degree to which this image is accurate, in all its significant aspects, according to the generally agreed accounting principles. To conduct the financial audit, the accounting cycle of financial statements is divided into parts. Each part is then dealt with separately and also in conjunction with the others. In the specialist literature there are three theories that emphasise the necessity of auditing, namely:- the theory of agency, which stresses the fact that investors cannot be fully confident that managers will utilize funds adequately, without misusing them. Both owners and managers need to nominate an independent financial auditor who can provide an accurate rundown of the company's financial statements;- the theory of assurance, which explains the need for financial auditing, in terms of the principles of assurance and availability to information;- the motivational theory, which explains the need for financial auditing in terms of the professional of the persons who are responsible for drafting financial statements.

One can reasonably state that financial auditing is necessary owing to the control that it provides over the quality of information, given that it achieves an independent control of accounting data. From a legal point of view, financial audit is comprised of the following two aspects: legal audit, which certifies financial statements and oversees the management of the business and is utilized by comptrollers and financial auditors. Contractual audit, which can certify certain elements of the balance, statements intended for business partners as well as confirm the reliability of certain financial plans; it is conducted by chartered accountants and financial auditors.

According to the data provided by the Chamber of Financial Auditors, on the business market, the state of play in the contest between the demand and offer of financial audit is the following: The audit offer: more than 600 companies are registered to conduct financial audit and more than 1600 persons are chartered financial auditors. The potential offer can be increased with the number of interns admitted in the entrance exams for the financial auditor profession; The financial audit demand has seen a constant increase since the year 2000, with an estimated 2500 companies beign audited at the end of the year 2005.

Although financial audit is required by the practical circumstances, it can only be conducted in the framework of the applicable international norms and national legislation.

These standards lay emphasis on the chief personal qualities that the financial auditor must possess. The auditor must be a qualified person, with

relevant training, professional expertise and formal training in auditing and accounting. Standards of procedure refer to those aspects related to the collection of audit evidence and other field work.

They are provided by professional manuals and lay emphasis on the quantity and quality of the audit evidence.

Standards of reporting require the financial auditor to provide comparisons between the current and previous year. The auditor's report must include opinions on the overall financial statements, the reason for the control performed by the financial auditor and the level of responsibility that the financial auditor takes on.

Quality control of the audit of financial statements is provided by the International Standard on Auditing 220 R "quality control of historical financial statements". The quality standards must be observed both by the auditing body and in each financial audit engagement. The importance of quality control on the auditing process increases when there is a risk of financial liability on the part of the financial auditor. According to the standards on auditing, the chief objectives to be followed as far as the quality of auditing is concerned are:

- professional requirements that involve the compliance with professional ethics obligations; skills and competencies that focus on providing qualified personnel, assuming responsibilities and continuous professional training; consultation, the procedure that allows the employed personnel to resort to specialists consultation; the delegation of responsibilities, and appropriate guidance, monitoring and review at all levels; the acceptance and securing of clients, a method which seeks to evaluate the potential audit clients and the control of existing ones; integrity, independence and objectivity.

CONCLUSIONS

In taking the best decisions for the purpose of achieving the economic and social goals, all stakeholders involved in the running of a business must reach an understanding of the issues involved in transactions, as described by the data provided in financial statements.

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THE WINE CUSTOMER'S BEHAVIOUR VS MARKETING STRATEGIES

COMPORTAMENTUL CONSUMATORULUI DE PRODUSE VINICOLE VS POLITICI DE MARKETING

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Abstract. *In the economic environment, profit acts as success barometer, and its premise lies in meeting the customer's demands. In order to run a successful business one must thoroughly understand customer's behaviour by simply providing answers to the following questions: 'Who buys wine-derived products?', 'How does he buy them?', 'When and where does he buy them from?', 'Why does he buy them for?', 'Which are his most favourite ones?'.Understanding and identifying the customer's reactions to the different traits of a peculiar product, alongside its price policy and marketing strategy turns into a real advantage for those companies that hold answers to such questions.Successful marketing policies depend upon the results of market and customer's response surveys. Thus, it is but necessary for any company to master both the market target segment aspect, and it must also provide answer to the problem of how strong its need to purchase that particular product is. If there is little demand on the part of the consumer one has to identify and analyse those aspects that can modify the whole state of affairs, such as the form, price, labelling and advertising strategy of the given product.*

Rezumat. *In domeniul economic, barometrul succesului este profitul iar premisa acestuia consta in satisfacerea consumatorului.În asigurarea unei afaceri de succes trebuie înțeles cât mai bine comportamentul consumatorului prin găsirea răspunsului la următoarele întrebări: Cine cumpără produse viticole? Cum cumpără? Când şi unde cumpără? De ce cumpără? Care sunt produsele cele mai preferate?Înțelegerea şi depistarea reacțiilor consumatorului la caracteristicile diferite ale produsului, la preț şi campania publicitară constituie un avantaj pentru firmele ce dețin aceste răspunsuri.Fundamentarea oricaror politici de marketing se bazeaza pe rezultatele cercetarilor efectuate asupra pietei si comportamentului consumatorilor. De aceea este necesar a se cunoaste urmatoarele aspecte : care este categoria de consumatori careia sunt adresate produsele si cat de puternica este dorinta lor pentru produsele respective.In cazul in care nu exista o cerere puternica trebuie depistate si analizate aspectele care o pot modifica , cum ar fi forma produsului, pretul, ambalajul, publicitatea.*

Specialty studies lay a strong accent on the dual character of marketing, namely that of art and science. In practice marketing becomes the science of making money, the art of attracting and keeping those customers that bring profit. Through marketing the aimed target is maximising the profit by means of massive sales, increasing the numbers of clients and dominating the market in terms of

product quality. Consumers' orientation towards a certain brand may be determined by a change in preferences, low cost price in comparison with other type.

MATERIAL AND METHODS

Thus, one has to analyse the overall picture of any business in horticulture as often as required in order to identify the factors responsible for increasing production, sales and revenues, implicitly. Success in marketing and especially in capitalizing horticultural products is the result of consumers' preferences and it is for this reason that special attention has to be given to studying consumers' behaviour.

RESULTS AND DISCUSSIONS

The consumer is the central pillar of the economic circuit – production – distribution – consumption – production. The barometer of production is given by the consumption level. In market economy, preferences, suggestions and dissatisfactions of customers must turn into the starting point of any production process.

In order to sell one must 'read' the mind, preferences and tastes of people.

In order to be able to promote a successful business one has to thoroughly understand the consumer's behaviour by finding answers to the following questions: Who buys horticultural products? How does he /she buy them? Why does he/she buy? When and where does he/she buy them from? Which are the favourite products, most frequently purchased? Understanding and identifying the reactions of the consumers to the different features of a product, price and marketing campaign turn into a real advantage for the companies that hold answers. Some producers believe that obtaining success depends on the orientation of production towards certain classes and social groups. When it comes to wines, besides the 4 stimuli, consumers' preferences are influenced by social, cultural, personal and psychological factors that lay their mark on the very behaviour of the consumers. Tradition and culture stand for those factors that influence the behaviour. If tradition appreciates wine consumption, thence a certain area will host a safe market, but if there are religious impediments in what alcoholic beverages consumption is concerned, then it is but impossible to talk about creating a market there.

In what social classes are concerned, one may state that, generally, producers direct their products towards superior types, when people with high-incomes constitute their market. Otherwise, producers focus their production almost exclusively on cheap wines, destined to people with low incomes, for whom form and modality do not count much. The behaviour of the consumer is also influenced by social factors, such as the small groups he/she belongs to.

The groups that have direct influence on the consumer are the main groups, such as family, friends, colleagues, neighbours, and the secondary groups such as professional associations, union trades .On the wine market one ha to identify those groups towards various subjects tend to long for, since they may influence

another group by another life style, influencing consumers' choices towards purchasing certain wine types and brands.

In Europe, wine has a good image among consumers that has to do with a multitude of perceptions, behaviours that vary according to the factors that originate the purchase and consumption act itself. The image of the wine encourages the consumption at home, with friends and family, shaping the social status, personal taste of the buyer, his/her will to choose something else, to discover something new. In order to better understand the specific phenomena of wine image, it is but necessary to classify the main consumption countries in four categories:

• the Latin model (Spain, France, Italy) that characterizes wine as a part of any 'ordinary' meal; the preferred type is the red wine, and this model is characterized as a 'simple purchasing act';

• the Northern Europe model (Denmark, Sweden), with a significant percentage of non-consumers, and with an occasional consumption mainly oriented towards red wines;

• the British, Dutch and Belgian model (Great Britain, the Netherlands, Belgium) is characterized by a large number of non-consumers, with occasional consumption episodes, mainly oriented towards red/white wines. Purchases are mainly carried out by female consumers that perceive wine as a relaxing beverage to be consumed at home, during the holidays;

• the German model, characterized by the following: few non-absolute consumers, but frequently oriented towards occasional consumption, in which white wines play the dominant part. Wines are mainly to be consumed at Easter time, and the purchase is directly from the producer (more than 32%).

The European consumption models will acquire new values in time with the appearance of a new consumer profile that will trigger the decrease of the demand for common wines.

In the countries of the Far East, wine market experiences a real expansion.

The studies made by the French Centre of Foreign Trade, among Japanese consumers, help to a better understanding of the factors that influence wine consumption. In Japan, wine takes the fifth position among other alcoholic beverages, in terms of consumption. There is a preference for relatively sweet, white wines, produced locally, and mainly consumed at home..The production of alcohol-free wines opens new possibilities of penetrating the Islamic markets that forbidden by law the production and consumption of alcoholic beverages.

Due to the different models of behaviour, the CEO s of those wine-producing companies that wish to hold an advantage over the competition, should formulate their strategies starting form the very understanding of the reaction attitude of the consumer towards the different characteristics of the product, price and advertising campaign, since the consumption model is, in fact, the response of the buyer to market stimuli. A recent survey carried out on a sample of wine consumers of the main 200 towns of Romania, has highlighted the fact that 57%

of 1,500 buyers have purchased a certain wine type, being influenced by other persons .

Generally, the purchase decision is influenced by income of the buyer, his/her social status. High-quality products are purchased by people enjoying a certain level of social status, for whom price is the last factor to consider when purchasing a bottle of wine. This thing constitutes an advantage for the producer who wishes to conquer the market of high-income people, accustomed to consume little, but of exquisite quality. Special attention has to be given to those people of medium and low-income that allocate a considerable part of their budget to purchasing wine at a low price. Regarding the life style, the personality and self-opinion of the consumer is to be taken into account exclusively when top-notch quality wines are concerned.

Psychological factors lay their mark on the behaviour of wine consumers. The people that prefer medalled wines try to satisfy their need of self-esteem. They can afford to purchase collection wines, proving them selves knowledgeable in what wines are concerned. They purchase wine in order to fulfil a social need, but they cannot appreciate its qualities.In order not to be mistaken, they purchase it from renowned off-licence shops, or they go for a wine brand that has been authenticated by some advertising campaign.

The second step a wine producer has to take after performing the analysis of the factors that has determined the consumption is the understanding of the way in which the future buyers will take the purchasing decisions.

Thus, answers to these questions have to be provided:

- who has a leading role in taking the decision regarding twine purchasing;
- which are the factors and stages that have to be taken towards reaching a final decision.

CONCLUSIONS

Knowing the needs of the consumers and the purchasing process itself is the foundation of any successful business. Understanding the way in which consumers know their needs, search for information, assess the variants, take decisions, behave after the purchasing process has come to an end, constitute the starting point of an approach whose aim is to identify forms and means of satisfying the customers, alongside trying to find ways of capitalising the products, and, why not, elaborating an efficient programme of successfully launching new wine offers on the market.

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ASPECTS ON THE NEW APPROACHES TO CASH FLOW STATEMENTS

ASPECTE PRIVIND NOILE ABORDARI ALE TABLOULUI FLUXURILOR DE TREZORERIE

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Abstract. *Exchequer flowchart was (and in some cases still is) a part of the governments of England (latterly to include Wales), Scotland, and Northern Ireland that was responsible for the management and collection of revenues. The Anglo-Saxon accountancy is more responsive to investors' needs, their focus being on the future activity of the company, on increasing the current and potential dividends, company capacity of generating positive exchequer flows, so that the notion that gains grounds is that of cash-flow and not that of result. Exchequer flowchart has turned into a compulsory report document incorporated into the International Accountancy Standards. The initial model, to be found throughout the whole bookkeeping world, is the FAS 95 "Statement of cash-flow" drafted by the FASB.*

Rezumat. *Tabloul fluxurilor de trezorerie se utilizează în special în mediul contabil anglo-saxon. Contabilitatea financiară anglo-saxonă este mai receptivă la cerinţele investitorilor, aceştia fiind interesaţi de activitatea viitoare a întreprinderii, de mărimea dividendelor actuale şi potenţiale, de capacitatea întreprinderii de a genera fluxuri pozitive de trezorerie, astfel că noţiunea care câştigă teren este cea de cash-flow şi nu cea de rezultat. Situaţia fluxurilor de trezorerie a devenit un document obligatoriu de raportare, fiind preluat n cadrul Standardelor Internaţionale de Contabilitate. Modelul de plecare, care îşi găseste generalizare în întreaga lume contabilă, este modelul adoptat prin nomra FAS 95 „Statement of cash-flow" elaborată de FASB.*

Accounting has been transformed from a record of the business transactions of a company into a means of monthly calculation of a company's performance indicator, i. e. **output**. Flow is "*an economic concept which refers to a movement or transfer of a quantity of goods, services or currency, over a specific period of time*." Flows are only an "*accounting translation of exchanges"* with the environment.

MATERIAL AND METHODS

Every economic decision to make an investment is intended to improve the financial position of the business, which leads to increased capitalisation. Numerous authors have carried out research on cash flows. Bernard Colasse, for example, notes that cash flows (which are the remit of accounting) are flows of assets and liabilities that do not necessarily involve an impact on the company's cash on hand, which is why they recommend a ranking depending on cash impact: • cash flows with

immediate impact on the company's cash on hand (including all the purchases, impending payments and sales whose price was paid immediately); • cash flows which do not have an immediate effect on the company's cash on hand (such as acquisitions and sales on credit); • fictitious flows which never have an impact on the cash in hand (amortisations which generate a *"diminishing flow"*)

RESULTS AND DISCUSSIONS

In analysing cash flows, one must consider the information that is made available to users by the management. In this respect, the balance sheet highlights in a global manner, the balance of cash and the cash-equivalent assets of the company, at the beginning and the end of a particular period.

By examining the balance sheets of two consecutive periods, one can verify whether cash and cash-equivalent assets have increased or decreased during the specified period. However, the balance does not point out the causes that have determined the increase or decrease in cash and cash-equivalent assets during the financial period.

On the other hand, the profit and loss account provides information on the earnings, expenditure and output of various activities – which are benchmarks for the sources and uses of cash and cash-equivalent assets – yet this information too does not explain why those elements increased or decreased. Moreover, often behind significant profits reflected in the profit and loss accounts of a company there lie serious problems with liquidity. Cash flow statements are an alternative for solving the problems related to the provision of financial information to all parties interested in the economic and financial position of a company and are as such a most useful tool.

The users of financial and accounting information are not satisfied only with the information that is provided by the balance sheet and the profit and loss account and that is why further information is required for a more accurate image of the dynamics of the financial structure and that is why engagement accounting requires the determination of cash flows.

The state of cash flows has become a prerequisite reporting document, being included rather recently in the International Accounting Standards. Cash flow statements are particularly used in the accounting systems of Anglo-Saxon countries. The Anglo-Saxon financial accounting is more receptive to the needs of investors, who are interested in the company's future activity, the size of current and potential dividends, the company's capacity to generate positive cash flows, so that the prevailing notion is that of cash flow and not output.

Many Romanian companies face financial deadlock as they are not able to make payments and preserve their solvency. Under the circumstances, the introduction of a compulsory financial reporting document in Romania is welcome, as it would ensure further harmonisation with the International Accounting Standards and the prospect of reducing the financial deadlock at macroeconomic level through better management of liquid assets at macroeconomic level. The objectives of preparing the cash flow statements

consist of the disclosure of information on the cash flow evolution, the variation of cash flow starting from the results reported in the profit and loss account, the provision of information on the operations, investments and financing of a company during a particular financial year. The cash flow statement is of interest inside the company for the management and outside the company for investors and lenders. For investors and lenders, the cash flow statement is useful in assessing the company's capacity to generate future positive cash flows and to properly use those flows, thus providing an indication as to the quality of profit.

Cash flow statements classify the company's activities into operation, financing and investment activities. Within the cash flow statement, the flows are classified in three categories: flows generated by the operation activities; flows generated by the investment activities; flows generated by the financing activities.

The analysis of cash flows for all the three activities is useful for: correlating profit (loss) with cash; separating activities that involve cash from those that do not involve cash; evaluating the company's capacity to fulfil its obligation to pay in cash; assessing cash flows related to future activities. The usefulness of the analysis resides in the fact that the global cash flow variation is reflected in the cash reserves, resulting from asset management. The flows of the operation activity represent the monetary effects of events and transactions associated with the company's operation. The cash flows resulting from the company's operation can be determined by using the direct or indirect method.

The main features of the two methods are:

a. the direct method:

- uses information such as cash receipts and payments, the cash flow variation on operation activities being equal to the sum of cash receipts and payments. Information on the major classes of cash receipts and payments are not directly provided by the financial statements. These can be obtained either directly from accounting records, either indirectly through adjustments. The sum of sales during the financial period is not usually equivalent with the receipts from the sales over that period. In order to determine the information about cash receipts from customers, certain data are retrieved both from the balance sheet and from the profit and loss account, as they are more accessible to end users and ensure the presentation of the overall cash flow, thus providing information on the sources and uses of cash. The method is preferred by investors, as it provides useful information for forecasts of future cash flows (international accounting standards encourage the use of the direct method).

b. the indirect method

It is favoured by the company management (it conceals to internal users the actual image of the cash and solvency of the company). Using data provided by engagement accounting the method highlights the differences between the profit from operating activities and the net cash flow from the operating activities.

The method consists in preparing a table which adjusts the net results before taxes and the extraordinary elements with the net cash flow from the operating activities. It is preferred by the company's accountants, being easily obtained by

retrieving information from the balance and the profit and loss account. The new vocabulary of accounting revolves around the new trends in the comparability of the financial and accounting statements of the company. The objective is to provide an accurate image of the company's performance, which can be read and interpreted all over the world. As a matter of fact, the current orientation towards financial analysis is reflected at terminological level, through the change of the name of the well-known IAS (International Accounting Standards) into IFRS (International Financial Reporting Standards).Financial statements become useful to the extent that they provide a vision or a link to the future, that is, if they help end users to evaluate the company's capacity to generate cash flows in the future and the exact moment and the certainty of their generation. In a constantly changing economic environment, annual financial statements can no longer be limited to describing the past. The specialists accounting literature uses various terms to describe the annual reporting published by companies: annual accounts, summary reports or annual reports. The specifics of each report varies also with the individual accounting norms of each country.

CONCLUSIONS

Of all the sources of information, summary documents are considered by end users as being the most comprehensive and most apt to reflect the company's official image. They lie at the centre of the decision-making process. That is why the quality of the information that they present and accurate disclosure are highly important both for those who prepare financial statements and for those who request such information. Intelligibility, relevance, comparability and reliability, along with the faithful presentation, prudency, neutrality and the observance of the other accounting principles are the crucial qualitative characteristics that must be considered when preparing and presenting financial statements.

Although IAS 7 recommend the utilization of the direct method, especially in order to satisfy the information needs of investors, who can thus make better forecasts of future cash flows, most companies prefer to use the indirect method, due to the calculation method which is closer to the format of accounting reports.

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FINANCIAL EQUILIBRIUMS ANALYSED AND PREVISIONED ON THE BALANCE-SHEET DATES

ECHILIBRE FINANCIARE ANALIZATE ŞI PREVIZIONATE PE BAZA DATELOR DIN BILANȚ

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Abstract: *The present paper objective is the analysis and the research of the balance-sheet on two directions (horizontal and vertical), each of that making evident certain correlations, with special significance for the enterprise's financial situation appreciation. In this way, the horizontal analysis of the balance-sheet, the one we have in view, make evident the mode in which are realised the main financial equilibriums for the enterprise's or for the group of enterprises, on short and long term, through some elements such as the bearing fond and, respective, the necessary bearing fond. During the time, the bearing fond has various interpretations but only two of them are more useful for the financial analysis and administration and are known under the names of clear or permanent bearing fond, respective, own bearing fond. The existence of the bearing fond is bounded by the clear need of capitals which appears in the exploitation cycle and is known under the name of necessary bearing fond. The last one appears from the comparison between the needs and the means of finance.*

Rezumat*: Lucrarea de față are în vedere analiza şi studiul bilanțului pe două di-recții (orizontală şi verticală), fiecare dintre acestea punând în evidență anumite corelații, cu semnificație deosebită în aprecierea situației financiare a întreprinderii. Astfel, analiza pe orizontală a bilanțului, pe care o vom avea în ve-dere, pune în evidență modul în care se realizează principalele echilibre finan-ciare pe termen scurt şi pe termen lung ale întreprinderii sau grupului de între-prinderi, prin intermediul unor elemente dintre care, vom lua în discuție, în lu-crarea de față, fondul de rulment şi necesarul de fond de rulment*[1]*. Fondul de rulment a suferit în decursul timpului numeroase interpretări, două dintre aces-tea dovedindu-se de mare utilitate în cadrul analizei şi gestiunii financiare şi purtând denumirea de fond de rulment net sau permanent, respectiv fond de rul-ment propriu. Existența fondului de rulment este strâns legată de nevoia netă de capitaluri manifestată în cadrul ciclului de exploatare şi cunoscută sub denumi-rea de necesar de fond de rulment care ia naştere în urma comparării nevoilor de finanțare cu mijloacele de finanțare.*

MATERIAL AND METHOD

The horizontal analysis of the balance-sheet make evident the main financial equilibriums on short and long term of the enterprise or of a group of enterprises through some measures as: the clear situation, the bearing fond, the necessary bearing fond and the treasury[2].

The determination of the enterprise's clear situation have, at basis, the following

[1]Petrescu Silvia, *Analiza economico-financiară, Concepte-Modele-Studii de caz*, Editura Universității "Al.I.Cuza" Iaşi, 2003, p. 241.
[2]Ibidem.

relation:

SN = A – DT,

where:

NS represent the clear situation;

A - actives;

TD - total liabilities.

Being the expression of the enterprise's owner fortune (because represents the value of the active who can be realised at a certain moment), the clear situation must be sufficient to assure not only the enterprise's function but also its financial independence. In the same time, it present interest also for the enterprise's creditors, especially for its liquidation case.

If we have in view the financial balance-sheet, the clear situation will be determined as difference between the active total and the advanced incomes (on one hand) and total liabilities (on the other hand), fact who represent nothing else than the enterprise's own capitals value. The harmonised accounting balance-sheet proceeds to the calculus of the clear situation as difference between the active total, current liabilities and long term liabilities.

According to its measure values, the firm will be characterised through a *healthy economic administration* (when the clear situation is positive and increasing); in that case, the enterprise's value and its own capitals are maximised; *before bankruptcy situation* (the is case characterised through a negative clear situation).

RESULTS AND DISCUSSIONS

To characterise the clear situation of the analysed enterprise "X", on the studied period of time, and also to show the mode in which it will evolve in future, we will proceed to the enterprise's own capitals prevision. The effective and future values of its elements are presented in table 1. The existence of some positive and increasing values for the own capitals leads to the conclusion that the analysed firm is characterised through an economic healthy administration.

Table 1

The situation of the own capitals at the analysed enterprise (thousands lei)

Own capitals at S.C. "X" SA			
The analysed period of time		**Prevision values**	
Years	**Value**	**Years**	**Value**
2001	527,50	**2008**	1.355,67
2002	579,54	**2009**	1.556,12
2003	726,28	**2010**	1.777,67
2004	742,80		
2005	891,51		
2006	955,71		
2007	1.218,09		

The bearing fond and the necessary bearing fond – indexes of the enterprise's financial equilibrium; The bearing fond suffers, during the time, various interpretations, two of them proving big utility for the financial analysis and administration, known under the names of clear or permanent bearing fond, respective own bearing fond.

The clear bearing fond determination starts from the idea to reclassify the posts from the accounting balance-sheet, for the utilizations part and, also, for the resources part. In that way, for the utilizations, we obtain an order of it after the liquidity criterion (over an year for the fixed assets, respective under an year for the circulating assets). The resources was under classified according the liability criterion, in permanent capitals (own capitals plus liabilities who must be reimbursed in a period over an year) and liabilities under an

year (the one with a reimburse term inferior than the financial exercise period of time and who are bounded, as result, by the enterprise's solvability degree).

The calculus relations for the clear bearing fond are:

CBF = PC – FA (determined according to the superior part of the financial balance sheet)

CBF = CA – CCL (determined according to the inferior part of the financial balance sheet**,** where:

CBF represent the clear bearing fond ;

PC - permanent capitals;

FA - fixed assets;

CA - circulating assets;

CCL - clear current liabilities.

To demonstrate the equivalence between the two calculus modes of the clear bearing fond we use the dates presented in table 2.

Table 2

The equivalence between the two methods used for the CBF calculus (thousands lei)

Elements	2001	2002	2003	2004	2005	2006	2007
First method							
PC	527,500	579,538	726,279	742,796	1.042,98	1.312,934	2.077,015
FA	471,185	497,237	512,907	512,395	794,429	1.210,538	1.435,483
CBF	**56,315**	**82,301**	**213,372**	**230,401**	**248,551**	**102,396**	**641,532**
Second method							
CA	76,015	144,440	387,124	703,581	1.046,669	1.429,014	2.512,080
CCL	19,700	62,139	173,752	473,180	798,118	1.326,618	1.870,548
CBF	**56,315**	**82,301**	**213,372**	**230,401**	**248,551**	**102,396**	**641,532**

According to the relations which exists between the permanent capitals and the fixed assets, respective between the circulating assets and the short term liabilities, the clear bearing fond can take the following values:

- *positive* – the situation correspond to the case when, according to the chosen determination relation, the permanent capitals are superior to the fixed assets or the circulating assets are bigger than the short term liabilities;
- *negative* – in that case, the bearing fond can not assure even the assets whole finance; to its completion we must appeal to a series of resources on short term.
- *zero* – the present situation, hard to find in practice, can be interpreted as a perfect equilibration of the resources with the utilizations and also, a circulating assets whole finance on the short term liabilities.

The own bearing fond, as enterprise's financial autonomy expression, can be determined as difference between the own capitals value and the one of the fixed assets, according to the formula:

OBF = OC – FA,

where: OBF represent the own bearing fond; OC-own capitals; FA-fixed assets.

For the enterprise "X" studied, the value of the own bearing fond will be determined using the dates from table 3.

Table 3

The values of the own bearing font of the "X" society (thousands lei)

Elements	2001	2002	2003	2004	2005	2006	2007
OC	527,500	579,538	726,279	742,796	891,507	955,712	1.218,086
FA	471,185	497,237	512,907	512,395	794,429	1.210,538	1.435,483
OBF	56,315	82,301	213,372	230,401	97,078	-254,826	-217,397

After the examination of the dates from table 3 we can say that the enterprise have total financial autonomy for the 2001 – 2007 period of time financing all its fixed assets from own resources. After that, the existence of a negative own bearing fond appears as a consequence of the fact that the own resources became insufficient to finance the assets, fact who lead to the necessity to appeal at borrowed resources. The last one are tightly connected to the *borrowed bearing fond* determined as difference between the clear bearing fond and the own bearing fond.

The existence of an increasing bearing fond is a proof of the increase of the circulating assets part financed on the permanent capitals, meaning an increase of the enterprise's security mardge. The stationary bearing fond shows that the enterprise is stagnating, from different reasons, on a certain period of time and the decrease of the bearing fond is caused by the permanent capital decrease (credits reimbursements on long term or liabilities credits) or by the clear assets increase (investments).

The existence of the bearing fond is tightly bounded by the clear need of capitals manifested into the exploitation cycle and known as *necessary bearing fond*. The last one appears from the comparison of the finance needs (fond which must be used by the enterprise to buy raw materials and materials, to pass the unfinished production through different fabrication process stages, to cover the expenses caused by the circulating active's depositing till the delivered moment etc. and, respective, to afford the establishing, in the customers relations, of certain payments terms, after the delivery; when the enterprise used the customer- credit, a period of time she will not benefit by liquidities but only by debts) with the finance means (the suppliers – credits obtained by the enterprise and who permit to it to benefit by a series of fond because of the fact that the payment is made to a certain date of payment from the engagement appearing).

The permanent character of the necessary bearing fond results because of the fact that even the factors who compose it (utilizations and respective resources) have a short existence in the enterprise, they solicit a permanent renewal. The fluctuant character of the necessary bearing fond is tightly bounded by the turnover variation (that's increase suppose the increase of the circulating assets and debts volume and its decrease means the inverse evolution of these circulating assets).

To cover the finance necessity of the production activity (exploitation cycle), the enterprise appeal, as rule, to a series of resources with temporary character known as exploitation liabilities which appears as effect of the firm's economic-financial reports with suppliers, creditors etc. According to the nature of the difference which appears between that two elements and which can be explained through the discrepancy who exists between the realization moment of an economic-financial operation and the one of its implications over the treasury, we can appreciate the normality of an enterprise in the following mode:

✔ *the existence of a positive bearing fond* (which means a superior level of the cyclic allocations according to the cyclic resources) is the interpretation, from the enterprise's point of view, of a normal state (if represent the result of an investment process which correspond to the exploitation cycle) and, also, the expression of the existence of one discrepancy between cashing and payments (the debts cash term increase and the payment one decrease);

✔ *a negative necessary bearing fond*, appeared as effect of the superior level of the exploitation temporary resources according to the temporary allocations, can be understand as a positive fact only if it shows through the circulating assets rotation speed acceleration and, respective, through the increase of the exploitation's liabilities payment term; for the situation when that fact do not exist, the appearance of a negative necessary bearing fond is the expression of certain difficulties bounded the provisioning and, implicit, by the circulating assets renewal.

As generally determination rule, *the necessary bearing fond* represents the difference between the circulating assets (excepting the active treasury) and the capitals with smaller than an year exigibility (excepting the passive treasury). As effect of the distinction realised by the functionally balance-sheet construction between the exploitation's operations and the outside one, the necessary bearing fond can be decomposed in the following mode:

- exploitation necessary bearing fond (ENBF);
- necessary bearing fond outside the exploitation (NBFOE).

The determination mode for the two measures is the following one[3]:

ENBF = ECA – EL,
NBFOE = OECA – LOE,

where:

ENBF represent the exploitation necessary bearing fond;
ECA - exploitation circulating assets (stocks and unfinished production, advances to the suppliers, exploitation debts and exploitation advanced expenses);
EL - exploitation liabilities (advances from the customers, exploitation liabilities – liabilities to the suppliers, social and fiscal liabilities from exploitation and exploitation advanced incomes);
OECA - outside exploitation circulating assets;
LOE - liabilities outside the exploitation.

The exploitation necessary bearing fond can be realised taking account by the enterprise's exploitations norms, meaning the own activity conditions of it. The method, known as dynamic method for the exploitation necessary bearing fond prevision have, at basis, the stocks rotation period of time, of the customers-credit and, respective, of the suppliers credit. It permit the determination of the enterprise's necessary bearing fond

[3]Georgescu Iuliana, *Conturile anuale în societățile comerciale*, Editura Sedcom libris, Iaşi, 1999

and came to complete the determination method of it on the balance-sheet base. For the determination of the provisioned values of the exploitation necessary bearing fond we can use: the exploitation circulating assets value, the exploitation liabilities and the provisioned turnover.

CONCLUSIONS

The existence of a positive clear bearing fond means that the last one is sufficient to assure the finance of the whole fixed assets and for a part of the circulating assets. The necessity almost permanent of money capitals for the finance of the cyclic assets is a consequence of a continuous renewal character of the stocks and debts. Looking to a new perspective, that kind of value for the bearing fond is the expression of the fact that the circulating assets permit not only the reimbursement on term of the short term liabilities, but also, a plus of liquidities, fact with a positive influence over the enterprise's solvability.

The negative bearing fond means, in liquidity terms, that the circulating assets gives sufficient cash for the liabilities reimburse on short term, fact which, at the first sight, seems to affect negative the enterprise's solvability. For a sure verdict, it is necessary a detailed analysis of the structure on term for the circulating assets and, also, for the liabilities with the payment date under an year, an important role being the one of the medium payment day term. If the last one is smaller (in days) than the one of the short term liabilities, the enterprise's solvability will be not affected because the released sums from the cashing debts will be sufficient to reimburse the part from the short term liabilities which correspond to the costumers credit period of time. For the contrary case, to not affect the enterprise's solvability it is necessary the existence of a substantial clear bearing fond.

We can say that the enterprise can appreciates the optimum level of the bearing fond (as own finance resource) only if have in view a level for it which will cover the minimum and permanent need of bearing fond. The part from the necessary bearing fond which is superior to the permanent and minimum need will be covered by treasury credits or by a series of advantages credits looking the cost.

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THE EVALUATION AND THE PREVISION OF THE FINANCIAL RISK

EVALUAREA ŞI PREVIZIUNEA RISCULUI FINANCIAR

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Abstract: *The purpose of the present paper is the evaluation and prevision of the financial risk using the mathematical models. The financial risk, or the risk of capital, is bounded by the mode in which the enterprise's results changes according to its financial structure - that means that an increase of the borrowed capitals will lead, because the fact that these capitals generates (through the interest) financial expenses, to an increase of the financial risk level and vice versa. The two capital expressions which are available for a firm (own and borrowed capitals) are different looking their remuneration level (the borrowed capital remuneration is smaller than the own capitals one). In that case, is normal, for the enterprise, to use, for the profitableness increase, borrowed capitals. The situation supposes an automatic increase of the financial risk. The fact has negative effects for the shareholders which will demand an increase of the own capitals which will cover the one of the risk.*

Rezumat: *Prezenta lucrare îşi propune reliefarea realizarea unei evaluări şi pre-viziuni ale riscului financiar cu ajutorul modelelor matematice. Riscul financiar sau de capital este legat de modalitatea în care variază rezultatele întreprinde-rii în raport cu structura financiară a acesteia în sensul că o majorare a capi-talurilor împrumutate va conduce, datorită faptului că acestea sunt purtătoare de dobânzi ce vor lua pentru firmă forma unor cheltuieli financiare, la o majo-rare a nivelului riscului financiar şi vice versa. Cele două expresii ale capita-lurilor de care dispune o societate (proprii şi împrumutate) prezintă diferenţe în ceea ce priveşte nivelul lor de remunerare în sensul că, de regulă, remunerarea capitalurilor împrumutate este inferioară celei a capitalurilor proprii. În aceste condiţii este normal ca întreprinderea să recurgă, pentru creşterea rentabilităţii, la capitaluri împrumutate. Situaţia atrage după sine însă o creştere automată a riscului financiar fapt ce îi nemulţumeşte pe acţionarii care se văd îndreptăţiţi să solicite o creştere a rentabilităţii capitalurilor proprii care să o acopere pe cea a riscului.*

MATERIAL AND METHOD

The financial risk or the capital one is bounded by the mode in which the results of the enterprise vary according to its financial structure. In other words, an increase of the borrowed capital will lead, because of the interests who takes, for the firm the aspect of certain financial expenses (for a risk increase and vice versa). The two expressions which exists for the firm capital (own and borrowed) presents differences looking their remuneration in sense that the remuneration of the borrowed capitals is inferior to the one of the own capitals. In these conditions, is normal for the enterprise to resorts, for the profitableness increase, to the borrowed capitals. The situation suppose, automatically, an increase of the financial risk which mean the stockholders

dissatisfaction. The last one requests an increase of the own capitals profitableness over the one of the risk.

RESULTS AND DISCUSSIONS

The efficiency of the indebted policy express, according the financial profitableness, depends by the relation which exists between the economic profitableness and the interest's instalment, such as the following cases: for the situation when the economic profitableness is superior to the interest's instalment, the increase of the indebted degree will lead to the increase of the financial profitableness; for the case when the economic profitableness is inferior to the interest's instalment, the increase of the enterprise's indebted degree will suppose the decrease of the financial profitableness.

Met in the speciality literature as capital risk, the financial risk appears as effect of the enterprise's appeal to the alternative which suppose the finance of its activity through credits. For the financial risk valuation, the economic-financial analysis use the *financial lever coefficient* which will quantify the financial exercise's clear result modification, for the situation of the exploitation's result modification. The impact of the financial expenses over the financial lever coefficient is making evident even by it's determination mode, according to the equation:

$$\mathbf{FLC = (\Delta CR/CR)/(\Delta ER/ER),}$$

where: FLC represent the financial lever coefficient; ΔCR - the relative variation of the clear result; CR - the financial exercise's clear result; ΔER - the relative variation of the exploitation activity's result; ER - the xploitation's result.

The non implication of the financial incomes and of the extraordinary result in the ordinary activity lead, for the financial lever coefficient, to the following formula[1]:

$$\mathbf{FLC = (ER - FE + FI - ExtR)(1-i),}$$

where: FE represent the financial expenses; FI - the financial incomes; ExtR - the extraordinary result.

Because the exploitation activity do not suppose financial and extraordinary elements, if we give up to it for the relation which describe the financial exercise's clear result we will obtain the expression: $\mathbf{FLC = ER / (ER - FE)}$

The last relation make evident the impact of the financial expenses over the financial lever coefficient (when the financial expenses increase, the financial lever coefficient increase and have as effect, the risk increase). In other words we can say that the financial lever coefficient represents nothing else than the image of the effects produced over the financial profitableness by the enterprise's loans contraction. According to the modifications of the financial lever coefficient calculus elements, that coefficient can takes the following values: **FLC = 1** (for the case when the ER – FE = ER – in that case, the financial expenses are zero because the enterprise do not use the indebted policy to finance its activity; in these conditions the financial risk does not exists and the clear result register a similarly evolution with the one of the exploitation's

[1]Petrescu Silvia, Mironiuc Marilena, *Analiza economico-financiară, Teorie şi aplicații*, Editura Tiparul, Iaşi, 2002, p. 220.

result (ICR = IER); **CLF = 0** (in that case, the relation which describe the financial lever coefficient is zero when its denominator goes to the infinite, or when the numerator is zero; for the first case, how the exploitation's result have, always, a finite value, exists the possibility of that interpretation only for the case when the financial expenses are very big, fact which suppose a very big financial risk; **CLF** $\rightarrow \infty$ (is the case who suppose the existence of a zero denominator, in the relation which describe the financial lever coefficient; in other words, the exploitation's result is absorbed by the financial expenses, for its remuneration; in that case, the financial risk value is maximum and the enterprise's survival is in danger).

An other approach for the financial risk is the one which suppose the calculus and the comparison of a chain of financial profitableness instalments. That instalments category includes: the financial profitableness instalment (FR), the economic profitableness instalment (EcR) and the interest's instalment (II). As calculus mode, these instalments can be calculated in the following mode:

$$\mathbf{FR = Rexe / OC,}$$

where: FR represents the financial profitableness instalment; Rexe - the exercise's result (rough or clear); OC - own capitals.

The values of that economic profitableness instalment offers informations looking the activity's finance mode and can be determined in the following mode:

$$\mathbf{ER = ER / A}$$

where: ER represents the economic profitableness instalment; ER - the exploitation result. The bound which exists between the two instalments make reference to the enterprise's possibility to be indebted, for the financial profitableness improvement. In other words, if the economic profitableness is bigger than the interest's instalment, the indebt can be a mode to improve the enterprise's profitableness, the last one registering a similar evolution as the indebt degree; if the economic profitableness is smaller than the interest's instalment, then, an increase of the enterprise's indebt degree have, as consequence, the decrease of the financial profitableness. The pro or against vote gave to the indebt appears as effect of the financial lever index analysis (IFL) defined as report between the financial profitableness instalment and the economic profitableness one (a value bigger than 1 for that index means the fact that the enterprise can appeal to the indebt).

For the previsioning of the financial risk of an enterprise must be crossed the following stages: the own capitals prevision; the clear profit prevision; the establish of the regression equation form who describe the dependence of the own capitals by the clear profit; the determination of the financial lever coefficient; the calculus of the previsioned values for the financial risk. The necessary dates for prevision was taken from the balance-sheets and the profit and loss accounts. Datele necesare pentru previziune au fost preluate din bilanțurile şi respectiv din conturile de profit on the period 2001 - 2007.

The criteria used for the determination of the most appropriate adjustment model used for previsions are presented in table 1.

Table 1

The criteria used for the determination of the most appropriate adjustment model used for previsions

Criteria used to choose the adjustment proceedings				
1. We compare the medium value of the adjusted series with the median value of the real terms of the series				
Median	The adjustment model (the media of the series)		The deviation (media – median)	Commentaries
140,82	linear	153,00	12,18	After the analysis we can say that the smallest deviation in repost the median is characteristic to the parabolic model
	parabolic	145,00	4,18	
	exponential	148,67	7,85	
	power	155,33	14,51	
	hyperbolic	161,50	20,68	
2. We compare the "b" parameter of the regression equation with the medium growth with chain basis				
The medium growth	The parameter of the regression equation equationparametrul ecuației de regresie (b)			Commentaries
	The model	The value	The deviation	The smallest deviation correspond to the linear model
21,82	linear	20,00	1,82	
	parabolic	4,00	17,82	
	exponential	1,15	20,67	
	power	0,37	21,45	
	hyperbolic	-74,00	95,82	
3. We compare the growth medium index with the "b" parameters of the regression equation				
The medium	The parameter of the regression equation (b)			
	The model	The value	The deviation	The smallest deviation correspond to the exponential model
1,14	linear	20,00	18,86	
	parabolic	4,00	2,86	
	exponential	1,15	-0,01	
	power	0,37	0,77	
	hyperbolic	-74,00	75,14	
4. The graphic comparison of the deviations between the adjusted values and the empiric one				
5. The calculus of the deviations sum (absolute values) between the adjusted dates and the empiric one				
The model	The empiric	Adjusted values	The deviation	The smallest value of that sum will indicates the appropriate adjustment model
linear	100,00	93,00	7,00	
	109,87	113,00	-3,13	
	137,68	133,00	4,68	$\Sigma(y - \hat{y}) = 60,72$
	140,82	153,00	-12,18	
	169,01	173,00	-3,99	
	181,18	193,00	-11,82	
	230,92	213,00	17,92	
parabolic	100,00	103,00	-3,00	$\Sigma(y - \hat{y}) = 42,74$
	109,87	113,00	-3,13	
	137,68	127,00	10,68	

Criteria used to choose the adjustment proceedings				
	140,82	145,00	-4,18	
	169,01	167,00	2,01	
	181,18	193,00	-11,82	
	230,92	223,00	7,92	
exponential	100,00	97,75	2,25	
	109,87	112,41	-2,54	Σ(y – ŷ) = 43,26
	137,68	129,27	8,41	
	140,82	148,67	-7,85	
	169,01	170,97	-1,96	
	181,18	196,61	-15,43	
	230,92	226,10	4,82	
power	100,00	93,00	7,00	Σ(y – ŷ) = 74,68
	109,87	120,19	-10,32	
	137,68	139,64	-1,96	
	140,82	155,33	-14,51	
	169,01	168,69	0,32	
	181,18	180,47	0,71	
	230,92	191,06	39,86	Σ(y – ŷ) = 156,27
hyperbolic	100,00	106,00	-6,00	
	109,87	143,00	-33,13	
	137,68	155,33	-17,65	
	140,82	161,50	-20,68	
	169,01	165,20	3,81	
	181,18	167,67	13,51	
	230,92	169,43	61,49	

6. The calculus of the variation coefficient				
Σ(y – ŷ) =				The smallest variation coefficient characterised the appropriate model; for the present case this model is the parabolic one
The model	The value			
linear	60,72	media –	0,42	
parabolic	42,74		0,29	
exponential	43,26		0,30	
power	74,68		0,52	
hyperbolic	156,27		1,08	

The establishing of the regression equation form who describes the dependence between the own capitals and the clear profit; the regressive model is described through the equation: $y = a_0 + a_1x_1$. The values for different combination of "x" and "y" are presented in table 2.

Table 2

Values of the x and y variables

Years	y_i (OC)	x_i^2	x_i (CP)	$x_i y_i$
2001	527,50	678,60	26,05	13.741,38
2002	579,54	6.059,07	77,84	45.111,39
2003	726,28	53.638,56	231,60	168.206,45
2004	742,80	471,32	21,71	16.126,19
2005	891,51	1.088,34	32,99	29.410,92
2006	955,71	7.373,66	85,87	82.066,82
2007	1.218,09	149.877,38	387,14	471.571,36

-	Σy_i = 5.641,43	Σx_i^2 = 219.186,93	Σx_i = 863,20	$\Sigma x_i y_i$ = 826.234,51

After the calculus for the "a_0" and "a_1" coefficients determination, the regression equation will be: y = 663 + 1,16x. We also present, in table 3, the values who are necessary to determine the future values for the financial lever coefficient.

Table 3

The future values of the financial lever coefficient

Elements	2008	2009	2010
CP*(mii lei)	411,400	584,080	810,440
ER (mii lei)	222,410	300,790	424,660
Active	5.179,400	6.275,510	8.495,080
FR	0,303	0,375	0,455
ER	0,043	0,047	0,049
ΔCP/CP	0,060	0,300	0,280
ΔER/ER	0,230	0,240	0,290
I_{FL}	7,500	7,600	9,100
FLC	0,260	1,250	0,970

CONCLUSIONS

The CP prevision through the multi factorial linear regression method will be obtained taking account that, in the base year (2001), the value of the clear profit was 26,05 thousands lei.; the own capitals will be determined in the same manner, taking account that, in the base year (2001), its value was 527,5 thousands lei.

The dates looking the exploitation result was determined according to the base year when the ER_{2001} = 39,32 thousands lei.

If we determine, for the anterior dates, the financial lever index, we can see that the future values of it are over unit.

According to these results, we can say that the enterprise can be indebted in future, but carefully, to not limit its financial independence.

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BOUNDERING THE FRUIT GROWING AREAS FROM SOUTH COMPARTMENT OF THE SUCEAVA PLATEAU

DELIMITAREA ZONELOR POMICOLE DIN COMPARTIMENTUL DE SUD AL PODIŞULUI SUCEVEI

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Abstrac*t: The natural and economical conditions from South Compartment of the Suceava plateau which is situated along a two counties has led us to bound in Iaşi county of a fruit growing basin laying across Deleni – Hârlău – Cotnari – Cepleniţa.*

Areas with a total of 1150 ha. For Suceava county meeting the same climatic and soil conditions it has been bounded a second basin of 1290 ha, situated into a traditional fruit growing area of Fălticeni – Rădăşeni – Vultureşti.

*The high rate of favorability in the fruit growing bounded areas is confering for the apple kind ideal conditions for grow.As a result of the research working from this area (SCDP Fălticeni) have been created and omologated two kinds of apple (Fălticeni and Rădăşeni) with superior features of production (resistance to cold and drought) and uppermost under the aspect of taste quality***.**

Rezumat*: Condiţiile natural economice din Compartimentul de Sud al Podişului Sucevei situat pe raza a două judeţe ne-au condus la delimitarea în judeţul Iaşi a unui bazin pomicol care se întinde în zona Deleni – Hârlău – Cotnari – Cepleniţa în suprafaţă de 1150 hectare. Pentru judeţul Suceava cu aceleaşi condiţii pedoclimatice a fost delimitat al doilea bazin pomicol în suprafaţă de 1290 hectare, fiind cantonat într-o zonă pomicolă tradiţională Fălticeni – Rădăşeni – Vultureşti.*

Gradul ridicat de favorabilitate în bazinele pomicole delimitate conferă speciilor de măr condiţii ideale de cultură. Rod al muncii de cercetare din această zonă (SCDP Fălticeni) au fost ceate şi omologate două soiuri de măr (Fălticeni şi Rădăşeni) cu însuşiri superioare de producţie (rezistenţă la ger şi secetă) şi deosebite sub aspectul calităţilor organoleptice.

The fruit growing heritage from our country continue to be under concentration and specialization actions within fruit growing basins, although it is diminishing speaking about the areas occupied. Zonation workings of fruit growing were made at national level, but delimitation of fruit growing at regional level are scarce. That's why is occring the neccessity of delimitation of fruit growing basins of Fălticeni – Rădăşeni (Suceava) and Hârlău – Deleni – Cotnari – Cepleniţa (Iaşi)

MATERIAL AND METHOD

The natural and economical conditions existent in the South compartment of the Suceva plateau lain on Iaşi and Suceava counties led us to make a delimitation of two fruit growing basins> the first one is situate in Iaşi county is stretching in Hârlău – Deleni – Cotnari – Cepleniţa area on a surface of 1150 ha. The second one, was delimitated in Suceva county and is comprising Fălticeni – Rădăşeni – Vultureşti villages with a surface of 1290 ha having old tradition in apple growing.

RESULTS AND DISCUSSIONS

The Suceava plateau is a structural unit very large with lined and consolidated bedding, covered with a blanket un lined. The bedding consist of cristalline schist banking towards west and is submerging under flysch, which is gushing over the platform. Some authors afirm that the bedding of Suceva plateau of pre - Cambrian age is corrsponding with the area in which took place the maximum submerging of Podolic platform.

Geological deposits in which is situated the area relief are formed from an alternance of clays, sandy clays and sands in which are more level of sandstone and chalkstone. On all over these, along of the main valleys is layng over quaternary deposits tipically for meadows and terraces, and the large interfluviatile spaces are covered very often by eluvial and coluviale loessoid clays, of reduced thickness.

In detail, the Suceva plateau presents some differencies concerning the heights and the relief modelling extent. This permit to divide it in several subunits. In the followings are made refferings to only to the micro zones belonging to the south compartment of the suceva plateau – situated as a geographical settlement on a range of 42 villages from Suceava and Iaşi counties.

Tabel 1

The micro zones of the south compartment of Suceava plateau

Nr. crt.	Name of the micro zone	County
1	Fălticeni	Suceava
2	Depression Liteni	Suceava
3	Suceava valley	Suceava
4	Siret alley	Suceava
5	Moţca	Iaşi
6	Paşcani	Iaşi
7	Lespezi	Iaşi
8	Hârlău	Iaşi

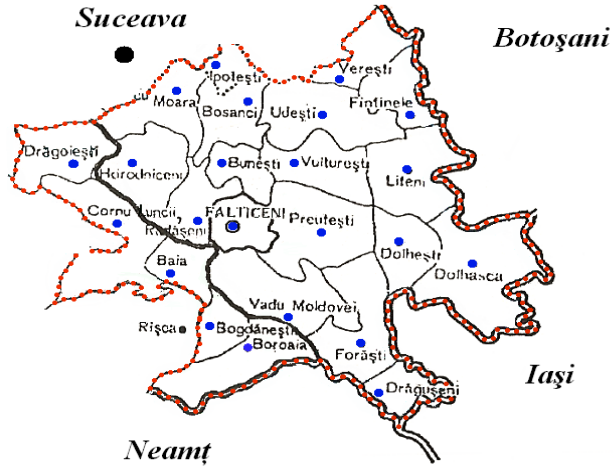

Fig. 1 Delimitation of fruit growing basin Fălticeni – Rădăşeni – Vultureşti

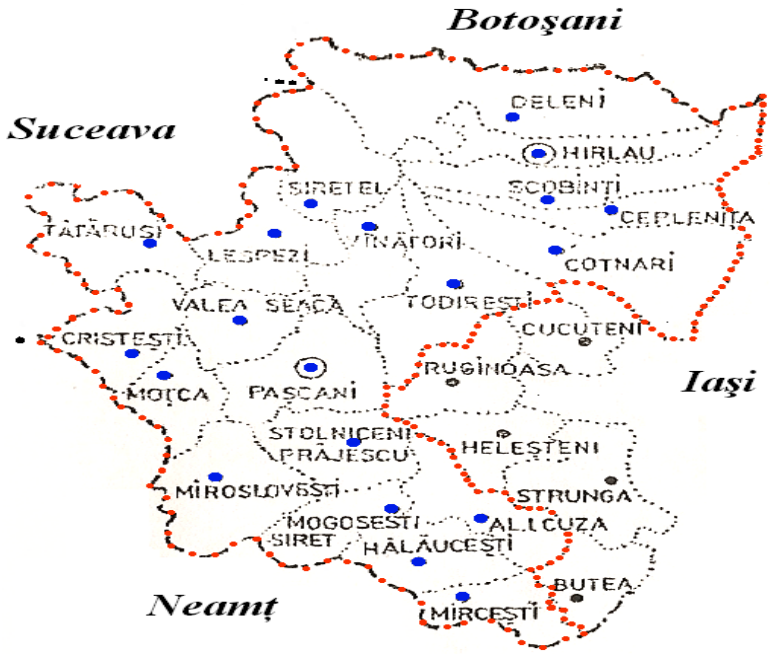

Fig. 2 .Delimitation of fruit growing basin Deleni –Hârlău –Cotnari

CONCLUSIONS

1. The natural and economical conditions from south compartment of the Suceva plateau situated in a range of two counties led us to a delimitation in the Iaşi county of a fruit growing basin laying in Deleni – Hârlău – Cotnari – Cepleniţa area with a surface of 1150 ha.

For Suceava county with similar pedoclimatic conditions have been delimitated the second fruit growing basin with a surface of 1290 ha situated into a fruit growing traditional area Fălticeni – Rădăşeni – Vultureşti.

2. The high extent of favorability in the delimitated fruit growing basins are confering to the apple kind ideal conditions of growing. As a result of research working in this area (SCDP Fălticeni) there were created and registered two kinds of apple (Fălticeni and Rădăşeni) with superior features of production (cold and drought resistance) and especial organoleptic qualities.

In the fruit growing basin of Deleni – Hârlău – Cotnari – Cepleniţa, although the main growing is apple, the sweet cherry is very common, beeing cultivated for hundreds of years known as Boambe de Contnari.

SCDP Iaşi is multiplying this king of fruit in order to respond for hgher demand of domestic and external market.

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EVOLUTIONS AND TENDENCIES OF AGRICULTURAL DEVELOPMENT IN BRAILA PLAIN

EVOLUȚII ŞI TENDINȚE DE DEZVOLTARE ALE AGRICULTURII CÂMPIA BRĂILEI

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Abstract: *The study has a diagnosis character and has in view the analysis of the evolutions of the main parameters of agriculture in the Brăila Plain on a significant period of 5 years, respectively the period 2002-2006. It is an important period which presents the main effects of applying the Law 1/ 2000 regarding the retrocession of the main agricultural properties, other than those given to the old owners according to the Law 18/1991. The agricultural surface of Brăila County was of 388.100 ha at the end of 2006, manifesting a tendency of fall of 0,09% in comparison to 2002. Not all the categories of use have shown falls in comparison to 2002. Thus, the arable land has increased with 3490 ha, in the detriment of areas occupied with vines, smaller with 3005 ha or areas occupied by orchards, smaller with 418 ha. Moreover, it should be mention that the areas occupied by woods have increased in the same period with almost 1500 ha.*

The paper presents other indicators such as the structure of the land fund, the structure of agricultural areas on categories of units and analytically, on the 44 localities; equipment with mechanic machines, ensuring fertilizers and manure, structure of areas occupied by field cultures, vines and orchards. The analysis is done dynamically (2002-2006) both for the total agriculture and separately on the two types of sectors: private one and mixed one. The evolutions of these indicators have allowed the identification of some tendencies of development with a view to the perspective which characterizes the whole development of the agricultural branch in the studied zone.

Rezumat: *Studiul întreprins are un caracter diagnostic şi îşi propune analiza evoluțiilor principalilor parametri ai agriculturii din Câmpia Brăilei pe o perioadă semnificativă de 5 ani, respectiv perioada 2002-2006. Este o perioadă importantă care reflectă principalele efecte ale aplicării Legii 1/2000 privind retrocedarea principalelor proprietăți agricole, altele decât cele restituite proprietarilor în urma aplicării Legii 18/1991. Suprafața agricolă a județului Brăila a fost la sfârşitul anului 2006 de 388100 ha manifestând o tendință de scădere de 0,09% față de anul 2002. Nu la toate categoriile de folosință s-au înregistrat scăderi față de anul 2002. Astfel, terenul arabil a crescut cu 3490 ha, în detrimnetul suprafețelor ocupate cu vii, mai mici cu 3005 ha, sau a suprafețelor ocupate cu livezi, mai mici cu 418 ha. Este de menționat faptul că suprafețele ocupate cu vegetație lemnoasă au crescut, în aceeaşi perioadă cu aproape 1500 ha.*

Lucrarea prezintă şi alți indicatori, cum ar fi structura fondului funciar, structura suprafețelor agricole pe categorii de unități; şi în mod analitic pe cele 44 de localități, dotarea cu mijloace mecanice, asigurarea cu îngrăşăminte chimice şi naturale, structura suprafețelor ocupate cu culturi de câmp, vii şi livezi. Analiza este efectuată în dinamică (2002-2006) atât pentru total

agricultură, cât şi separat pe cele două tipuri de sectoare: sectorul privat şi cel cu capital de stat sau mixt. Evoluţiile acestor indicatori au permis identificarea unor tendinţele de dezvoltare în perspectivă a indicatorilor ce caracterizează ansamblul dezvoltării ramurii agriculturii în arealul studiat.

MATERIAL AND METHODS

In order to accomplish the study, the data has been gathered both from direct investigation on field and the official statistic documents. The aria of investigation refers to the Brăila Plain, which is situated in the South-Eastern Romania.

For the study there were used the following methods: the method of comparison, the monographic method, the specific index method and the graphic method. There were used the specific indicators and index of a diagnosis analysis with techical-economic character recommended by the specialized literature.

RESULTS AND DISCUSSIONS

The study has a diagnosis character and has in view the analysis of the evolution of the main parameters of agriculture from Brăila Plain on a significant period of 5 years, respectively the 2002-2006 period. We had in view the analysis of the effects of application of property laws: Law 18-1991 and Law 1/2000 regarding the retrocession of the main agricultural properties.

The total surface of Brăila Plain is of 476576 ha, of which the agricultural surface which represented in 2006 81,4%.

We mention the fact that, even if it is a tipical plain territory, the studied area has a surface of 27919 ha (5,9%) occupied with forests. Also, there is asurface of almost 13%, with other uses than agriculture.

It is also to be mentioned the fact that the agricultural area manifested a tendency of dropping in 2006, in comparison to 2002 with 0,09%, under the conditions in which the arable surface raised with 3490 ha in the detriment of the areas occupied with vines, orchards and natural pastures.

A positiv factor is represented by the fact that the surface occupied with forests increased with almost 1500 ha, an important aspect for the ecologic developemnt of the zone.

As regards the structure of surfaces on categories of units (*table 1*) results in the fact that the private sector has the comparative wheight with the sector of state or mixed capital.

Table 1

The structure of surfaces on categories of units (2006)

Specification		The agricultural surface	Of which:			
			Arable	Meadows	Vines	Orchards
Total agriculture	ha	388100	349401	33144	4825	730
	%	100,0	100,0	100,0	100,0	100,0
- Units with state and mixed capital	ha	74079	72680	1399	-	-
	%	19,1	20,1	4,2	-	-
-Private Sector	ha	314021	276721	31745	4825	730
	%	80,9	79,9	95,8	100,0	100,0

Thus, the arable land in the private sector has 79,9%, meadows 95,8%, and the vines and orchards, are totally in the private sector. In comparison with 2002 the private sector has raised as products.

For example, in the case as the arable land, the surface of this sector has increased with 6176 ha, as a consequence of the process of retrocession of the lands to the old landowners.

From the administrative point of view, the Brăila Plain streches on the territory of 40 communes, with a total area of 350936 ha, at which we can add 3 towns and Brăila municipiun which have 37164 haq. The average agricultural surface which belong to a commune is of 8773 ha and from the towns, Însurăței has 18334 ha followed by Ianca – 16610 ha.

The equipment with tractors and agricultural machines represents one of the main indicators of the agricultural production.

In 2006, in the studied area there were a number of 3685 tractors, whith almost 100 more than in 2002 (*table 2*).

For a tractor there belong 105 ha of agricultural land, thing that demonstrates the low level of equipment in agriculture in that area with energetic baze. And form the point of view of the number of machines, the precarious equipment, a plow being used for 130 ha and a seeding machine for 220 ha.

We also mention the fact that the machined for fertilization have disappeared, the aviation being very little used for this purpose.

Another analized indicator is represented by the quantities of chemical fertilizers used on the cultivated areas.

Table 2

The park of tractors and main agricultural machines (pieces)

Specification	Years				
	2002	2003	2004	2005	2006
Agricultural tractors – total	3598	3325	3509	3647	3685
Plows for tractors – total	2829	2673	2827	2964	2976
Mechanical cultivators– total	770	664	830	849	854
Mechanical seeding machines – total	1493	1435	1505	1742	1764
Combines for harvesting cereals - total	402	373	391	453	457
Combines for harvesting potatoes– total	18	18	12	7	7
Combines for harvesting forage – total	28	20	24	21	21
Machines for speading chemical fertilizers – total	242	217	215	-	-

The situation presented in the table 4 shows a concering tendency of dropping the fertilizer quantities, especially the nitrogenuous ones.

Table 3

Chemical fertilizers used in agriculture (tones)

Specification	Years									
	2002		2003		2004		2005		2006	
	ha	%	Ha	%	ha	%	ha	%	ha	%
Applied chemical fertilizers – total	10728	100,0	7447	69,4	9026	84,1	8831	82,3	6633	61,8
Of which: - nitrogenuous	7592	100,0	4702	61,9	6033	79,5	5397	71,1	3494	46,0
- phosphorous	3011	100,0	2593	86,1	2966	98,5	3348	111,1	3041	100,1
- potassium	125	100,0	152	121,6	27	21,6	86	68,8	98	78,4
On average per ha(kg/ha)										
- agricultural	28		19		23		23		17	
- arable	31		21		26		25		19	

In 2002 there were used on the whole area 10728 tones of chemical fertilizers, i.e. 28 kg per ha of agricultural area and 31 kg per ha of arable area. After four years, in 2006 these quantities have dropped substantially arriving to represent only 61,8% of those used in 2002.

Quantities of only 17kg/ha registered in 2006 shows the extremely low level of the degree of fertilization of the agricutural surfaces explaining the low efficiency per hectare at the main cultures.

A positive aspect is represented by the fact that there have increased the quantities of organic fertilizers per surface unit. If in 2002 there were used only 8 kg/ha, in 2006 these quantities reached 167 kg/ha.

As regards the structure of cultures (*table 4*), the wheight is held by the grain cereals (54,2%) followed by the oil plants with 37,5%. There existed a tendency of increasing the surfaces occupied by oil plants from 88318 ha in 2002 to 110245 ha in 2006. this situation is explained through the high economic efficiency and the safety in exploitation.

Table 4

Area cultivated with main cultures (tones)

Specification	Years			
	2002		2006	
	Ha	%	Ha	%
Area cultivated – total	334350	100,0	294258	100,0
Of which:				
- Grain cereals	213234	63,8	159517	54,2
- Grain leguminious plants	1947	0,6	1282	0,4
- Oil plants	88318	26,4	110245	37,5
- Plants for other industrializations	888	0,3	308	0,1
- Potatoes – total	867	0,3	505	0,2
- Vegetables – total	3773	1,1	7248	2,5
- Green forage in arable field	21058	6,3	16513	5,6

The average productions obtained are relatively modest, far from the potential of the zone and the conpetition demans of the European Union. There are positive signs regarding the increase of efficiency per hectare to the sugar beet and potato cultures, but they do not change the whole negative image of this indicator.

The main restrictive factor is water and till the problem of irrigations is solved for all the cultures in the area, these cultures will not be competitive on the European market.

The sector that registered an obvious regression as regards the fruit-tree number in a relatively short period was the 2002-2006 period was the fruit-tree growing and viticultural sector (*table 5*). The total number of trees decreased with almost a quarter, from 602160 items in 2002 to 459096 items in 2006.

Table 5

Number of fruit trees on categories of use

	2002		2003		2004		2005		2006	
	nr	%	nr	%	nr	%	nr	%	nr	%
Total fruit trees	602160	100,0	598011	99,3	489419	81,2	423463	70,3	459096	76,2
Plum trees	184540	100,0	202275	109,6	179267	97,1	167910	90,9	155058	84,0
Apple trees	113896	100,0	110433	96,9	99947	87,7	57165	50,2	107716	94,6
Pear trees	40227	100,0	37713	93,7	34700	86,3	34976	86,9	1232	52,8
Cherry and sour cherry trees	109010	100,0	112939	103,6	73982	67,9	63720	58,4	63451	58,2
Apricot trees	90869	100,0	82427	90,7	68211	75,1	51780	57,0	63651	70,0
Peach trees	26483	100,0	17884	67,5	18792	70,9	20070	75,8	22571	85,2

The largest falls were at the species of pear, cherry and sour-cherry trees, the tree number falling to almost a half. There were maintained at an almost constant level the species of apple and peach trees, existing some fluctuations from one year to another as regards their number.

It has to be mentioned the fact that from the total number of trees, the private sector had the largest part, 85,2%, this increasing from 2002, when it was of 76,5%.

If the tree number registered falls, it is different the situation of the total production volume which had a specatcular increase from 4128 tones in 2002 to 10608 in 2006. The cause is the beginning of friuts for the new fruit-tree growing plantations and the displacement of the old and low-productive trees with highly productive ones.

Finally, the last aspect analysed is represened by the situation of viticulture (*table 6*).

Table 6

Surface of fruitful vines and grape production

Specification	UM	2002		2003		2004		2005		2006	
vines total	ha	6735	100,0	6404	95,1	3897	57,9	4810	71,4	4631	68,7
	t	26154	100,0	18337	70,1	13789	52,7	11734	44,9	14363	54,9
Grafted native vines	ha	1175	100,0	1076	91,6	481	40,9	1065	90,6	834	70,9
	t	4552	100,0	1427	31,3	3348	73,6	2098	46,1	2158	47,4
hybrid vines	ha	5560	100,0	5328	95,8	3416	61,4	3745	67,4	3797	68,3
	t	21602	100,0	16910	78,3	10441	48,3	9223	42,7	11787	54,6

At this branch, both the areas and total productions registered significant decreases, by the reduction of areas of grafted native vines in paralel with the hybrid ones.

As they are not part of the traditional zone favourable for the development of vine, the decrease is normal, having in view the requests of the European Union regarding the abolishment of large areas of hybrid vines.

CONCLUSIONS

1. The Brăila Plain, which practially covers all the county of Brăila, has an important agricultural potential, both in the size of the areas and due to the quality of the existing soils.

2. Of the total area, the wheight id held by the arable land, over 80%, and from this, the grain cereals (54%) occupy the largest areas, followed by oil plants with 37%. The other cultures occupy smaller areas.

3. the cultures of vine and fruit-trees registered a significative fall as regards the number of fruit-trees and vines. It was noticed the fact that in the analysed period the fruit production increased, while the grape one registered significant falls.

4. the level of average productions is modest regardless the high potential of the soil. The causes are the low developemnt of irrigation network and the low level of fertilization with mineral fertilizers.

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THE OPTIMIZING OF THE MANAGERIAL DECISION ASSISTED BY THE COMPUTER IN ORDER TO ACHIEVE THE OBJECTIVES OF S.C. COTNARI S.A.

OPTIMIZAREA DECIZIEI MANAGERIALE ASISTATĂ DE CALCULATOR PENTRU ÎNDEPLINIREA OBIECTIVELOR LA S.C. COTNARI S.A.

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Abstract. *The approach of this work started with the analysis of the present conditions to the early past ones, from where we came back again to the present and we planned, as much as possible for these times, the future. At the basis of the documentation stayed a part of the works dedicated to management, economy in general, to vineyard, wine, locality and wine-growing region from the area. The information processing, a quite complex process, which cannot be exclusively computerized, no matter how sophisticated the utilized technique would be, has as result solutions that can be decisions, ideas and attitudes.*

Rezumat. *Demersul acestei lucrări a pornit de la analiza stărilor prezente spre trecutul indepărtat, de unde neam intors iar aşi la prezent şi am privit, atât cât ne-au permis aceste vremuri, spre perspectivă. La baza documentării au stat o parte din lucrările consacrate managementului, economiei în general, viei, vinului, localităţii şi podgoriei din această zonă. Din prelucrarea informaţiilor, proces destul de complex, ce nu poate fi lăsat doar pe seama calculatorului, oricât de rafinată ar fi tehnica utilizată, rezultă soluţii care pot fi decizii, idei sau atitudini.*

SC Cotnari SA was founded in 1991 through the transformation of the former State Agricultural Industrial Unit Cotnari into HG 266/1991. The new founded society took ever the patrimony of the former IAS Cotnari, having as stockholders. The Fund of State Property, Fund of Private Property II Moldova (current SIF II Moldova) and the farmer land owners according to the Law 18/1991, which posses a surface of approximately 800 ha.

This favourable surface is limited to about 1800 ha, out of which, at the moment, more than 1200 ha is administered by SC Cotnari SA.

SC Cotnari SA is a Romanian juridical person with total private capital, having the juridical form of society on stock. The main department of the society is locality Cotnari, Iaşi County. The Society possesses vineyards in Cotnari, Cepleniţa, Scobinţi and Balş localities.

When founded, the society had a social state capital of 215500000 lei, and now it has a sum of 11.3 billion lei and it is divided in a number of 412531 stocks.

The main objective of activity is to produce and market an internal and international scale of grapes for wine, grapes for eating and wine.

The organizatorial structure corresponds to the present necessities concerning the management and control of production economic and commercial services. In the coming period of time we estimate as necessity the continuous development of commercial and marketing departments.

Using the criteria size of social capital, number of employs value of fixed means and rate of sales, SC Cotnari SA is part of big society's category.

In order to estimate, the general economic state of SC Cotnari SA we look into consideration the evolution the rate of sales, the financial administration and the utilization of material resources during the last four years.

The mathematical shaping – the economic mathematical method used in optimizing the production processes

The production potential of agricultural exploitations is similar with the result which can be achieved through the modification of resource potential technologically balanced conditioned by the functioning of the production process at standard technique-economic level.

Regarding the mathematical shaping, the satisfactory results are obtained through the models elaborated in the limits of living programming. Thus, as part of a model of optimizing the production structure, through the purpose function centred on maximizing the value of the rate of sales, of income or of profit, founds its representation through the direct proportionally, relation between the level of development of different branches and the result of production activity which characterizes the size of production potential.

The restrictions of the model colligate the consumption of material, financial and human means, on categories of resources. Thus, the discrepancies which exist in the specific consumption of resources expressed in technical-economic terms of model, conjugated with the difference of relative efficiency of different activities, had to their dimensioning, and on this basis, to the structuring of the system of agricultural exploitation production in such a way so that it be able to ensure the maximization of the result which can be obtained, in other words, to establishment of the maximum production potential.

RESULTS AND DISCUSSIONS

The results obtained by applying the mathematical model reflect the most favourable result established in certain limits and conditions set by the foreseen restrictions.

As we above mentioned, the optimizing offers infinity of solutions starting with the diversity of conditions and resources. If any of these conditions or restrictions is changed, the obtained result will be different.

That is why we specify that the estimation of the most favourable mathematical result that can be obtained is done only in the context of conditions, restrictions and the pursued objective presented above.

The results obtained by applying the mathematical model were written down with R, and the results obtained through tests with Ro. Then there were presented the minimum results (Ro_{MIN}) and the maximum results (Ro_{MAX}) in each system hours/ha, direct costs, costs of production and profit.

In table 1 are presented the results of optimizing (R_1) at medium production compared to the other results of tests (Ro_{MIN} and Ro_{MAX}).

Table 1

Results of optimizing the medium grape production (kg/ha)

Nr. ctr.	System	Average production			
		R_0		R_1	Closing variants R_{0MAX}
		Var.	Minim Maxim	Optim	
1	ON	3P E+1P	12500 13870	14557	6P=13750 5P=13650
2	ID	3P 6P	9830 10860	10742	5P=10560 E+1P=10220
3	E	3P 5P	12180 13680	13877	6P=13500 E+1P=13350
4	ON/ID	3P 6P	11070 11970	12682	E+1P=11880 5P=11720
5	ON/E	E 6P	11550 13270	13173	5P=13120 4P=12370
6	ID/E	3P 6P	10960 12750	13152	E+1P=12420 5P=12130

Where: P= breeding, E=erbiciding

In ON system, the best production is 14557 kg/ha, and in testing Ro_{MIN} = 12500 kg/ha at alternative 3P, and Ro_{MAX}= 13870 kg/ha at alternative E + 1P.

Alternatives 5P and 6P are close of Ro_{MAX}. This favourable result was imposed by the colligation with the other indicators that have high values: direct costs/ha , labour consumption, the maximizing of production being necessary in order to obtain the maximum profit which are also optimizing criteria.

Similar situations were recorded in systems E, ON/ID and ID/E. In the other systems ID and ON/E, the best production is lower than the maximum production recorded in the testing phase. Thus, in system ID, the best result is 10742 kg/ha, and the maximum obtained is 10680 kg/ha.

In table 2 are presented the results of price optimizing.

It was concluded that in systems ON and ID, the best price is found in the limits of the prices achieved through the tests. If in ON only one alternative (3P) has Ro_{MAX}, higher than R_1, and 4P is close to R_1 in ID system, two alternatives (3Pand 4P) are $Ro_{MAX,}$ higher than R, but the alternative 5P virtually equals R_1. In the other four systems: E, ON/ID, ON/E and ID/E, the best price is 3.7-6.6 higher than Ro_{MAX}, making it necessary to increase the quality of production.

In table 3 are represented the results of optimizing in direct costs/ha, taking as objective their minimizing.

Table.2

Results of utilization price optimizing (lei/kg)

Nr. ctr.	System	Price of valorising			
		R_0		R_1	Closing variants R_{0MAX}
		Var.	Minim Maxim	Optim	
1	ON	6P 3P	4900 5200	5179	4P=5100
2	ID	6P 3-4P	5300 5600	5518	5P=5500
3	E	6P 3P	5000 5300	5463	4P=5200
4	ON/ID	6P,E+1P 3P,E	5000 5300	5427	4-5P=5200
5	ON/E	5-6P E	5000 5300	5417	3P,4P,E+1P=5200
6	ID/E	6P 3P	5100 5400	5492	4P, E=5300

Table 3

Results of direct costs optimizing (thousands lei/ha)

Nr. ctr.	System	Cheltuieli directe			
		R_0		R_1	Closing variants R_{0MIN}
		Var.	Minim Maxim	Optim	
1	ON	E 6P	25686 26761	24674	3P=25866 E+1P=25999
2	ID	E 6P	25013 26111	23541	E+1P=25249 3P=25299
3	E	E 6P	26089 27146	24203	3P=26243 E+1P=26348
4	ON/ID	E 6P	25280 26412	24071	3P=25555 E+1P=25601
5	ON/E	E 6P	25717 26908	24328	E+1P=25985 3P=26035
6	ID/E	E 6P	25545 26651	23786	3P=25756 E+1P=26043 4P=26046

The table shows that in all the systems, the most favourable result (R_1) is 13,3% lower than Ro_{MIN}. The alternative with lowest costs was E, in all systems and close values were recorded at alternative E + 1P and 3P.

Optimizing the cost of production expressed in lei/kg is presented in table 4 and contains the effects of production level as well as those of costs.

The results obtained show that the best cost of production is under the level of those realized in all systems. It is noticed the fact that in ON, the most favourable result

is 3409 lei/kg and very close to Ro_{MIN}, 3442 lei/kg realized in alternative E + 1P and also in systems ON/ID and ON/E.

Table 4

Results of optimizing the cost of production expressed in lei/kg

Nr. ctr.	System	Cost of production			
		R_0		R_1	Closing variants R_{0MIN}
		Var.	Minim Maxim	Optim	
1	ON	E+1P 3P	3442 3586	3409	E=3474 5P=3511
2	ID	6P 3P	3854 3945	3631	E+1P=3865 5P=3873
3	E	E 3P	3525 3667	3467	E+1P=3531 5P=3546
4	ON/ID	E+1P 3P	3641 3756	3592	E=3689 6P=3714
5	ON/E	5P E	3584 3701	3530	6P=3592 E+1P=3635
6	ID/E	E 3P	3612 3797	3494	E+1P=3614 6P=3632

The most important indicator, the profit is presented in table 5 in optimized alternative (R_1) and in alternatives minimum and maximum in each system.

Table 5

Results of optimizing the profit (lei/ha)

Nr. ctr.	Sistemul	Profit			
		R_0		R_1	Closing variants R_{0MAX}
		Var.	Minim Maxim	Optim	
1	ON	6P E+1P	15174 17742	18106	3P=17668 4P=17647
2	ID	6P 4P	14840 16962	16743	5P=16615 3P=6432
3	E	6P 4P	15568 17855	18073	3P=17718 E+1P=17600
4	ON/ID	6P E+1P	13425 16913	16352	3P=16018
5	ON/E	6P E	15405 16919	17330	E+1P=16903 4P=16854
6	ID/E	4P E	15956 18284	17672	E+1P=17271

Even if it was thought that the maximizing of the profit will come from systems ID, ON/ID and ID/E, the optimized profit is under the limits of the maximum achieved (Ro_{MAX}), and the other three systems ON, E and PN/E is higher than $Ro_{MAX.}$ The alternatives with the lowest profit were E + 1P in ON and ON/ID systems, E in systems ON/E and ID/E, 4 P in system ID and E.

CONCLUSIONS

The conclusion is that the alternatives with five and six weeding, even if the present few better indicators, on the whole they have the lowest profit.

An example is the case of system ON/ID where the minimum profit (Ro_{MIN}) obtained in alternative 6P is less than 50% out of the maximum profit (Ro_{MAX}) obtained in alternative E + 1P.

It is noticed the fact that exists a colligation of the results established experimentally and the optimized results which proves that both ways of analysis led to close results, underlining the most efficient or most favourable ones.

Regarding the maintenance of the soil, the choice of the most efficient one depends on the conditions specific to the region.

Thus, it was tried a multifactorial analysis of five systems of soil maintenance, each having seven alternatives that could offer to those interested sufficient information in choosing the one which corresponds the best to the conditions in the region and the pursued objective.

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EARLY AND TOTAL YIELD OF GREENHOUSE CYCLE I TOMATO HYBRIDS IN SOILLESS CULTURE

PRODUCȚIA TIMPURIE ŞI TOTALĂ A HIBRIZILOR DE SERĂ CICLUL I CULTIVAȚI ÎN SISTEME FĂRĂ SOL

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Abstract. *Tomatoes are the main vegetable crop cultivated in greenhouses as a result of the continuous demand that exists on the market for consuming both fresh and processed tomatoes all over the year. Besides from cultivating them in the greenhouse soil, tomatoes are being cultivated in soilless systems. The cultivation system of tomatoes in polyethylene bags started some years ago, in 1989 in the greenhouses belonging to USAMV and was prooved to be superior to the old cultivation system (directly in the greenhouse soil). This soilless system was improoved all over the years: different substrate's composition and volume, plant density and hybrids used. Early and total yield for the year 2007 varies from 9.16 kg/m^2 to 12.88 kg/m^2 both for the two culture systems and the fertilization method used.*

Rezumat. *Tomatele se situează pe primul loc între plantele legumicole cultivate în sere, datorită cerințelor permanente existente atât pentru consumul în stare proaspătă cât şi prelucrate industrial (pastă, ketchup, bulion, etc) pe parcursul întregului an. Pe lângă cultivarea acestora direct în solul serei, a fost implementat şi noul sistem de cultivare în culturi fără sol. Sistemul de cultură pe substrat organic al tomatelor de seră în pungi din folie de polietilenă a fost experimentat şi în serele USAMV din 1989 şi dovedindu-se a fi un sistem de cultură superior celui în solul serei a fost practicat an de an până în prezent. Pe parcursul acestor ani, acest sistem de cultură a fost permanent îmbunătățit, atât în ceea ce priveşte compoziția şi volumul substratului, a densității plantelor cât şi a hibrizilor folosiți. Producțiile timpurii şi totale obținute variază în funcție de sistemul de cultură şi de tipul de fertilizare aplicat de la 9.16 kg/m^2 până la 12.88 kg/m^2.*

Tomatoes are the main vegetable crop cultivated in greenhouses, being highly requested all around the year. The producers try to find ways of satisfying this need by starting an early harvest, from April until late autumn.

The present research offers an alternative by cultivating the tomato plants in polyethylene bags, on organic substratum instead of directly in the greenhouse soil by using a special mixture: peat 80%+ long duration follow soil and well-decomposed manure 20% at least 8 l substrate/plant.

The development, fructification and yield of the tomatoes were registered periodically from April until July when the tomato culture ended. Foliar and root fertilizations (Ferticare NPK 10:5:26, each 10 days) were applied and all the specific maintenance works were performed on a regular basis in order for the culture to be successful and the tomato plants free from diseases and pests.

MATERIAL AND METHOD

The experimental field was set up in the greenhouse of the vegetable growing sector of the Faculty of Horticulture. The experiment is poly-factorial with four experimental factors, each with two graduations:

F1: the hybrid — a. Cronos F_1; b. Menhir F_1

F2: the culture system — a. in the greenhouse soil; b. in polyethylene bags on organic substratum

F3: the basic fertilization — a. simple doses; b. double doses

F4: the supplementary fertilization — a. root; b. root + foliar

From the combination of the four factors a number of 16 experimental variants resulted, placed in 3 repetitions. The tomato seedlings were planted in 10.02.07 at the density of 80/40 cm with 31.200 plants/ha in experimental variants of 9 m^2 each.

The tomato fruits were harvested starting with 23.04.07 until 15.07.07. The early yield was calculated from 23.04.07 to 31.05.07, while the total yield was considered until 15.07.07 when the final crop was ingathered.

RESULTS AND DISCUSSIONS

The results obtained are presented both for the early and total yield. The influence of the different factors as well as their combined influence had been studied.

Comparing the two culture systems: in the greenhouse soil and in polyethylene bags, the outcome is very favorable for the plants grown in PE peat bags, which had registered a much better production: 4.87 Kg/m^2 in PE bags for early yield and 12.32 Kg/m^2 for total yield, compared to 3.35 Kg/m^2 and 10.07 Kg/m^2 for soil culture (Table 1).

Table 1

The influence of the culture system on early and total yield

The culture system	Early Yield				Total yield			
	Kg/m^2	%	Differ.	Signific.	Kg/m^2	%	Differ.	Signific.
soil	3.35	100	+ 0.00	-	10.07	100	+0.00	-
PE bags	4.87	145.3	+ 1.52	xx	12.32	122.4	+2.25	x

DL (p 5%)	+ 0,63	DL (p 5%)	+ 0,99
DL (p 1%)	+ 1.45	DL (p 1%)	+ 0,29
DL (p 0,1%)	+ 4.63	DL (p 0,1%)	+ 7.30

Comparing the behavior of the two hybrids with the control (Cronos cultivated in the greenhouse soil), the differences are significant positive for the variants cultivated in the PE bags, both for early and total yield (Table 2).

Table 2

The combined influence of the culture system and of the hybrid on yield

Culture system	Hybrid	Early yield				Total yield			
		Kg/m^2	%	D	S	Kg/m^2	%	D	S
soil	Cronos	3.13	100	+ 0.00	-	9.57	100	+ 0.00	C
PE bags	Cronos	4.57	145	+ 1.44	x	12.02	125	+ 2.46	x
soil	Menhir	3.57	114	+ 0.44	-	10.57	110	+ 1.00	-
PE bags	Menhir	5.18	165	+ 2.05	xx	12.61	131	+ 3.04	x

DL (p 5%)	+ 0.89	DL (p 5%)	+ 1.41
DL (p 1%)	+ 2.05	DL (p 1%)	+ 3.25
DL (p 0,1%)	+ 6.54	DL (p 0,1%)	+ 10.33

D= difference
S= significance
C= control

In the next table (Table 3) a significant positive difference can be noticed for the plants grown in soiless culture, with an increase up to 1.86 kg/m^2 for early yield and 2.43 kg/m^2 for total yield, after using the two supplementary fertilization methods (root and root + foliar), among which the best results are those of the tomato plants grown in PE bags.

Table 3

The combined influence of the culture system and of the supplementary fertilization on yield

Culture system	Supplem. fertilization	Early yield				Total yield			
		Kg/m^2	%	D	S	Kg/m^2	%	D	S
soil	root	3.18	100.0	+ 0.00	-	9.67	100.0	+0.00	C
PE bags	root	4.71	147.8	+ 1.52	xx	12.10	125.2	+2.43	xx
soil	root+foliar	3.52	110.7	+ 0.34	-	10.47	108.3	+ 0.8	-
PE bags	root+foliar	5.04	158.5	+ 1.86	xx	11.80	122	+ 2.13	xx

DL (p 5%)	+ 0.67	DL (p 5%)	+ 1.00
DL (p 1%)	+ 1.38	DL (p 1%)	+ 2.12
DL (p 0,1%)	+ 3.90	DL (p 0,1%)	+ 6.91

D= difference
S= significance
C= control

Analyzing the combined influence of the three factors (culture system, hybrid and supplementary fertilization) on the tomato yield (Table 4), a positive significant difference is registered for the two hybrids when cultivated in polyethylene bags with 4.40 Kg/m^2 for early yields and 11.86 Kg/m^2 for total yields in contrast with soil crops of 2.97 Kg/m^2 (early) and 9.16 Kg/m^2 (total yield). It can be concluded that the main influence on the total yield is conferred by the culture system, especially the soiless culture.

Compared to the controlled variant: Cronos cultivated in soil and root fertilized, all the others variants registered higher yields, as a result of being grown in PE bags, both root and foliar fertilized, especially Menhir with 5.35 Kg/m^2 for early yield and 12.88 Kg/m^2 for total yield (Table 4).

Table 4

The combined influence of the culture system, hybrid and supplementary fertilization on yield

Culture system	Hybrid	Suppl. fertiliz.	Early yield				Total yield			
			Kg/m^2	%	D	S	Kg/m^2	%	D	S
soil	Cronos	root	2.97	100.0	+ 0.00	-	9.16	100.0	+0.00	C
PE bag	Cronos	root+foliar	4.40	148.2	+ 1.37	x	11.86	123.1	+2.24	x
soil	Cronos	root	3.29	110.8	+ 0.32	-	9.97	108.8	+0.81	-
PE bag	Cronos	root+foliar	4.74	159.6	+ 1.77	x	12.19	133	+ 3.03	x
soil	Menhir	root	3.40	114.5	+ 0.43	-	10.17	111	+ 1.01	-
PE bag	Menhir	root+foliar	5.01	169	+ 2.04	xx	12.34	134.7	+ 3.19	xx
soil	Menhir	root	3.75	126.3	+ 0.78	-	10.96	119.6	+ 1.80	x
PE bag	Menhir	root+foliar	5.35	180.1	+ 2.38	xx	12.88	140.6	+ 3.72	xx

DL (p 5%)	+ 0.95	DL (p 5%)	+ 1.42
DL (p 1%)	+ 1.95	DL (p 1%)	+ 3.17
DL (p 0,1%)	+ 5.51	DL (p 0,1%)	+ 9.77

D= difference
S= significance
C= control

CONCLUSIONS

1. Analyzing the two culture systems: in the greenhouse soil and in polyethylene bags on organic substratum, it can be concluded that the best yields were obtained at the tomatoes grown in soiless culture.

2. Both hybrids (Cronos and Menhir) had the best behavior when cultivated in polyethylene bags, on organic substratum and root + foliar fertilized, with early yields up to 5.35 Kg/m^2 and total yields of 12.88 Kg/m^2.

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THE INFLUENCE OF MODE OF "KNIP-BAUM" CROWN FORMATION ON APPLE TREE PRODUCTIVITY AND QUALITY IN THE FRUIT NURSERY

INFLUENȚA MODULUI DE FORMARE A COROANEI „KNIP-BAUM" ASUPRA RANDAMENTULUI ŞI CALITĂȚII POMILOR DE MĂR ÎN PEPINIERĂ

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Abstract. *In the period of 2006-2007 in Ltd. „Fruit Nurseries" were made some investigations referring to the influence of three modes of „knip-baum" crown formation on the apple tree productivity and quality in the second field of the fruit nursery. For „knip-baum" crown formation were used three methods: „Knip-baum" with a free growth (control variant), „Knip-baum" with periodical remove of the apical leaves of the axle offshoot and „Knip-baum" with the application of biological active substances of the axle offshoot. As a rootstock served the M 9 type and as graft were used Golden Reinders, Jonagored and Idared varieties. The best results obtained for the apple tree productivity and quality were registered at the „knip-baum" crown basis formation by periodical remove of the apical leaves from the axle's offshoot.*

Rezumat. *În perioada anilor 2006-2007 în SRL „Fruit Nurseries" a fost studiată influența a trei moduri de formare a coroanei „knip-baum" asupra randamentului şi calității pomilor de măr în câmpul doi al pepinierei pomicole. Pentru formarea coroanei „knip-baum" au fost folosite trei metode: „Knip-baum" cu creşterea liberă (martor), „Knip-baum" cu ruperea periodică a frunzelor apicale ale lăstarului axului şi „Knip-baum" cu aplicarea substanțelor biologic active pe lăstarul axului. Ca portaltoi a fost folosit tipul M 9, iar ca altoi – soiurile Golden Reinders, Jonagored şi Idared. Cele mai înalte rezultate obținute asupra randamentului şi calității pomilor de măr au fost înregistrate la formarea bazei coroanei „knip-baum" prin ruperea (eliminarea) periodică a frunzelor apicale ale lăstarului axului.*

Strategy of pomology development till 2020 foresees the gradual replacement of the actual orchards with new ones that are modern of an intensive type on a surface of about 100.000 ha. In the new plantations, the apple trees represent 44% of the total area and 60% of the global fruit production (3).

The greatest importance when establishing high productive orchards is that of the high quality planting material (2, 6, 8).

At present the intensive and superintensive apple tree orchards in the republic of Moldova are planted with uncrowned apple trees (rods) in the fruit nursery.

The researches from the countries that have an advanced pomology (1, 6, 7, 8, 9), confirm that the plantation in the orchard of well-developed apple trees, rationally crowned in the second field of the fruit nursery, especially of those that are bench grafted, considerably contribute to the emerging of plantation, beginning early fructification and increase of qualitative fruit yield.

In the Republic of Moldova were made not many investigations referring to the production of apple trees that are crowned in the field of the fruit nursery, especially those obtained by bench grafting.

On the basis of the data mentioned above, the technology of apple tree crowning in the second field of the nursery, including the bench grafted apple trees, too, that is referring to an early fructification and yield increase in a very short time, presents a very actual problem for apple tree culture intensification in the Republic of Moldova.

MATERIAL AND METHOD

The researches were made in the period of 2005-2007 years in the fruit nursery of the mixed industrial unit "Fruit Nurseries" founded on the basis of collaboration between the joint- stock company "Codru-ST" and the Dutch "Van Rijn International". The first field was established on the second part of April with bench grafts made in March using the method of perfected copulation with detached branch.

As a rootstock was used the biotype M9, and as a graft the variety Idared in the Republic of Moldova and the long-term varieties: Golden Delicious Reinders, Jonagored. For grafting were used layers (marcottes) with a diameter of 10.0 mm and graft branches with high biological qualities taken from Holland.

The place of grafting was tied with special film, the graft was paraffined. The grafts obtained have been stratified by placing them vertically in containers, in the way that the basic part of the layer (20-25 cm) should be in a wet and moist stratum of sand. The temperature of stratification in the refrigerator is +2…4 ^{0}C. The distance of plantation of the grafted plants is 90x35 cm.

In spring, in the second field, the annual trunk was cut at the height of 50-60 cm from the graft's place. At the same time with the growth of lateral shoots was made the clear up of the trunk leaving only the terminal one. With a view to the branch stimulation and offshoot growth in the crown zone, were applied three methods:

V1 – knip-baum with a free growth (control variant);

V2 – knip-baum with periodic remove of the apical leaves of the axle;

V3 – knip-baum with the application of biological active substances.

The aerial part was palisated on a stick of bamboo.

As a biological active substance to stimulate the branching, was used the preparation Ecostim with a concentration of 0,25 ml to 1 liter of water.

The usual black soil, the content of humus is 2,6 %, that is maintained as cultivated field, irrigation is made by sprinkling, keeping the soil wet at 75-80% from the capacity of field.

The aim of investigations made is the determination of optimum method of "knip-baum" crown formation and its influence on apple tree productivity and quality in the fruit nursery.

The investigations were made in field and laboratory conditions after accepted methods of making researches with fruit-growing plants. The obtained results were subject to statistic processing according to dispersioned analysis (5).

RESULTS AND DISCUSSIONS

The researches that were made show that the development of apple trees at the end of both periods of vegetation in the fruit nursery depended on the varieties taken into the study.

At the end of the first period of vegetation in fruit nursery the height of the graft (figure 1) is between the limits of 106 cm (Idared) and 122 cm

(Jonagored), with a greater diameter of 10 cm from the place of grafting of 9,6-11,0 mm. The leaf surface of a tree is between 0,17-0,20 m^2/tree or, if to calculate per hectare, then it would be 5,39-6,34 thousand m^2/ha.

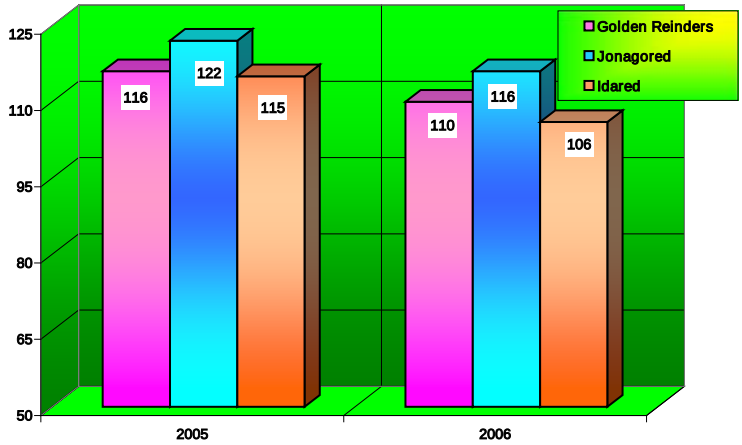

Fig. 1. - **Graft height at the end of the period of vegetation in the first field of the fruit nursery,** cm.

In the second field, during the spring period, all the technological operations taken on the apple trees lead to the methods studied on the crown formation of "knip-baum" type.

At the end of the second period of vegetation in the fruit nursery (table 1), the way of crown formation has not essentially influenced the tree's height at the variety Golden Reinders that is between the limits of 165,0-177,7 cm, and the trunk diameter is 15,2-15,8 mm. In 2006 the number of branches in the control variant is 13,1 pieces/tree, which decreases to 12,0 pieces/tree in the third variant with crown formation of "knip-baum" type with the application of biological active substances to stimulate the branching. But in 2007 the number of lateral branches in the crown zone increases from 6,2 pieces/tree in the first variant to 8,5 pieces/tree in the second variant.

The average length of a lateral branch that increases with about 5-23% in comparison with the control variant in the variant when the crown of "knip-baum" type is forming itself through the periodical remove of apical leaves, being 37, 9 cm (2006) and 46,9 cm (2007), with an angle of branching of 69,0-75,3^0. The leaf surface of a tree in this variant has maximum values and constitutes 0,56-0,59 m^2/tree.

The variety Jonagored, which has better biological features of growing the trees and with a higher capacity of forming lateral shoots, registered higher values at principal indicators of growing the aerial parts of trees, bench grafted in the fruit nursery, taken into comparison with the other two varieties being also studied.

The way of forming the crown, practically, doesn't influence the height of trees that is between the limits of 179,0-194,4 cm, or has increased with 9-18% the value of the index in comparison with the variety Golden Reinders, as well as the trunk diameter that is between the limits of 15,0-15,7 mm.

Table 1

The main indicators of trees growing and crown structure depending on the way of its formation

Way of crown formation	Tree height, cm	Trunk diameter, mm	Number of branches in the crown, pieces/tree	Average length of a branch, cm	Angle of ramifi-cation, ^{0}	Leaf surface, m^2/tree
Golden Reinders						
2006						
V-1	165,0	15,8	13,1	30,9	70,5	0,52
V-2	167,9	15,2	12,7	37,9	75,3	0,56
V-3	171,7	15,4	12,0	35,5	80,1	0,54
Dl $_{0,05}$	*2,78*	*0,18*	*0,53*	*3,71*	*4,62*	*0,02*
2007						
V-1	177,7	15,2	6,2	45,2	65,7	0,53
V-2	171,7	15,5	8,5	46,9	69,0	0,59
V-3	177,2	15,4	6,5	45,2	60,8	0,54
Dl $_{0,05}$	*5,51*	-	*0,55*	-	-	*0,03*
Jonagored						
2006						
V-1	194,4	15,7	12,0	48,9	84,8	0,62
V-2	181,1	15,4	10,0	54,2	91,5	0,67
V-3	187,4	15,3	11,1	50,6	79,8	0,70
Dl $_{0,05}$	*6,00*	*0,28*	*0,67*	*3,44*	*4,13*	*0,03*
2007						
V-1	184,2	15,2	6,2	52,9	71,7	0,44
V-2	179,0	15,2	8,2	55,4	84,5	0,50
V-3	182,4	15,0	6,7	53,4	71,1	0,48
Dl $_{0,05}$	*6,64*	-	*0,85*	-	-	*0,02*
Idared						
2006						
V-1	191,7	15,6	6,0	29,8	69,1	0,47
V-2	179,9	16,0	8,6	34,2	73,0	0,50
V-3	186,4	15,8	7,5	32,6	65,7	0,52
Dl $_{0,05}$	*5,23*	*0,21*	*1,06*	*2,41*	*3,29*	*0,02*
2007						
V-1	155,2	15,0	5,2	35,1	63,8	0,37
V-2	153,7	15,5	6,4	40,2	71,4	0,41
V-3	153,7	15,4	5,7	38,7	59,7	0,39
Dl $_{0,05}$	*5,10*	-	*0,67*	*3,44*	-	*0,04*

The average number of branches in the crown, depending on the method of crown formation, varies from 8,2-10,0 pieces/tree in the second variant to 6,2 pieces/tree in 2007 and 12,0 pieces/tree (2006) in the control variant. The average length of a lateral branch in the control variant has increased given to the variety Golden Reinders by 58-71% and is 48,9-52,9 cm, which depending on the crown formation of "knip-baum" type, has increased, respectively, to 54,2-55,4 cm or by 5-11% in comparison with the control variant in the variant of crown formation of "knip-baum" type with periodical remove of apical leaves and an angle of branching ramification of 84,5-91,5^0. The leaf surface increases from 0,44-0,62 m^2/tree in the control variant to 0,70 m^2/tree in the variant with

crown formation of "knip-baum" type with the biological active application of substances for stimulating the growth of branches.

The height of tree of variety Idared, depending on the way of formation the crown of "knip-baum" type, is between the limits of 153,7-191,7cm, the trunk diameter being 15,0-16,0 mm. The average number of branches in the crown at the variety Idared is influenced by the capacity of forming sylleptic shoots which at the given variety are weak and constitutes 5,2-8,6 pieces/tree.

At the crown formation of "knip-baum" type through periodical remove of apical leaves, the average length of a lateral branch is 34,2-40,2 cm, which increases with about 14-15 % in comparison with the control variant that is 29,8-35,1 cm, having an angle of ramification of 71,4-73,0^0. The leaf surface at the variety Idared, as well as at the variety Jonagored, increases from 0,37 m^2/tree to 0,52 m^2/tree in the third variant, and in the second variant were obtained the best growing tree indicators in the second field of both years of the fruit nursery and constitute 0,41-0,50 m^2/tree.

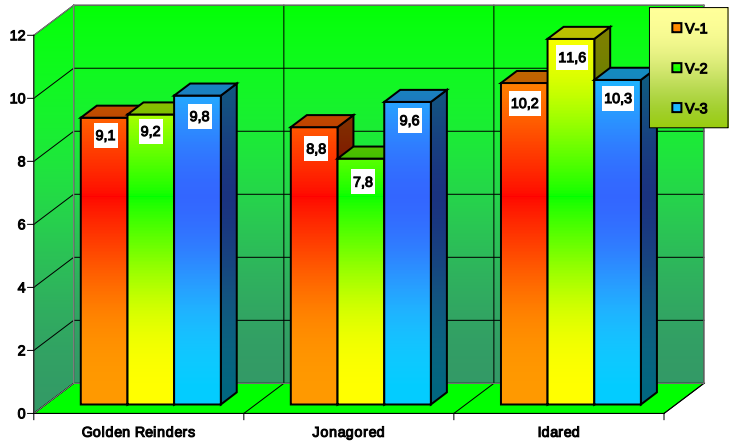

Fig. 2. - **Number of fruit buds of apple trees in the second field in dependence on the mode of "knip-baum" crown formation,** piece/tree (*average of 2006-2007*).

The intense and extended growth of shoots creates a higher leaf surface and is detrimental to the differentiation of fruit buds (4). The number of bud fruits (figure 2) of the apple trees in the second field, according to the way of "knip-baum" crown formation, in average, during the period of investigations, is between the limits of 9,1-9,8 pieces/tree for Golden Reinders variety, 7,8-9,6 pieces/tree (Jonagored) and 10,2-11,6 pieces/tree (Idared).

In both years of investigation, the apple tree productivity and quality have been directly influenced by the mode of "knip-baum" crown formation (table 2). In the case of apple tree crowning by periodical elimination of apical leaves from the axle offshoot, it was registered the greatest number of apple trees of first quality that are between the limits of 26,49-30,31 thousand pieces/ha, and is greater with 7-10% than that of the control variant and 5-9% in the case of apple trees' crowning by the application of biologic active substances on the axle offshoot.

Table 2

Apple tree productivity and quality in the second field, according to the mode of "knip-baum" crown formation

Way of crown formation	2006		2007	
	productivity, thousand pieces/ha	**1st quality,** thousand pieces/ha	**productivity,** thousand pieces/ha	**1st quality,** thousand pieces/ha
Golden Reinders				
V-1	30,50	28,32	28,59	26,26
V-2	31,04	29,80	29,46	28,63
V-3	30,82	27,71	28,71	26,57
Jonagored				
V-1	28,98	26,31	29,95	27,64
V-2	29,77	28,68	30,74	30,31
V-3	29,39	27,04	30,15	27,36
Idared				
V-1	28,19	24,80	30,99	27,24
V-2	29,11	26,49	31,19	28,95
V-3	28,60	25,74	31,04	27,58

CONCLUSIONS

1. The most favorable equilibrium between growth indicators of apple trees and crown basis formation in the second field of the fruit nursery has been registered in the variant with crowning of "knip-baum" type by periodical remove (elimination) of apical leaves of the axle offshoot of 5-6 times.

2. Superior productivity of apple trees of first category, crowned in the second field of the fruit nursery was obtained in the case of apple tree formation according to "knip-baum" type by periodical remove of apical leaves of the axle offshoot.

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THE INFLUENCE OF FRUIT EARLY PRODUCTION ON CAPITAL INVESTMENTS RECOVERY

INFLUENȚA PRODUCȚIEI PRECOCE DE FRUCTE ASUPRA RECUPERĂRII INVESTIȚIILOR CAPITALE

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Abstract. *The investigations were made in the orchard of Ltd "Codru-ST" founded in 2004 with "knip-baum" apple trees of Idared, Golden Reinders, Ionagold Decosta, and Čampion varieties, grafted on M9 rootstock. It was also studied the plantations productivity in the first four year after plantation and its capital investments recovery. It was established that the precociousness of the plantation fructification and soil biologic features diminishes the period on the recovery of directed capital investments. The obtained production of at the varieties under consideration in the first four years after plantation was 57,00-69,11 t/ha. The best results registered the variety Golden Reinders, which is 69,11 t/ha. High qualitative production the fourth year after plantation to recover the capital investments to have an index of 112,6-134,7%, registering a considerable profit for Golden Reinders variety.*

Rezumat. *Investigaţiile au fost efectuate în livada SRL „Codru-ST" fondată în anul 2004 cu pomi de măr de tipul „knip baum" soiurile Idared, Golden Reinders, Jonagold Decosta şi Čampion altoite pe portaltoiul M 9. S-a studiat productivitatea plantaţiei în primii 4 ani după plantare şi influenţa ei asupra recuperării investiţiilor capitale. S-a stabilit că precocitatea fructificării plantaţiei şi particularităţile biologice ale soiului diminuează perioada recuperării investiţiilor capitale direcţionate la înfiinţarea livezilor. Producţia cumulată la soiurile în studiu în primii 4 ani după plantare a constituit 57,00-69,11 t/ha. Cele mai înalte rezultate s-au obţinut la soiul Golden Reinders 69,11 t/ha. Producţia înaltă, calitativă şi fructificarea precoce a permis ca în anul 4 după plantare recuperarea investiţiilor capitale a constituit 112,6-134,7 % înregistrând un profit considerabil la soiul Golden Reinders.*

The concept and program of fruit-growing development in the Republic of Moldova foresee that till 2020, orchards surface to be about 100000 ha, and the global fruit yield 980000 tones (7). To find solution for these decisions, it is recommended that the plantations with a higher productivity to be maintained, and on the new lots to plant the new ones that have a perspective with a higher productivity potential (1,2).

Fruit growing plantation establishment with effective varieties the use of modern technologies permit to have an early yield in the second and third year after plantation, a productivity of 30-35 t/ha of high qualitative fruit and a total reimbursement of investments for plantation foundation and supervision in the given period (3,5,7).

Lately, in the countries with an advanced fruit-growing, the producers of fruits more and more often create orchards with 2-year old planting material of "knip-baum" type that correspond to the mentioned requirements and permit to obtain early production of 4-5 kg/tree, and in the fourth year -15-18 kg/tree (4,7).

MATERIAL AND METHOD

The investigations were made in an orchard founded in 2004 at Ltd "Codru-ST" with the support of Holland government. For plantation were used crowned 2-year old apple trees of "knip-baum" type imported from Holland of varieties: Idared (variant control), Golden Reinders, Ionagold Decosta, and Čampion, bench grafted on rootstock M9. The apple tree are formed after the thin ameliorated fusiform crown and planted at a distance of plantation 3,25 x 1,25m.

Plantation productivity was established in the harvesting period for all variants taken into the study. Capital investments recovery were made by determining real expenses when was established fruit growing plantation. The cost for planting material, supporting elements, system of irrigation and the price by selling fruits have corresponded in that year with the real prices of the market from the Republic Moldova (3,5).

REZULTS AND DISCUSSIONS

For the accomplishment of the concept about fruit growing development, the next following years it is planned to enlarge the surface of the plantation. The intensive culture of fruit growing varieties requires significant capital the beginning of fruit bearing.

The obtained results (table 1) demonstrable the apple-trees have fructification from the 1 year after plantation on terminal buds of the obtained selleptic shoots in the fruit nursery. According to the variety biologic characteristic features, the yield was 0,71 – 1,03 t/ha.

With plantation age, the fruit productivity increases. In 2005 the fruit production was 11,91 – 18,11 t/ha. The highest productivity was registered at Jonagold Decosta variety – 18,11 t/ha, and the lowest one registered the Golden Reinders variety – 11,91 t/ha. The varieties Idared and Čampion the fruit yield constituted 13,53 and respectively 13,88 t/ha.

In 2006 the fruit production of varieties under the study constituted 17,62 – 26,60 t/ha. The highest yield was registered at Golden Reinders variety – 26,60 t/ha. Idared and Jonagold Decosta varieties productivity constituted 19,56 – 20,59 t/ha. Čampion variety the yield constituted 17,62 t/ha.

The 2007 year was a very difficult year for fruit – growing plants and not only, because of the atmospheric rain – fall insufficiency and with high temperature of + 30^0C that both have stopped the photosynthesis process and diminished the plantation productivity with 30 – 35%.

The most productive variety vas Golden Reinders with 29,57 t/ha. Next varieties were Čampion, Idared and Jonagold Decosta where the fruit production constituted 27,82; 23,20 and respectively 23,05 t/ha.

The obtained results regarding the productivity of apple tree plantation founded with "knip baum" apple trees, demonstrates us that in the second year after plantation productivity can be of 30-35 t/ha of qualitative fruit, in case when the favorable climatic conditions for apple tree development.

The investments made demonstrate us that the volume of investments for plantation foundation is determined by the effective expenses for preparing the lot, plant material cost, supporting elements of apple trees, system of irrigation and no biological features of the soil.

The expenses of the varieties under the study for the foundation of 1 ha of orchard constituted 157400 lei, including for the lot preparation and apple tree plantation 13900 lei, plant cost for planting material 111700 lei, elements for supporting the apple trees 28700 lei, system of irrigation 13400 lei.

Table 1

The fruit productivity on plantation at different apple tree varieties planted with trees of "knip-baum" type

Variety	2004	2005	2006	2007	Accumulated production
Idared	0,71	13,53	19,56	23,2	57,00
Golden Reinders	1,03	11,91	26,60	29,57	69,11
Jonagold Decosta	0,73	18,11	20,59	23,05	61,48
Čampion	0,78	13,88	17,62	27,82	60,10
Dl 5%	0,21	1,75	2,64	3,24	-

The expenses of orchard supervision during the four years after plantation depend on biological features of the soil. The greatest expenses of supporting the plantation in the given period were registered at Golden Reinders variety 86000 lei due to a high yield fruit production of 69,11 t/ha. For the other varieties, the expenses were 70500 - 73700 lei/ha.

The total investments are very linksed with the expense made for supporting the plantations depending on variety, because those from its foundation are identical. The mentioned indicator for Golden Reinders variety constituted 237400 lei/ha. At the varieties Idared, Ionagold Decosta and Čampion the obtained values constituted 227900, 230100 and respectively 231100 lei/ha (table 2).

Table 2

Capital investments recovery for apple tree foundation and supporting with "knip-baum" apple trees depending on the biological features of the soil, 2004-2007 year.

Variety	Investments at orchard foundation, thousand lei/ha	Investments for supporting the orchard, thousand lei/ha	Total Investments, thousand lei/ha	Production value, thousand lei/ha	Investments recovery, %
Idared	157,4	70,5	227,9	256,5	112,6
Golden Reinders	157,4	80,6	237,4	319,6	134,7
Ionagold Decosta	157,4	72,7	230,1	274,7	119,4
Čampion	157,4	73,7	231,1	271,2	117,4

The value of the global production depends directly on the obtained yield quantity, quality and selling price. The highest values during the investigations registered Golden Reinders variety 319600 lei/ha, then Ionagold Decosta 274700 lei/ha, Čampion 271200 lei/ha and Idared 256500 lei/ha.

The investments recovery is the main indication of the entire activity of the fruit growers. For the recovery acceleration of the extremely high expenses appears the necessity to reduce the period of entering of early fruit production and to obtain high and qualitative production in the first years after plantation.

In the forth year of exploitation of the plantation, the total investments were completely recovered and Golden Reinders variety registered 134,7 %, Ionagold Decosta 119,4 %, Čampion 117,4 % and Idared 112,6 %.

It was established that the early fruit production will permit to recover all the investments for plantation foundation with apple trees of "knip-baum" type in the fourth year after plantation and show the tendency to obtain a sort of profit.

CONCLUSIONS

1. The first yield was registered in the year when the orchard was planted, the fruit production was 0,71 - 1,03 t/ha. The accumulated fruit production was registered at the variety Golden Reinders – 69,11 t/ha, followed by the varieties Jonagold Decosta – 61,48 t/ha, Čampion – 60,10 t/ha and Idared – 57,00 t/ha.

2. To accelerate the investments recovery it is suggested to reduce the period of entering on early fruit production and to obtain high and qualitative yields (10 t/ha) from the second year after plantation. The requirements correspond to the founded plantations with apple trees of "knip-baum" type.

3. Formation of modern apple plantations of "knip-baum" type require significant capital investments – 157400 lei/ha.

4. In the fourth year after plantation foundation, the total investments recovery constituted 112,6 - 134,7 % depending on the biological features of the soil.

5. It was established that the early harvest permit in the fourth year of plantation exploitation to have a complete recovery of the total investments and to obtain a sort of profit.

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THE NEGATIVE EFFECTS OF FROST IN THE WINTER OF 2007 ON THE FRUIT GROWING SPECIES CULTIVATED IN THE N-E MOLDAVIA

EFECTELE NEGATIVE ALE GERULUI DIN IARNA ANULUI 2007 ASUPRA SPECIILOR POMICOLE CULTIVATE ÎN N-E MOLDOVEI

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Abstract. *The N-E part of Moldavia sprads good conditions for the grouth of the pome fruits (apple, pear, quince) and the stone fruits (plum, cherry, apple, apricot and peach trees) which marks the north limit of growing. The 2006-2007 winter was an abnormal one, with high temperatures during December-January and first decade of February, following by of suddenly lower of temperature (20,5 degrees centigrades bellow). In the experimental plantation of Fruit Growing Research Development Station Iasi after that frost, the blossom buds have been affected such as apricot, peach, cherry, plum trees, or even drying of nut trees. The most affected were supported by the apricot and peach species, in fact the fruit crop was destroyed. The same, the plum crop was 90%-100% affected. Damages of the floriferous buds were also registered for the cherry breeds especially for the breeds with an early maturity in proportion of 10-20% and for the walnuts where some trees partially dried off in the inferior third of the canopy and whose floriferous buds (especially male) were affected, a fact that led to the reduction of fruit production by 10-30%..*

Rezumat. *Zona de N-E a Moldovei oferă condiţii favorabile culturii speciilor pomicole seminţoase (măr, păr, gutui) şi sâmburoase (prun, cireş, vişin, măr, puţin cais şi piersic) care se găsesc la limita nordică de cultură. Iarna anului 2006/2007 a fost una anormală, cu temperaturi ridicate în lunile decembrie, ianuarie şi primele decade ale lunii februarie, urmată de o scădere bruscă a temperaturii în ultima decadă a lunii (-20,5°C), când s-au înregistrat afecţiuni ale mugurilor floriferi la speciile cais, piersic, prun, cireş şi nuc şi chiar uscarea parţială sau totală a unor pomi la nuc. Speciile măr, păr, gutui şi vişin nu au fost afectate de aceste calamităţi. Cele mai grave afecţiuni s-au înregistrat la speciile cais şi piersic a căror producţie a fost calamitată în totalitate. Surprinzător a fost faptul că specia prun a fost puternic afectată ca urmare a distrugerii mugurilor floriferi în proporţie de 90-100% Afecţiuni ale mugurilor floriferi s-au înregistrat şi la specia cireş, în special la soiurile cu maturare timpurie în proporţie de 10-20% şi la nuc la care unii pomi s-au uscat parţial în treimea inferioară a coroanei şi a căror muguri floriferi (mai ales masculi) au fost afectaţi, fapt ce a produs diminuarea producţiei de fructe cu 10-30%.*

Key words : frost, cherry tree, plum tree, walnut tree, affections

INTRODUCTION

There have been published may papers with valuable scientific contents on the climate of Iasi and its surrounding area. Thus in the paper " Descriptio Moldavae" (1716), Dimitrie Cantemir (1673-1723) speaks in the second chapter about the Moldavian climate and he mentioned for the first time the non-uniform character of this climate as a consequence of the influence from the mountainous region "of Transylvania".

Observations on the climate of Iasi we may also find in the paper of Andreas Wolf (1805). Speaking about the Moldavian climate, he remembers that winters are very harsh, the springs windy and the most common winds come from east and north. In our area of influence, the low temperatures of a frosty winter provoke damages in nurseries and orchards manifesting by the nipping of the vegetative and floriferous buds, the damaging of the inner bark - ligneous tissues from branches and trunk and sometimes the total destruction of trees. Consequently the trees grow weak, become sensitive to diseases and pests and the fruit production is partially or totally destroyed in the respective year and even in the next 2-3 years.

MATERIAL AND METHODS

The pronounced continental climate is specific to the NE area of Moldavia. The average annual temperature is 9,5^{O} C, the lowest temperatures being registered in January with an average of – 17,3^{o}C. The minimal temperatures reach sometimes -32^{o}C, when they may affect the floriferous buds especially for apricot trees, peach trees and cherry trees.

The winter of 2006-2007 was an abnormal one. After a period poor in precipitations (53,7 mm in the months September-December), with temperatures exceeding 30^{o}C (32,1^{o}C on October 4th), there occurred the first frosts registered in October (-3^{o}C on October 17th and -1^{o}C October 31st). The beginning of the year 2007 was a warm one with positive temperatures in January (3,8^{o}C on average) and February up to 22nd of February when they registered the first snow of winter followed by the abrupt decrease of temperature (-20,5^{o}C) (table 1).

Table 1

Thermic and pluviometric conditions at Iasi between 1.10.2006-1.05.2007

Month	Monthly sum of rainfalls (mm)		Average temperature ^{O}C		Absolute minim temperature ^{O}C
	2006-2007	Normal	2006-2007	Normal	
October 2006	27,9	32,0	11,4	10,1	-4,7
November 2006	8,6	36,2	6,5	4,0	-4,5
December 2006	1,4	30,3	2,3	-0,9	-8,3
January 2007	26,5	29,4	3,8	-3,3	-9,9
February 2007	33,9	28,1	0,9	-1,5	-20,5
March 2007	33,4	29,2	7,5	3,1	-2,4
April 2007	23,0	44,8	10,6	10,3	1,2

As research material we used the trees from the experimental contest plantations for the breeds of apple tress, pear trees, quince trees, plum trees, apricot trees, cherry trees, sour cherry trees and walnuts. We analysed the unfavourable meteorological factors, the degree of damage for the trees that were during their fruit-bearing period as well as the manner in which the trees recovered in the period of vegetation from 2007.

RESULTS AND DISCUSSIONS

The fruit-growing breeds under study behave differently this year in terms of frost resistance.

The seedy breeds (apple trees, pear trees, quince trees) that can bear temperatures between -26-35^{o}C, were not affected. Surprisingly, the plum trees that can resist in normal conditions to minimum temperatures of -32 -38^{o}C, were the ones that suffered a lot this

year. Otherwise, A. Negrilă, 1980 warns that the plum trees are more sensitive than apple trees at low temperatures during winter and that some breeds, having a short winter rest, are very sensitive to low temperatures from January-February.

In the winter of 2007, with positive oscillating temperatures and high amplitudes when frost occurred abruptly after a warm interval, it affected the reproductive organs of buds for some breeds in proportion of 90-100%. For the plum trees, all the hybrids B.N.68, B.N. 5-125-5 and B.N 61-4 and the breeds Joris plum, Prezident, Valor and Carpatin. Soiurile Centenar, Blue free, Stanley, Superb, Dâmboviţa, Tuleu gras, Silvia and the hybrid B.N 7-237-7 were affected in proportion of 91-99%. The breed Minerva registered a damage percentage of 90% being the only breed where they harvested fruits but the production was still low (3,5 kg/tree). In the production plantations, they registered damages of 100% of the reproductive organs of buds fro the breeds d Agen, Vinete româneşti and Renclod Althan.

The breeds of apricot and peach trees, whose the floriferous buds were the most sensitive to temperatures of -12-14^{o}C were destroyed during their pheno-phase of bud swelling and the temperature of -20^{o}C caused the total destruction of the fruit production.

The specialized literature shows that the cherry trees resist to low temperatures depending on the breed, the stage of development, the vegetation phase, the level of nutrition and health of trees. Large oscillations are registered within the breed depending on the geographical origin of the breed (Breon 1980).

In a decreasing order in terms of need for warmth the fruit-growing breeds may be classified as follows: peach trees, apricot trees and almond trees, cherry trees and walnut trees, nut trees, plum trees, sour cherry trees and apple trees. The cherry trees are more sensitive than apple trees, pear trees, plum trees and quince trees. The most sensitive part of the floriferous buds in the period of rest is the pistil, at -20^{o}C in the rest period the floriferous buds suffer registering losses of 65-75% for the early breeds and Boambe de Cotnari, Germersdolf and B. Napoleon and less for Hedelflinger, B. Donissen (1-6%).

In the conditions specific to this year, after registering a temperature of -20,5^{o}C in the last decade of February, we sectioned the floriferous buds to determine their degree of damage. Most of the cherry breeds were not affected (Precoce dela Marca 21%, M. Fruhe 19%, Cetăţuia 13%, Cătălina 11%). Exception made the breed Rivan (of Swedish origin) that was not at all affected. The fruit production registered in this year were lower than in the previous years but the determining factor was not the effect of the February frost but the excessive drought registered in April-June that caused an accentuated physiological fall of fruit, reduced quantities and an inferior quality of these.

The sour cherry trees, with modest claims for temperature resisted well to the February frost and did not register damages of the floriferous buds and still the fruit productions were small as compared to the previous years due to the severe drought from that year. In deep rest, the walnut trees resist to temperatures of -25-30^{o}C. The conditions specific to the winter of 2007 caused severe damages to walnut trees. In some localities of the counties Iaşi, Botoşani and Vaslui, especially in the lower areas very many walnut trees dried off completely, but most often the lower third of the canopy was affected in proportion of 50-90%.

On the experimental plantation of walnut trees from SCDP Iaşi most of the walnut breeds registered damages consisting in the drying of the branches from the lower third of the canopy. Some breeds (Velnița, Bucium, Ciurea) had their aments totally affected whereas the breeds Germisara, Miroslava, Geoagiu 65 were affected in proportion of 35-50%. The female flowers were also affected, especially their stigma in proportion of 10-30%, a fact that led to the serious diminishing of the fruit production.

CONCLUSIONS

1. The winter of 2006/2007, with very low temperatures in the last decade of February, after a warm interval in December 2006, January and February 2007 was a good occasion to find out the behaviour of the fruit-growing breeds cultivated in the NE area of Moldavia in these unusual conditions.

2. In the fruit-growing plantations, as a consequence of the frosts from the last decade of February, we registered damages of the floriferous buds for the breeds of apricot, peach, plum, cherry and walnut, and even the total or partial drying of the walnut trees.

3. The breeds of apple, pear, quince and sour cherry trees were not affected by the frost from the winter of 2007.

4. The most serious damages were registered for apricot and peach trees whose production was completely destroyed.

5. The plum trees were strongly affected by the frost in proportion of 90-100%.

6. Damages were also registered for the cherry breeds especially for the breeds with early maturity of the floriferous buds (10-20%) and for the walnut tress by the total or partial drying and destruction of the male and female flowers, a fact that led to the diminishing of the fruit production (10-30%).

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THE GROWTH INDICES APPLE TREES IN „V" SYSTEM ORCHARD

INDICATORII DE CREŞTERE A POMILOR DE MĂR ÎN PLANTAȚIA CU CORONAMENTUL ÎN DOUĂ PLANURI OBLICE

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Abstract. *The productivity of an orchard depends in part on how well it collects sunlight. One system that achieves the goal of accelerated planting density without inhibiting canopy light penetration is the „V" system. A trial was established in the spring of 2004, one-year-old scab-resistant apple cultivars grafted on dwarfing M.9 rootstock, were planted in the Experimental Station "Criuleni" in central Republic of Moldova. Apple trees of the cultivar Generos and Florina were trained different crown, with trees leaned to 40^0 from vertical, each in an alternate direction down the row ("V" system). The higher value indices was obtained in the variant were trees was planted two in one place and angle of approximately 40^0 from vertical.*

Rezumat. *Gradul de captarea a radiației solare are o influență majoră la productivitatea plantației pomicole. O structură care ar asigura o accelerare a densității pomicole şi nu ar inhiba penetrarea luminii in coronament este structura plantației cu coronamentul în două planuri oblice. Lotul experimental a fost înființat în centrul Republicii Moldova la Stațiunea Didactică Experimentală „Criuleni" în primăvara anului 2004, cu pomi de măr în vârstă de un an, soiurile au o rezistență genetică la rapăn şi sunt altoite pe portaltoiul de vigoare slabă M9. Pomii de soiurile Generos şi Florina au fost conduşi după diferite forme de coroană, fiind înclinați la 40^0 față de verticală în direcția intervalelor dintre rânduri formând un gard fructifer în formă de „V".*

Cea mai mare valoare a indicatorilor de creştere la o unitate de suprafață, a fost obținută în varianta unde pomii au fost plantați doi într-o groapă, unghiul de înclinare al pomilor de la verticală fiind de circa 40^0.

Light intensity is a critical factor in yield and fruit quality. It is possible to provide trees with adequate water and mineral nutrients even in super-densely planted orchards. In young orchards which are planted moderately densely, light interception is insufficient, which reduces yield. In densely planted orchards, 60-70% of the light reaching the canopies is intercepted within two or three years after establishing the orchard. The must interception, of light intensity, in open canopy or V system orchards (*Buler Z. et al., 2004; Czynczyk A. et. al. 2004; Robinson T.L., 2005)*. In our country, with advanced fruit growing, in various it is soil - climatic conditions, researches and formations of trees have shown the studying of new systems of accommodation lead with the purpose, that efficiency of gardens increases proportionally to increase in number of plants at units of the area, most dwarf and semi-dwarf apples trees are trained as spindles *(Cimpoieş Gh. 2000, Babuc V. 2000, Pe□teanu A. 2007)*. Many tree-training methods have recently

been modified with attention to tree planting density, light intensity patterns in the orchard and fruit quality (*Cimpoieş Gh. 2000).*

Recent studies have shown that trees planted and trained at an angle have higher growth indices and better light interception at scab-resistant apple cultivars Generos and Florina grafted on dwarfing M.9 rootstock, in central Republic of Moldova

MATERIALS AND METHODS

The experiment was conducted at the Experimental Station "Criuleni" in central Republic of Moldova. Apples trees of the cultivars Generos and Florina grafted on dwarfing M.9 rootstock, was planted in spring 2004. The trees rows were aligned north-south.

The experiment was designed as a randomized block with three replicates. Each plot consisted of ten trees. The site was drip irrigated.

The experiment plots was divided in 5 variants:

- 1 variant (control) - one-line with vertical accommodation of trees and their formation as spindle. The scheme of planting 4 x 1,5 m (1666 trees per ha);
- 2 variant - two-plane V - figurative with formation of trees as a spindle and their inclination under a corner 60^0 in the opposite sides. The scheme of planting 4,5 x 1 m (2222 trees per ha);
- 3 variant - two-plane V - figurative with formation of trees as palmet system (central lider) and their inclination under a corner 60^0 in the opposite sides. The scheme of planting 4,5 x 1 m. (2222 trees per ha);
- 4 variant - two-plane V - figurative with formation of trees as palmet system (central lider), two trees in one place and an inclination in the opposite sides under a corner 60^0. The scheme of planting 4,5 x 1 m (4444 trees per ha);
- 5 variant - two-plane V - figurative with formation of trees on system Tatura. The scheme of planting 4,5 x 1 m (2222 trees per ha).

RESULTS AND DISCUSSIONS

The analysis of the received results shows, that the design of plantings has rendered essential influence on parameters of crones of trees. The greatest height on both grades was reached with a plant in the control (tab.1) where trees had vertical position. However if a difference in height by variants made within the limits of 10 - 50 cm values of diameter of a crone, especially top part made 150 - 170 cm that is connected with design features of crones in variants 2 - 5 where two adjacent trees are inclined in the opposite sides. Such system of accommodation promotes increase in density of planting of trees in 2,6 times in comparison with the control and allows to land on 1 hectares up to 4444 trees without damage of their light exposure.

The high density of planting promotes also to more intensive accumulation vegetative-growth at young age. So the area of a sheet surface of a grade of the Florina has made in 4-th variant 6800 m^2 per ha while in the control the given parameter was in 2,5 times below and 2700 m^2 per ha has made all.

Table 1

The growth indices and parameters of crown an apple-tree

Variants	Parameters of a crone			The leaf area, m^2/ha	The Lateral surface m^2/ha	Productive volume of a crone , m^3/ha
	Height of a tree, m	Diameter of a crone, m				
		At bases.	In top			
Generos						
Variant 1(c)	2,60	1,45	0,30	2483	9996	2615
Variant 2	2,20	1,75	2,00	3650	13800	3325
Variant 3	2,50	0,50	2,00	3300	13350	3600
Variant 4	2,50	1,50	2,00	6500	18200	4400
Variant 5	2,10	0,50	1,80	3175	9950	3325
Florina						
Variant1 (c)	2,70	1,50	0,35	2716	10635	2809
Variant 2	2,40	1,80	2,00	3975	14560	3525
Variant 3	2,60	1,70	2,00	3825	14500	3894
Variant 4	2,60	1,80	2,00	6800	19130	4670
Variant 5	2,40	0,70	1,50	2400	10780	3614

Two-plane designs not only promote accumulation of a lot of a sheet surface, but also their productive work. So the lateral surface and productive volume of a crone in V - figurative designs were on 25,2 - 55,1 % above than in the control.

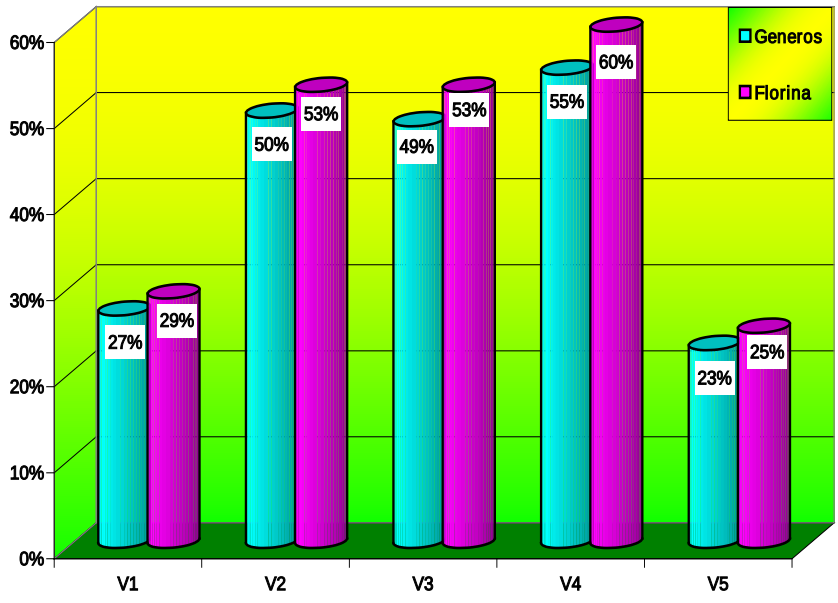

Fig. 1 - Development of the area of a garden depending on a design of a crone.

The important parameter of efficiency of the form of a crone is also fast development of the area of a meal allocated to trees. Among investigated designs the highest values of the given parameter are noted in two-plane V - figurative system with accommodation in two trees in one place. Already at four-year-old age they mastered on grade Generos of 55 % of the area allocated by it, and at a grade of the Florina the given parameter has reached 60 %.

CONCLUSIONS

Thus the optimal parameters of crown apple-tree develop in two-plane V - a figurative design of a crone. Among them the variant 4 in which owing to planting of two plants in one hole the maximum quantity of trees per hectare (4444 trees per ha) is placed is allocated. Among grades the highest values of investigated parameters are noted at the Florins, a growth differing by greater force.

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FOLIAGE FERTILIZATION IN THE INTENSIVE APPLE ORCHARD

FERTILIZAREA FOLIARĂ ÎN CULTURA SUPERINTENSIVĂ DE MĂR

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Abstract: *The objective of this research is to study the effect of foliage fertilization about the tree productivity in plantings of Pinova and Gala Must cultivars. During the period of vegetation was effected 3 foliage fertilization with nitrogen in following rates: 0,4%; 0,6%; 0,8%; 1,0%; 1,2%, using 1000 l solution per hectare. The yield of both cultivars was significantly higher (43,8-47,0 t/ha) in the variant where the rate of fertilizing element was 1,2% N.*

Rezumat. *Scopul cercetării a fost de a studia efectul fertilizării foliare la pomii de măr din soiurile Pinova şi Gala Must. S-au administrat 3 fertilizări foliare cu uree în concentraţie de: 0,4%; 0,6%; 0,8%; 1,0%; 1,2%, folosindu-se 1000 l soluţie pentru un hectar. În urma aplicării fertilizării foliare cu uree se obţin sporuri importante de producţie, cuprinse între 43,8 t/ha la pomii soiului Pinova şi 47,0 t/ha la pomii soiului Gala Must. Efectul maximal al fertilizării foliare cu uree se face resimţit la varianta 6 (1,2% N) atât în cantitatea fructelor cât şi în calitatea lor.*

Key words: *apple trees, foliage fertilization, nutritive element, variety, yield.*

INTRODUCTION

The fertilization of agricultural crop is an important technological means in performing agriculture. The application of mineral fertilizer on the trees foliage is more advantageous because the assimilation of the macro and microelements to made easily than through of the root system. The foliage fertilization compensates quickly the mineral element insufficient and made possible the application simultaneous with protection treatments (*1,5,4*).

The improvements of the mineral nutrition condition through foliage fertilization influence the growing processes and the productivity of the plants. Due to foliage fertilization increase considerable the vegetal productivity and the quality of the production (*3,2*).

MATERIAL AND METHODS

The research was founded in 2005 years in the intensive apple orchard of the agricultural society „Alfa-Nistru". The biological material was constituted from 2 apple trees (Pinova, Gala Must) grafted on M 9 and planted at a distance of 3,5 x 1,2 m. In the experience was studied 6 variants of foliage fertilization with nitrogen (46% s. a.).

The following rates of nitrogen were used:

Nr.	The period of treatments	The rates of nitrogen, %					
		V1 control	V2	V3	V4	V5	V6
1	After blossoming (75% flowers is fall)	Water	0,4	0,6	0,8	1,0	1,2
2	When the fruit is the size of one hazel (20-30 May)	Water	0,4	0,6	0,8	1,0	1,2
3	When the fruit is the size of one nut (20-30 June)	Water	0,4	0,6	0,8	1,0	1,2

RESULTS AND DISCUSSIONS

After the administration of the nitrogen foliage fertilization the fruit productivity was increased indifferently of the variety (tab. 1). During the period of the years 2005-2007 the fruit production at the variety Pinova increased at 14,8 kg/tree in the variant with the rates of nitrogen was 0,4% to 18,4 kg/tree in the variant with the foliage fertilization was effected in the rate of 1,2%. At the tree apple Gala Must cultivar the fruit production increase also in the fertilization variant at 16,0 kg/tree (V2) to 19,7 kg/tree (V6).

Through the administration of nitrogen fertilization the fruit production to improve in correlation with the medium weight of the fruit (fig.1)

The medium weight of the fruit at both cultivar is more great (157 g) also in the variant 6 (1,2% N).

In accordance with experimental data we can conclusion that the foliage fertilization in the intensive apple orchard affects directly the fruit production and increase once with the rate of nitrogen.

Table 1

The influence of the nitrogen foliage fertilization about the fruit production at the apple varieties Pinova and Gala Must

The rootstock M9, the distance of the planting, 3,5x1,2m, the shape of the crown, spindle slender S. A. "Alfa-Nistru", in medium of the years 2005-2007

The experimental variant	The medium weight of the fruit (g)	The fruit production		
		kg/tree	t/ha	The difference face of the control (%)
The variety Pinova				
V_1 (c)	143	14,3	34,1	100
V_2	143	14,8	35,2	103,2
V_3	145	15,8	37,5	109,9
V_4	148	16,4	39,1	114,6
V_5	157	17,3	41,2	120,8

V_6	158	18,4	43,8	128,4
The variety Gala Must				
V_1 (c)	145	15,2	36,3	100
V_2	147	16,0	38,2	105,2
V_3	149	17,0	40,4	111,2
V_4	151	17,8	42,3	116,5
V_5	154	18,7	44,5	122,5
V_6	157	19,7	47,0	129,4

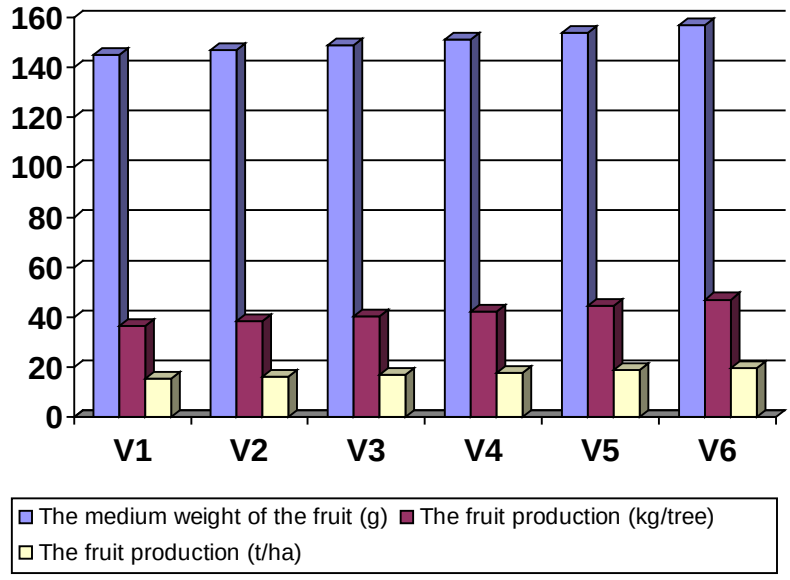

Fig. 1. The correlation of the fruit production and the medium weight of the fruit at the Gala Must variety in dependence of the nitrogen foliage fertilization.

CONCLUSIONS

Due to the possibility to effect the foliage fertilization simultaneous with protection treatments that agriculture means is financial productive.

Nitrogen foliage fertilization had significant effect the productivity of trees, yield and fruit quality of Pinova and Gala Must apple cultivar.

The highest yield (43,8-47,0 t/ha) was obtained in variant with the foliage fertilization in the rate of the nitrogen 1,2%.

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VITICULTURAL LANDSCAPE IN THE CONTEXT OF CLIMATE WARMING. STUDY OF CASE: COTNARI VINEYARD

PEISAJUL VITICOL ÎN CONTEXTUL ÎNCĂLZIRII CLIMATICE. STUDIU DE CAZ: PODGORIA COTNARI

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Abstract. *Viticultural landscape will be in a permanent changing, taking into account that climate warming is present both in global scale and in regional scale. In Cotnari Vineyard were recorded recently light trends of climate warming, trends which could lead to changes in the quality of the wine (low acidity level, high sugar accumulation, high alcohol concentration).*

Rezumat. *Peisajul viticol va fi într-o continuă schimbare având în vedere faptul că încălzirea climatică îşi face simțită prezența atât la nivel global, cât şi la nivel regional. În Podgoria Cotnari au fost semnalate recent uşoare tendințe de încălzire climatică, tendințe care ar putea avea drept efect modificări în ceea ce priveşte calitatea vinului (scăderea acidității, creşterea concentrației de zahăr, acumularea mai mare de alcool).*

MATERIAL AND METHODS

For setting off the light climate warming that takes place in Cotnari Vineyard, we analysed four climatic parameters (the annual average temperature, the number of frost days, the number of tropical days and the number of summer days) from two meteorological stations (Cotnari and Botosani).

RESULTS AND DISCUSSIONS

Global warming could have a significant influence on the regions producing high-quality wine situated at the grape growing limit. The northern regions could become more suitable for viticulture from the climatic point of view, while the southern vineyards could become too hot for grape growing (J. G. Kenny, A. P. Harrison, 1992).

Among the potential implications of global warming on viticulture observed by the scientists we can mention: warmer and longer growing seasons, altered phenological timing, changed ripening profiles, modified disease and pest timing, altered water needs (G. V. Jones, 2005a).

Viticultural landscape is a sensitive one in the context of climate warming. This phenomenon could affect viticultural landscape not only in a positive manner, but also in a negative one. The faster ripening of the grapes and the accumulation of the higher quantity of sugar represent the positive influence of climate warming on the viticultural landscape. Regarding the negative influence, we can say that it could be possible to increase the frequency of pests and diseases because of reducing the frosts, the last being induced by the increasing of temperatures.

The scientists from the whole world are trying to preserve the viticultural landscape in a present form. They use different strategies for supplying the deficit of water, for removing the pests and the diseases and for maintaining the actual varieties of grapevine. In some vineyards (southern France, southern Portugal, Spain), it's already too late to fight against climate warming. The only thing that can be done is to move the actual varieties of grapevine from the old sites, affected by warming, in the new ones. In this way, researchers were thinking to move some less climate warming resistant varieties of grapevine from France in southern England (G. V. Jones, 2005b).

This problem could preoccupy us regarding Cotnari Vineyard in the near future. Some investments regarding new techniques of irrigation for supplying the deficit of water, applying the pesticides for eradicating the pests and the diseases, the cultivation of some resistant varieties can be done. Also, we suggest that in the near future it could be necessary northward moving of some less climate warming varieties as other vineyards act.

The increasing of global temperatures imposes some changes regarding the selecting of some resistant prolonged drought varieties. Also, the assuring of some supplementary quantities of water for preserving soil humidity is necessary. The introduction of some special techniques of soil must take into account in case of maintaining the observed warming tendencies.

Analyzing climatic data obtained from two meteorological stations (Cotnari and Botosani) for the period 1956-2006 or 1970-2002, we can remark a light local climate warming trend for all the climatic parameters that we are taking into account (the annual average temperature, the number of frost days, the number of tropical days and the number of summer days). This local climate warming could have potential implications on the quality of wine from this region in the near future. Thus, the annual average temperature increased with 1.4 ºC in Cotnari and with 1.2 ºC in Botosani, for the period 1956-2006.

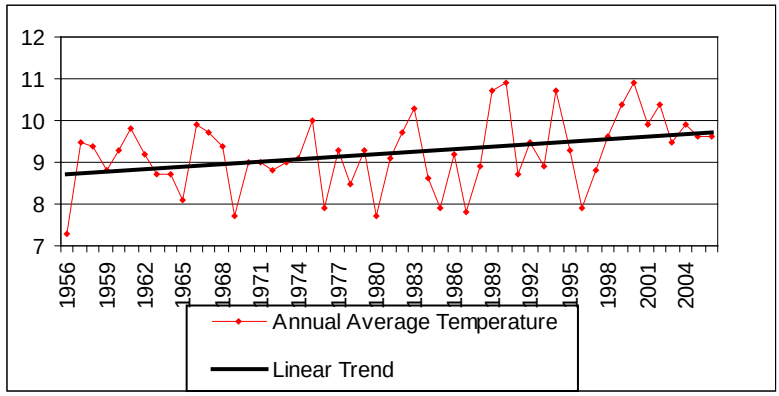

Fig.1 The evolution of the annual average temperature in Cotnari (1956-2006)

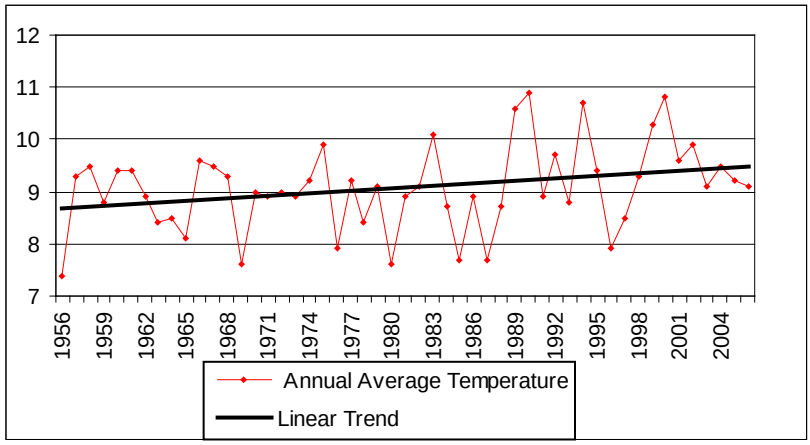

Fig.2 - The evolution of the annual average temperature in Botosani (1956-2006)

The second climatic parameter (the number of frost days) registered a decreasing trend with 16 days in Cotnari and with 10 days in Botosani, in the period 1970-2002. This decreasing of the number of frost days is due to local climate warming remarked in the last 33 years, in the two locations.

Due to global warming, many of the world's wine regions have experienced, over the last 50 years, a decline in frost frequency and warmer growing seasons with greater heat accumulation. The reduction in frost frequency is the most important in the dormant period and in spring. Also, it was noticed earlier last spring frosts, later first autumn frosts and longer frost free periods, due to the same phenomenon (G. V. Jones, 2006).

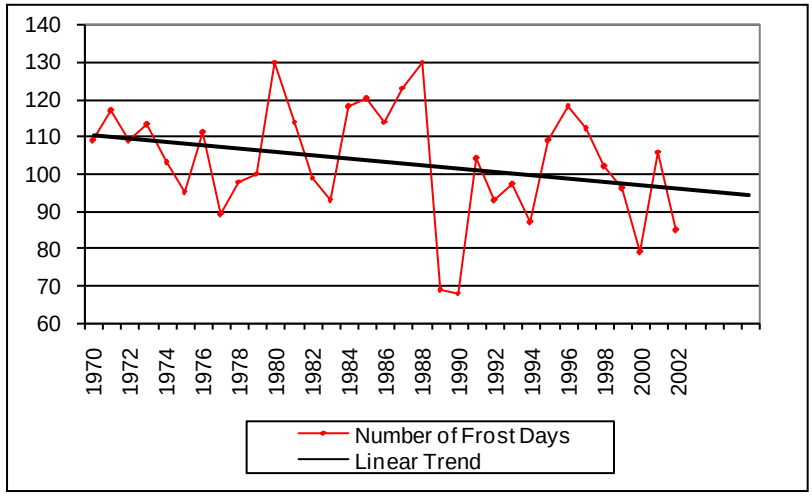

Fig.3 - The evolution of the number of frost days in Cotnari (1970-2002)

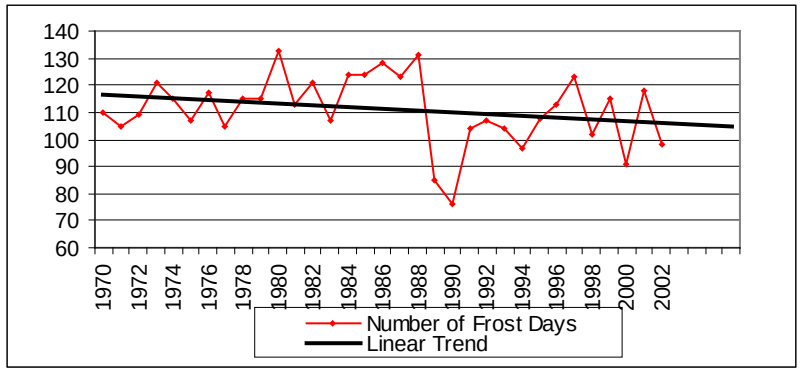

Fig.4 - The evolution of the number of frost days in Botosani (1970-2002)

An increasing trend was observed for the third climatic parameter, the number of tropical days. The two graphics represented below indicate an increasing trend with 32 days in Cotnari and with 46 days in Botosani, between 1970 and 2002.

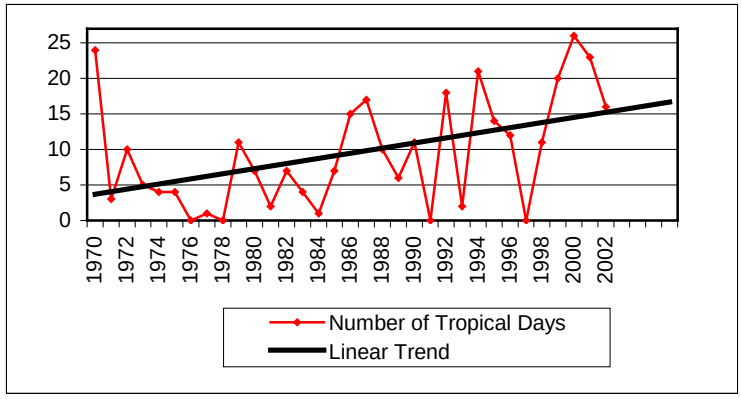

Fig.5 - The evolution of the number of tropical days in Cotnari (1970-2002)

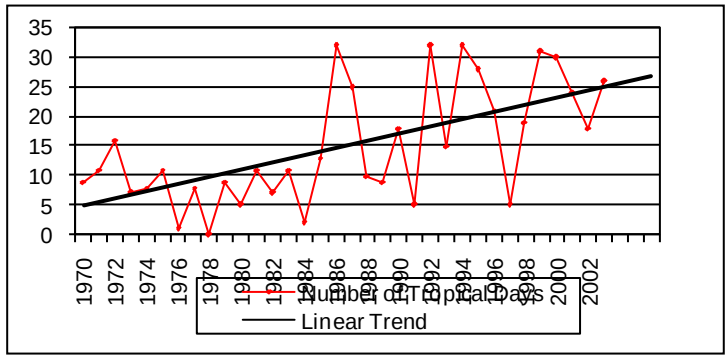

Fig.6 - The evolution of the number of tropical days in Botosani (1970-2002)

The last climatic parameter is the number of summer days. This parameter increased in the period studied with 18 days in Cotnari and with 22 days in Botosani.

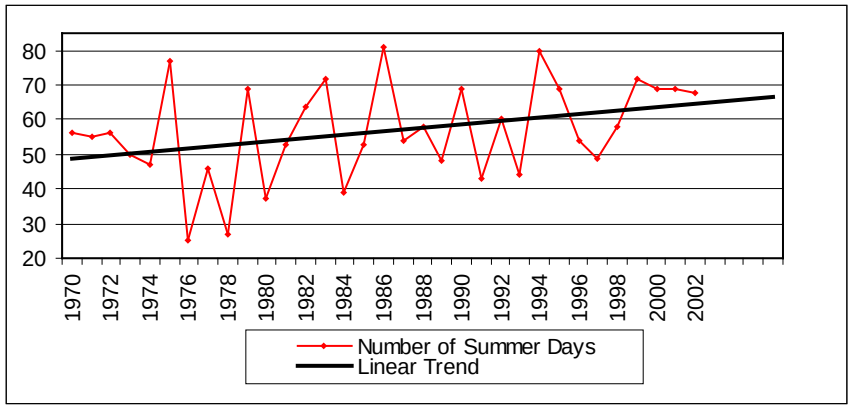

Fig.7 - The evolution of the number of summer days in Cotnari (1970-2002)

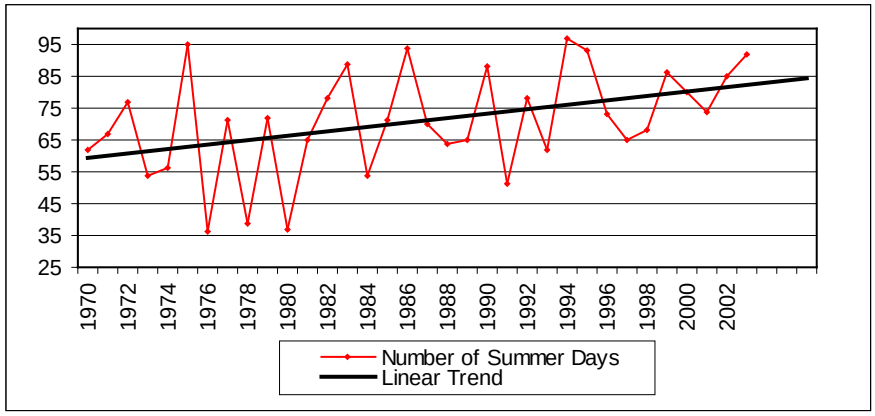

Fig.8 - The evolution of the number of summer days in Botosani (1970-2002)

CONCLUSIONS

Trends of climatic parameters studied (the annual average temperature, the number of frost days, the number of tropical days and the number of summer days) reveal a light local climate warming in the two locations (Cotnari and Botosani) for the period 1956-2006 or 1970-2002. When we analyzed the data, we observed the following aspects: the annual average temperature increased with 1.0 ºC in Cotnari and with 0.8 ºC in Botoşani, for the period 1956-2006; the number of frost days registered an decreasing trend with 16 days in Cotnari and with 10 days in Botosani, in the period 1970-2002; the number of tropical days indicated an increasing trend with 32 days in Cotnari and with 46 days in Botosani, between 1970 and 2002; the number of summer days showed the same increasing trend

with 18 days in Cotnari and with 22 days in Botosani, between the period mentioned above. We noticed that the number of characteristic temperatures days was higher in Botosani than that registered in Cotnari. We can explain this uncommon situation from Cotnari only by way of foehn phenomenon.

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FRÂNCUŞĂ 14 IŞ - CLONE OF VINE FOR HIGH-QUALITY WINES, SPECIFICALLY TO THE ASSORTMENT OF COTNARI

FRÂNCUŞĂ 14 IS – CLONĂ DE VIŢĂ DE VIE PENTRU VINURI ALBE DE CALITATE SUPERIOARĂ, SPECIFICE SORTIMENTULUI DE COTNARI

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Abstract: *The improvement of the biological value of valuable vine varieties making up the traditional varieties of renowned vineyards is one of the major interests of the scientific research in the field of improving and multiplying the vine. In this respect, by applying the clone selection within the Frâncuşă variety population, the 14 Is clone was obtained and homologated in 2007, with the following features: it shows better resistance to mildew, on using anticryptogamic treatments; it makes big plain grapes, with a lower degree of millerandage and coulure, in comparison with the population; The production capacity of the clone is superior to the variety population, ensuring 40 % harvest efficiency; the sugar accumulation potential, as well as the grape juice efficiency are superior to the control variety; it is separated from the variety population through the vine homogeneity, stability of the main features and distinctive character.*

Rezumat: *Îmbunătăţirea valorii biologice a soiurilor valoroase de viţă de vie ce alcătuiesc sortimentele tradiţionale ale unor podgorii renumite, constituie una din preocupările majore ale cercetării ştiinţifice din domeniul ameliorării şi înmulţirii viţei de vie. În acest sens, prin aplicarea selecţiei clonale în cadrul populaţiei soiului Frâncuşă, în anul 2007 s-a obţinut şi omologat clona 14 Is, care prezintă următoarele însuşiri: manifestă o rezistenţă mai bună la făinare, în condiţii de aplicare a tratamentelot anticriptogamice; realizează struguri mari, cu boabe uniforme şi un grad mai mic de meiere şi mărgeluire, comparativ cu populaţia; capacitatea de producţie a clonei este superioară populaţiei soiului, asigurând un spor de recoltă de 40 %; potenţialul de acumulare a zaharurilor ca şi randamentul în must sunt superioare martorului; se detaşează de populaţia soiului prin omogenitatea butucilor, stabilitatea principalelor caractere cât şi prin distinctibilitate.*

The vine growing involves a permanent selection and improvement activity, in order to obtain varieties and clones with high production and quality features. The local varieties are a permanent source of extremely precious germoplasma for the improvement of the biological material cultivated at present.

It is the case for the Frâncuşă variety, also called Mustoasă de Moldova, Ţârţâră or Vinoasă, cultivated especially in the Moldova vineyards and representing 20 % of the variety type composition for the Cotnari wines, where it is cultivated since the XII th – XIV th centuries, as the old documents about the existence of that vineyard prove (2). Meanwhile, the soil unevenness accentuated

due to the polyclonal origin, to the fathers used to grafting and to the genetic erosion generated by the irregularities resulted after the genome replication and virous infections that were transmitted by vegetative multiplication.

Nowadays, the Frâncuşă variety shows feature mutability, becoming a population which does not achieve the potential biological performances; hence we have started its improvement through the clone selection. In our country, 50 vine variety clones have been obtained and homologated so far, the Frâncuşă variety not being the beneficiary of this improvement (1, 3, 4, 6).

MATERIAL AND METHOD

The research done so far began 15 years ago, on a plantation with Frâncuşă variety within the Viticulture and Wine-production and conservation Research-Development Station of Iaşi in the Copou viticultural centre.

After two years of observations on the source plantation, we identified the valuable biotype of the population, by choosing 18 clone elites, with ampelographic feature evenness, reduced of millerandage and coulur percent, perfect phytosanitary condition and superior concentration of sugar accumulation, aiming at obtaining a quality clone (fig.1).

Fig. 1 – Aspects about the 14 Is Frâncuşă clone

The stable clone material multiplied through grafting and was checked in the vine system, in parallel with that followed on the source plantation. The grafted vines helped obtaining a comparative field, including 22 vines for every clone, where observations, analyses and tests were made about the vegetation condition, the grape production and quality of wines, resistance to cryptogamic diseases and to the stressful environment. After six years of observations and analyses, 4 perspective

elites (clones) stood out, which multiplied through grafting, resulting in 100 vines of each clone, which were used at creating a contest field (checking), organized by five repetitions of every alternative (clone). The control varieties used were the clone average and the variety population, according to the experimental technique norms and the improvement systems through clone selection. After other 3 years of fruit-bearing on the contest plantation and in the comparative field, a clone elite was evidenced, codified under no.14, which was registered in 2004 for testing for homologation and whose results are the object of the present work.

During 2004- 2006, which was the final stage of the official system of the vine clone selection adopted on the national and international level, the agrobiological and technological observations continued according to the I.S.T.I.S. requirements. The distinctive clone features were described, in comparison with the population of the Frâncuşă variety, throughout the whole vegetation period, following the descriptive elements adopted by UPOV. The phytosanitary and conservative clone selection were ensured, together with the serological testing of the main existing viruses. The grapes were submitted to the process of wine-production and conservation and the wines resulted from the homologation clone were fully analyzed in comparison with the control varieties.

RESULTS AND DISCUSSIONS

The weather in the Iaşi vineyard, namely the Copou viticultural centre, during the testing period of the Frâncuşă variety was close to the normal climatic conditions of these environment factors, being favorable for the grape vegetation and ripening period. The winter of 2004 was mild, with good minimum temperatures for the vine, while during 2006 there were sudden temperature decreases down to -25°C in the air, which mostly affected the buds.

The annual rainfall was greater and better distributed in 2004, while the daily average temperatures in the second half of 2006 favoured the beginning of the grape ripening and the grape technological ripening (table 1).

Table 1

Phenological spectrum

Describing elements	14 Is clone		The elite average		The population variety	
	2004	2006	2004	2006	2004	2006
Disbudding	28 IV	29 IV	28 IV	29 IV	28 IV	29 IV
Flowering	11 VI	14 VI	11 VI	14 VI	12 VI	14 VI
The grape ripening	20 VIII	5 VIII	19 VIII	5 VIII	19 VIII	5 VIII
Technological maturity	14 X	26 IX	14 X	26 IX	14 X	26 IX

The phonological spectrum started with disbudding at the end of April during the two years of observations, without any significant differences between the clones, the elite average and the population variety, just as the flowering phenostage, between 11 – 14 June. The grape ripening and technological maturation were almost two weeks earlier in 2006. From the point of view of the phonological spectrum, the Frâncuşă 14 clone is perfectly integrated into the variety features, achieving the vegetation period within 168 – 170 days.

The fertility and productivity elements of the clone evaluated by the

number of offsprings on vines and the percent of fertile offsprings are close to the Frâncuşă variety elite average and population (table 2). The same aspect is revealed as well by the average number of existing flowerings on the vine. There are obvious differences between the superior values of the grape average weight, which are favourable to the clone, in comparison with those of the control varieties. This aspect is corroborated by the smaller values of the millerandage and coulur grape percent noticed at the Frâncuşă 14 clone (table 2).

As for the description of certain physiological features, we noticed that, through the clone selection, we didn't manage to improve the frost resistance of the Frâncuşă 14 Is clone, but we improved the decrease in the percent of the millerandage and coulur grapes (table 3).

The behaviour towards the attack of cryptogamic diseases revealed a better resistance to midlew during the preventive treatments. The tests done by the ELISA procedure confirmed that this clone is free of virous diseases.

Table 2

Fertility and productivity elements

Describing elements	14 Is clone			The elite average			The population variety		
	2004	2006	$\overline{X}$	2004	2006	X	2004	2006	X
Number of offshoots / vine	54,2	41,0	47,6	50,6	40,8	45,7	52,8	40,4	46,6
% fertile offshoots / vine	54,9	50,2	52,9	67,5	48,5	59,5	66,8	47,0	58,3
No. of inflorescences / vine	41,6	23,2	32,4	47,4	20,2	33,8	38,4	19,6	29,0
Average weight of the grape, g	230,2	199,4	214,8	182,2	183,6	182,9	178,2	176,2	177,2

Table 3

Certain physiological features

Describing elements	14 Is clone			The elite average			The population variety		
	2004	2006	$\overline{X}$	2004	2006	X	2004	2006	X
Frost behaviour, % bud demage	16	48	32	16	48	32	16	48	32
Millerandage, %	0	0	0	0	0	0	7	5	6
Coulure, %	12	7	8	14	10	12	31	33	32

The grape production made on the vine and calculated on every hectar shows its stability features in the case of the 14 clone, which showed small variations under the influence of the annual environment factors, in comparison with the elite average and the variety population. This aspect was obvious throughout the whole experimental cycle of multiannual observations. The average grape production made by the 14 clone of 13.4 tons/ha is 41 % greater than the population variety and was appreciated and submitted to homologation due to its qualitative potential, even though the elite average registered greater crops (table 4).

The superior results of the average weight of 100 grapes and the sugar content of the grape juice which is good only for the Frâncuşă 14 clone provide reasons for the quality of the grape harvesting. We must underline that the Frâncuşă variety, which is cultivated within the vine ecosystem of Copou – Iaşi,

does not meet the specific qualitative parameters for the Cotnari vineyard, where it is possible to overripen and where the new clone may reach superior quality performances (5).

Tabelul 4

The production of grapes and its quality for the clone elite Frâncuşă14 compared with the control variety

Years	Variety code	Production		%	Average weight of 100 grapes, g	Total acidity, g/L H_2SO_4	Grape juice efficiency %	Sugars, g/L	%
		kg/vine	tons/ha						
2004	14	4,12	15,6	133	265	5,2	72	209	143
	X elite	5,32	20,15	172	197	5,6	70	146	100
	population variety	3,08	11,66	100	152	5,6	68	146	100
2005	14	3,00	11,36	153	215	7,6	71	187,6	112
	X elite	2,84	10,76	145	194	7,8	71	172,6	103
	population variety	1,95	7,38	100	190	7,8	68	166,8	100
$\overline{X}$	14	3,56	13,48*	141	240	6,4	71,5	198,3	123
	X elite	4,16	15,75	161	196	6,7	70,5	159,3	102
	population variety	2,52	9,54	100	171	6,7	68,0	156,4	100

DL compared with the population:
5 %= 1,27;
1 %= 6,36;
0,1 %= 63,66;

Tabelul 5

Physical-chemical features of the wines coming from the wine-production and conservation of the 14 clone elite grapes (Frâncuşă) compared with the control variety (the variety population)

Physical-chemical features	Frâncuşă cl 14 Iş		Frâncuşă, the population variety	
	2004	2006	2004	2006
Alcohol, vol. %	11,8	11,0	8,5	9,8
Total acidity g/LH_2SO_4	5,2	5,6	5,6	7,0
Volatile acidity g/LCH_3CCOH_4	0,21	0,23	0,28	0,34
Free SO_2, mg/L	24	25	27	28
Total SO_2, mg/L	135	137	142	145
Non-reducing extract, g/L	24	26	24	25

The sugar content of the grape juice made in Iaşi during the testing period of the Frâncuşă 14 clone proves its potential to obtain superior quality wines at the vineyard as well.

The results of the wine analysis obtained from the Frâncuşă 14 clone made in Iaşi and described in table 5 confirm this issue.

Created as a pure variety on the full grape maturity, the Frâncuşă 14 clone created soil-featured wines, fruitful wines, highly alcoholic wines superior to the population variety, less acid, extract stronger and richer that may be included in the category of the controlled source name wines. It participates, together with the other varieties, to make the “Cotnari”-like wines

CONCLUSIONS

1.The results of the clone selection of the local variety, Frâncuşă, destined for the production of superior white wines, were materialized by homologating the Frâncuşă 14 vine clone of Iaşi, through the certification no. 68043 of 31 October 2007 by the Public Institute for the testing and registration of varieties and the recommendation for cultivating in the areas favourable for the vine growing.

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THE CLIMATIC CHANGES AND THEIR IMPACT ON THE GRAPEVINE IN THE MURFATLAR VINEYARD CONDITIONS

MODIFICĂRILE CLIMATICE ŞI IMPACTUL LOR ASUPRA VIŢEI DE VIE ÎN CONDIŢIILE PODGORIEI MURFATLAR

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Abstract*. The knowledge concerning the climate changes impact on the development of the grapevine are reduced in contrast with those referring at the annual plant (Jones G. V. and collab., 2005; Stock M. and collab., 2005). In this context it was imposed to effectuate a laborious study concerning the behaviour of the main grapes varieties from the Murfatlar vineyard, with the aim to improve the breeding technologies for to maximise the utilization of the abiotic factors specifics of this ecosystem. In the Murfatlar vineyards conditions in the last period, it was observed an early debut of the phenophasis with until 1 to 2 weeks for bud opening and flourish and from 2 to 3 weeks for mellow and full maturity. Synthesising in interdependence the climatic factors analysed on the 5 years period, it can be take the conclusion that in the interval of the years 2003-2007, comparison with the multiyear mean of the last 50 years is unique and in the general note of the "global warming process". It was token in consideration also the influence of the building of Danube-Black Sea canal which split the vineyard Murfatlar from West to East, on the microclimate – increasing the days with mist, the modification the air currents.*

Rezumat. *Cunoştinţele privind impactul schimbărilor climatice asupra dezvoltării viţei de vie sunt relativ restrânse faţă de cele referitoare la plantele anuale (Jones G. V. şi colab., 2005; Stock M. şi colab., 2005). În acest context a devenit imperios necesară efectuarea unor studii multianuale privind comportarea principalelor soiuri de viţă de vie din podgoria Murfatlar cu scopul de a adapta tehnologiile de cultură în sensul maximizării utilizării factorilor abiotici specifici acestui tip de ecosistem. În condiţiile podgoriei Murfatlar, în ultima perioadă a fost observată o devansare a debutului perioadei de vegetatie prin declanşarea mai timpurie cu 1-2 săptămâni a dezmuguritului şi înfloritului şi cu 2-3 săptămâni a pârgii şi maturităţii depline. Analizând în interdependenţă evoluţia factorilor climatici pe o perioada de 5 ani, se poate concluziona că în intervalul 2003-2007, faţă de mediile multianuale ale ultimilor 50 de ani, la Murfatlar se resimte procesul de «încălzire globală». Trebuie luată în considerare şi influenţa Canalului Dunăre-Marea Neagră în acestă zonă, deoarece acesta brăzdeaza podgoria de la Vest la Est, microclimatul schimbându-se prin creşterea numărului zilelor cu ceaţă şi prin modificarea curenţilor de aer, favorizând local căderile de grindină.*

MATHERIAL AND METHOD

In 2003-2007 period the behaviour of the next varieties it was studied, in the Murfatlar vineyard conditions: Chardonnay, Muscat Ottonel, Riesling italian,

Sauvignon, Pinot gris, Columna, Cabernet Sauvignon, Pinot noir si Mamaia. It was done the observation and analysis in whole vegetative period on the dynamic of main phenophasis, registering also the variation of the climatic factors: the air temperature, the hours of sunshine and the precipitations, calculating the next climatic indexes: the global and utile thermal balances, the sunshine index and hydro balance.

RESULTS AND DISCUSSIONS

From the point of view of the thermal rapport the years 2003-2007 have a similar evolution, with some particularities on the vegetative intervals. Therefore, the repose period (November-March) in the 2003 year was relatively could in comparison with the same period in 2004, 2005 and 2007, years with normal thermal regime. In the 2006 winter, face with a normal year values it was registered very lows temperatures. In 2007 the winter was no rains and the temperatures vary between -9.0^{o}C in the night and 21.0^{o}C in day with strong winds. All these affected the buds viability and fertility.

In generally, on the all studied years, the global thermal balance (table 1) has good values in comparison with multiyear normal and the utile thermal balance is bigger in 2007 (3569,9^{o}C) face with the normal value (2247,9^{o}C). In the rest of the years the registered values was smaller than the normal.

The active vegetative period (bud-opening - the end of the shoots growing and grapes formatting, April – July) has a good global thermal balance, generally bigger than the normal - 2229,8 ^{o}C (between 2177^{o}C in 2004 and 2587 ^{o}C in 2007). The utile thermal balance has very goods values in 2007 (1992,7 ^{o}C face with 1501,9 ^{o}C- the normal). In the rest of years the values was sensible lowers face with the normal (between 957 ^{o}C in 2004 and 1376^{o}C in 2003).

The thermal balance it was not correlated with the sunshine index registered in the active period (table 1). If in the years 2003 (with 1091,8 hours), 2006 (with 1062,1 hours) and 2007 (with 1060,7 hours) it was in the normal values for Murfatlar, in the years 2004 (with 937,9 hours) and 2005 (with 839,9 hours) it was very low face with the multiyear normal – insufficient for to assure the normal photosynthetic conditions for good assimilation of the nutrients and to achieve high quality of the harvest (under 1000 hours). The 2007 year excel by 2252,9 hors of sunshine face with a normal of 2176,6 hours, followed by the year 2006 with 2116,8 hours.

The pluviometric regime (table 2) exercise a favourable influence on the harvest health by low quantities of precipitations registered in August: 144,8 mm in 2004, 131,6 mm in 2007, 69,9 mm in 2006 and respectively registered in September: 167,3 mm in 2003, 142,8 mm in 2005, 86,6 mm in 2006 and 76,2 mm in 2007. The severe drowght from the first mounths of vegetative periode beside of the raines falled at the mellow and full maturation of grapes where the stress factors which affected mainly white varieties, influencing in negative way the quality of grapes and wines.

Table. 1

Global and utile temperature balance and sunshine hours, Murfatlar (2003-2007)

Vegetative period		Global temperatures balance ∑t°C						Utile temperatures balances ∑t°C						Sunshine ∑ hours					
Month	Interval	Normal value (multiyear)	2003	2004	2005	2006	2007	Normal value (multiyear)	2003	2004	2005	2006	2007	Normal value (multiyear)	2003	2004	2005	2006	2007
XI	I	***228,1***	310	204	262	192	212	34,9	10	0	0	5,6	2,9	87,2	40,7	67,6	67,6	91,5	150,1
XII		***255,1***	-	84	127	95	145	3,4	-	0	0	3,5	0	66,1	57,7	95,6	44,2	84,3	73,6
I		***4,1***	25	-	102	-98	202	0,6	0	-	0	0	4,3	63,5	33,0	28,6	69,1	46,9	63,5
II		***62,6***	-	61	-	9,2	120	2,7	-	0	-	0	1,2	84,5	72,4	54,6	49,0	95,7	84,8
III		***125,6***	34	266	139	222	236	9,3	0	0	0	40	14,8	111,7	101,2	153,8	125,4	159,8	117,7
∑T		***675,5***	**369**	**615**	**630**	**420**	**915**	**50,9**	**10**	**0**	**0**	**49,1**	**23,2**	**413,0**	**305,0**	**400,2**	**355,3**	**478,2**	**489,7**
IV	II	***369,7***	270	369	336	346	314	53,8	-	69	36	59	28,5	160,7	168,8	170,1	163,2	160,5	160,7
V		***513,7***	663	490	558	530	618	703,7	363	180	248	220	308,6	261,8	299,6	213,0	206,1	320,4	261,8
VI		***620,1***	726	639	658	682	761	328,1	426	339	358	382	761,2	314,5	315,2	259,3	223,3	248,5	314,5
VII		***726,3***	887	679	753	750	894	416,3	587	369	443	440	894,6	323,7	308,2	295,5	247,3	332,7	323,7
∑T		***2.229,8***	**2.546**	**2.177**	**2.305**	**2.308**	**2.587**	**1.501,9**	**1.376**	**957**	**1.085**	**1.101**	**1.992,7**	**1.060,7**	**1.091,8**	**937,9**	**839,9**	**1.062,1**	**1.060,7**
VIII	III	***671,0***	765	709	756	871	798	361,0	455	399	446	471	798,0	305,5	316,4	196,5	212,7	328,0	305,5
IX		***521,3***	480	555	615	558	611	252,7	189	255	315	299	611,1	221,0	169,9	189,5	150,8	107,9	221,0
X		***373,1***	356	488	375	409	447	81,4	46	178	65	51,6	144,9	176,0	84,9	175,4	159,3	140,6	176,0
∑T		***1.565,4***	**1.601**	**1.752**	**1.746**	**1.838**	**1.856**	**695,1**	**690**	**832**	**826**	**822**	**1.554**	**702,5**	**571,2**	**561,4**	**522,8**	**576,5**	**702,5**
∑TG		***4.470,7***	**4.516**	**4.544**	**4.681**	**4.566**	**5.358**	**2.247,9**	**2.076**	**1.789**	**1.911**	**1.972,1**	**3.569,9**	**2.176,2**	**1.968,0**	**1.899,5**	**1.718,0**	**2.116,8**	**2.252,9**

Table 2

Regim of precipitations - 2003-2007 at Murfatlar vineyard

Anul / Lună	Media multianuală mm	2003	2004	2005	2006	2007
I	31,0	53,2	35,1	64,3	***7,7***	24,3
II	33,0	12,0	30,7	32,4	35,6	***18,8***
III	21,7	27,6	19,2	34,5	76,6	31,2
IV	33,5	24,2	*1,4*	32,2	34,1	31,3
V	50,2	*7,8*	**140,8**	24,0	73,7	***17,4***
VI	53,2	22,4	65,2	27,2	*16,7*	12,6
VII	35,6	31,4	37,7	**207,2**	**130,1**	***4,2***
VIII	31,6	16,1	**144,0**	24,6	**69,9**	**131,6**
IX	41,6	**167,3**	***13,5***	**142,8**	**86,6**	**76,2**
X	30,2	71,7	***8,9***	50,7	4,8	83,0
XI	40,4	25,0	***9,3***	104,1	25,8	53,0
XII	34,0	19,4	93,6	29,9	***7,5***	***9,4***
∑	**436,0**	**478,2**	**599,4**	**773,9**	**569,1**	**493,2**

The 2005 year excelled with 207,2 mm rains felled only in July and by the total year value: 773,9 mm precipitations, an exception year for the last 50 years, being followed by 2004 year with 599,4 mm and 2006 with 569,1 mm precipitation/ year.

The evolution of the phenophasis in this period was shorted with 5 to 10 days in comparison with the multiyear normal (figures 1 and 2).

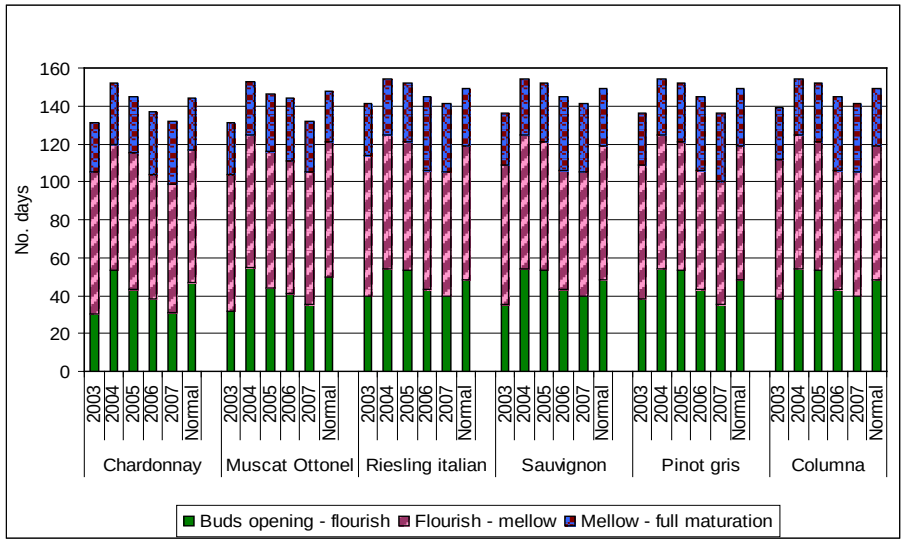

Fig. 1: The phenophasis evolutin at the white varieties, Murfatlar 2003-2005

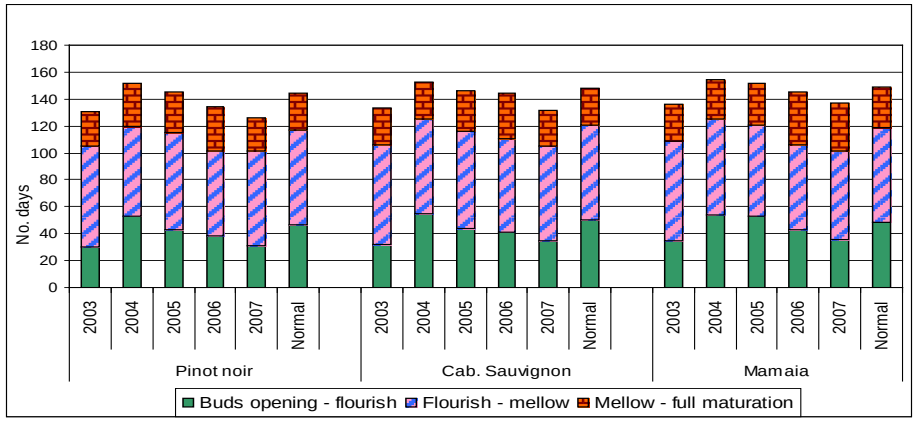

Fig. 2: The fenophasis evolution at the red varieties, Murfatlar 2003-2005

The bud opening started early in all 5 years, between April 13 and May 5-th. The flourish is developed between May 28 and June 15, being longer with 7 days than the normal. After this time, the abiotic conditions (air temperatures, sunshine) accelerate the succession of the other phenophasis.

The full maturity was noted after the second part of September, exception being Muscat Ottonel which is matured earlier.

The quality of grapes is sown in figures 3 and 4. It is observed that in case of the white varieties, Chardonnay and Pinot gris give constantly high quality grapes. The 2003 and 2007 years have very good conditions for quality wines.

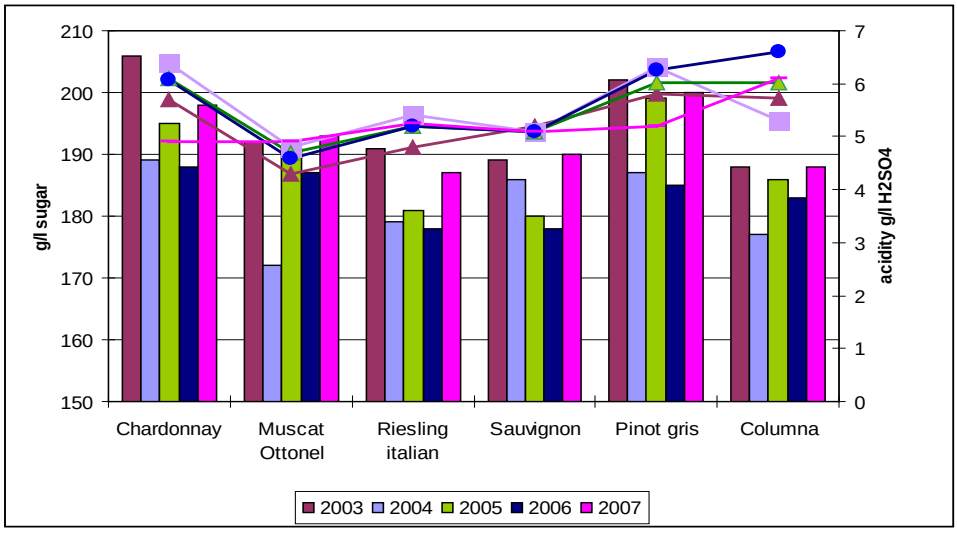

Fig. 3: Grapes quality at white varieties, Murfatlar 2003-2007

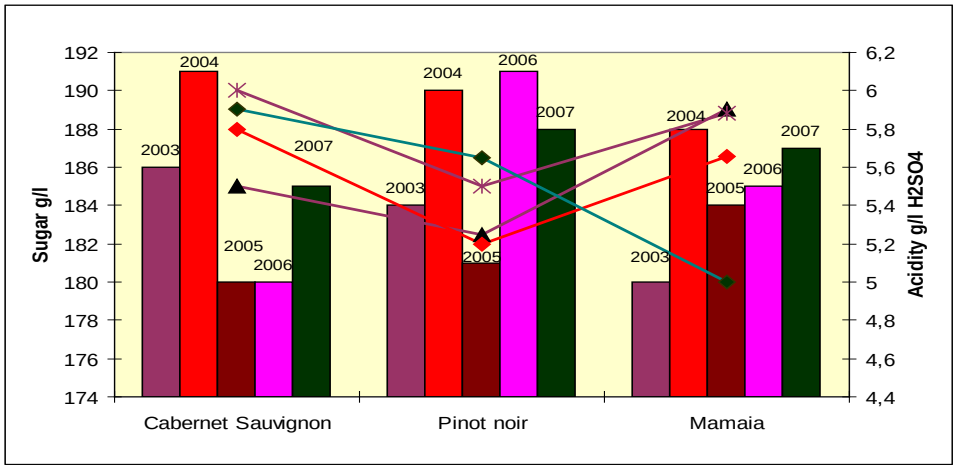

Fig. 4: Grapes quality at reds varieties, Murfatlar 2003-2007

CONCLUSIONS

In generally, all 5 studied years has particularities both in inactive and vegetative period under global and utile thermal aspect.

The sunshine values level was near the multiyear normal, exception being the year 2007 with highest sunshine values.

The total amount of precipitation was bigger than the normal in each studied year but in May, June, August and September was frequently registered lack of rains and was installed dryness phenomenon.

The progress of phenophasis was between 168 and 197 days, shortest in 2003 year and logiest in 2005 year.

The grapes quality was mentained in the normal multiyearly values, the years 2003 and 2007 excelling by quality conditions assured.

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AGROBIOLOGICAL CHARACTERISTICS OF SOME SEEDLESS CULTIVARS AND ELITES FROM NIVV GENOFOND

CARACTERISITCI AGROBIOLOGICE ALE UNOR SOIURI ŞI ELITE APIRENE DIN GENOFONDUL I.N.V.V. DIN R. MOLDOVA

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Abstract. *Seedless cultivars and elites from Genogond of National Institute for Viticulture and Oenology were studied according to agrobiological, technological and ampelographic characters. It was establish the diversity of genotypes by ripening period, berry size, firmness of flesh as well as by resistance to winter conditions. These cultivars permit to diversify the assortment for table grape consumption and, according the potential of sugar accumulation, it is possible technological processing of grapes for production of stewed fruits, jam, raisins.*

Rezumat. *S-a efectuat studiul agrobiologic, tehnologic şi ampelografic a unor soiuri şi elite apirene prezente în Genofondul Institutului Naţional pentru Viticultură şi Vinificaţie. S-a constatat diversitatea genotipurilor după perioada de coacere, mărimea bobului, consistenţa pulpei, cât şi după rezistenţa la condiţiile de iernare. Soiurile studiate permit diversificarea sortimentului de soiuri cu struguri pentru masă, iar reieşind din potenţialul de acumulare a zăharurilor este posibilă procesarea tehnologică a strugurilor pentru producerea compoturilor, dulceţei, stafidelor.*

Viticultural assortment for the table grapes can be diversified and improved through the cultivars with seedless qualities. Taking into consideration the permanently growing requirements of the consumers for seedless grapes for fresh consumption, stewed fruit, jam, raisins it were performed researches on agrobiological characters of the cultivars and their behaviour in different conditions of the ecosystems (Damian D. et al., 1997), creation of new seedless varieties with resistance to unfavorable conditions of environment (Savin Gh., 2005). Though they have high demand on market and some advantages in comparision with the grapes with seeds, area ocupied by seedless varieties in the Republic of Moldova is very limited. They are necessary studies of seedless cultivars, introduced during the last 15 years in Genofond of INVV (Savin Gh., Popov A., 2005) in order to elaborate new proposals for improvment of local grapevine assortment or their usage in genetic amelioration of grapevine.

MATERIAL AND METHOD

The research took place in 2006-2007. In study were included cultivars and elites that were introduction in the viticulture Genofond of INVV (Chişinău) during the last 15 years (Table 1). The plantation distances are of 1,5/2,5-3 m. and 1,75/2,5-3m using the system of half height stem cultivation, not protected during the winter period. The plantation middle age is of 15 years. The bush conduct, the agrofitotechnical work took place according to the norms in force.

Ampelographic description were effectuated according international methodology (Bulletin I.C.V.V., 1988; Ţîrdea, Rotaru, 2003). Also were determined the fertility coefficients and productivity index, the frost resistance qualities, the sugar and acidity content in the must, the technological index of grapes and berries (according Ampelografia RPR, 1959). As reference was taken homologated cultivar Kişmiş lucistîi.

Table 1

The main ampelographic characters of seedless sorts and elites (Genofond INVV)

Cultivar name	Country of origin	Characters of bunch		Characters of berry		
		shape	size	shape	size	skin colour
Călina	Romania	Cylinder-conical	Medium	Obtuse-ovate	Medium	Pink
Centennial Seedless	USA	Cylinder	Large	Narrow elliptic	Large	Green-yellow
Flame Seedless	USA	Cylinder-conical	Medium	Oblate	Small	Dark red
G-V-6	Bulgaria	Cylinder-conical	Medium-large	Narrow elliptic	Medium-large	Green with pink spots
Kişmiş lulucistîi	Moldova	Cylinder-conical	Medium-large	Narrow elliptic	Large	Pink
Mecita	Ukraine	Conical	Medium	Ovate	Small	Pink
Perlon	USA	Conical	Large	Obtuse-ovate	Large	Red intense-purple
TAD-V06	USA	Conical	Medium	Oblong	Large	Green-yellow

The research period corresponded to years with complicated climatic conditions – unfavorable for viticulture winter of 2005-2006 and prolonged drought in 2007 aggravated by high temperature in the summer up to 40°C.

RESULTS AND DISCUSSIONS

The growth vigor of the vine was influenced both the climate conditions and genetic potential of cultivars. The rate of affected buds after winter condition was the least for cultivars Călina (36,1%) and TAD-V06 (38,3%) and the greatest for Kişmiş lucistîi (85,5%), Perlon (78,1%) and Centennial seedless (77,6%). As a result Călina had a big vegetative growth, while Kişmiş lucistîi, Centennial seedless and Perlon had a weak beginning in vegetation.

The estimation of agrobiological peculiarities allows to distinguish and to select the cultivars by the development of phonological stages from bud burst to maturity of the berry (Table 2). The earliest bud burst was established for cultivars Călina, Mecita and TAD-V06, while for Centennial seedless – by 6-7 days late in comparison to reference cultivar Kişmiş lucistîi. It was not essential differences between the beginnings of bloom, but there are difference concerning the duration of this stage – from 4 days (for Călina and Flame seedless) to 7-8 days (for Perlon and G-V-6).

The period of grape ripening for studied cultivars is from 15th of July (Flame seedless) to 5th of August (G-V-6). The stage of the maturity of berries occurs at 16th – 18th of August for the cultivars Flame seedless, Centennial Seedless and TAD-V06, followed by Kişmiş lucistîi and Călina (22-23 August). At the end of August reach the necessary conditions for consumption cultivars Perlon and Mecita. The most tardive

maturity reach the elite G-V-6 – in the second decade of September. The differences that were revealed during these two years of studies allowed us to do the preliminary classification of cultivars in the occurrence of the stage of full maturity of the berries: Flame seedless, Centennial seedless, Kişmiş lucistii - early-medium; Mecita, Perlon, Călina – medium and G-V-6 – medium-late. This distribution allows the diversification of the assortment of grapes for fresh consumption from the middle of August to the middle of September.

Table 2

The development of phenological stage of seedless cultivars (Genofond of INVV, mean value for 2006-2007)

Cultivar name	Bud burst	Bloom		Ripening	Full maturity of the berries	Leaves falling	Vegetation period, days
		begining	end				
Călina	28.04	04.06	08.06	23.07	23.08	21.10	175
Centennial seedless	06.05	01.06	07.06	21.07	18.08	21.10	169
Flame seedless	02.05	01.06	05.06	15.07	16.08	22.10	174
G-V-6	25.04	02.06	10.06	01.08	12.09	20.10	178
Kişmiş lulucistîi	30.04	03.06	09.06	05.08	22.08	22.10	175
Mecita	28.04	01.06	06.06	25.07	29.08	22.10	176
Perlon	02.05	04.06	11.06	22.07	28.08	21.10	171
TAD-V06	28.04	02.06	08.06	20.07	18.08	22.10	172

During these years the leaves falling was caused by frosts in the autumn.

In order to estimate the quality of grapes and, in particular, as raw material for food industry, were done the technological estimation of cultivars (Table 3).

Table 3

The mechanical analysis of the grapes of seedless cultivars and elites (Genofond of INVV, mean value for 2006-2007)

Cultivar name	The grape weight, g	The weight of 100 berries, g	Sugar content of must, g/dm^3	Acid content of must, g/dm^3	Must volume per 1 kg of grapes, l	Husks of grapes per 1 kg of grapes, g
Călina	347,4	207,1	211	6,2	0,721	254,3
Centennial seedless	300,4	291,4	215	7,7	0,591	207,1
Flame seedless	416,4	194,5	228	7,5	0,606	226,3
G-V-6	513,6	462,8	191	6,1	0,662	196,7
Kişmiş lucistîi	254,1	384,9	215	6,2	0,644	345,3
Mecita	260,0	182,4	200	4,2	0,604	331,0
Perlon	426,5	463,3	143	6,7	0,572	191,7
TAD-V06	284,8	278,0	198	7,2	0,593	206,8

As a result of the analyses was found out that the mean weight of the grapes is between 254 and 513 gr. Cultivars Perlon, Flame Seedless and G-V-6 have medium-high weight of the grapes, while Mecita and Kişmiş lucistîi - the smallest. The mean weight of a hundred berries at the studied sorts varies between 182,4 gr. (Mecita) and 463 gr. (Perlon).

Sugar content in must vary between 143 g/dm3 for cultivar Perlon and 228 g/dm3 for Centennial seedless. As a result of the organoleptic evaluation of the fresh grapes all cultivars were high appreciated. The highest estimation had the cultivars with big and crispy berries as Centennial seedless and Kişmiş lucistîi - 8,7; Flame seedless and TAD-V06 - 8,5. The rest of the cultivars were appreciated by marks from 8,2 to 8,4. Obtained results denote the possibility to use these cultivars both for production of grape for fresh consumption and for technological processing for production of stewed fruits and jam.

CONCLUSIONS

Between studied seedless grapevine cultivars and elites the most resistant to winter condition were remarked Călina and TAD-V06, while the cultivars Kişmiş lucistîi and Centennial seedless were the most sensible.

Preliminary classification of cultivars by stage of full maturity of the berries is the following: Flame seedless, Centennial seedless, Kişmiş lucistii - early-medium; Mecita, Perlon, Călina – medium and G-V-6 – medium-late, that allows the diversification of the assortment of grapes for fresh consumption from the middle of August to the middle of September.

Variation of sugar content in must between 143 g/dm3 (Perlon) and 228 g/dm3 (Centennial seedless) denote the possibility to use these cultivars both for production of grape for fresh consumption and for technological processing for production of stewed fruits and jam.

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SITUATION *IN SITU* AND *EX SITU* OF WILD GRAPEVINE IN THE REPUBLIC OF MOLDOVA – CURRENT AND PERSPECTIVE ACTIVITIES

SITUAȚIA *IN SITU* ŞI *EX SITU* A VIȚEI DE VIE SĂLBATICE ÎN REPUBLICA MOLDOVA – PREOCUPĂRI CURENTE ŞI DE PERSPECTIVĂ

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Abstract. *The last vast expedition for location and description of wild grapevine in the Republic of Moldova was carried out more then 35 years ago. These activities were resumed during the last years, including in the frame of regional programs oriented to preservation, description, evaluation and utilization of local grapevine resources. It was established first contacts with responsible persons, effectuated some micro-expeditions and identified some old and two new sites. Initial data denote the presence of phenotypic variability between samples, but, at the same time, ampelographical difference with Vitis silvertris Gmel. There are necessary future complex investigations, including genomic analysis, in order to establish their origins. Also it was effectuated inventory and extension of the ex situ collection of wild grapevine, initiated evaluation of presented resources.*

Rezumat*. Ultima expediție amplă de localizare şi descriere a viței de vie sălbatice în Republica Moldova a avut loc mai bine de 35 ani în urmă. În ultimii ani aceste activități au fost reluate, inclusiv în cadrul unor programe regionale orientate la prezervarea, descrierea, evaluarea şi utilizarea continuă a resurselor genetice ale viței de vie. Au fost stabilite primele contacte cu persoanele responsabile, efectuate o serie de microexpediții, identificate unele locații atestate anterior cât şi două locații noi. S-a constatat prezența unei varietăți fenotipice între exemplare, cât şi unele deosebiri cu descrierea ampelografică anterioară a Vitis silvestris Gmel. Se impun investigații ulterioare, inclusiv analiza genomică, pentru a stabili originea genetică a acestor populații. La fel a fost efectuată inventarierea, completarea colecției ex situ de viță de vie sălbatică, inițiată evaluarea resurselor prezente.*

The wild grapevine *Vitis vinifera* L. *ssp. silvestris* Gmel. is one of the species belonging to *Vitis* genus with the largest area of growing – from Spain to Kapet-Dag mountains in Turkmenistan. Presence of this species in our, Carpathian – Danube - Pontic geographical zone it was attested from the oldest times, but first documental attestation dates at the beginning of XIX century in Statistical description of Basarabia (1822-1828) and first scientific investigations were carried out at the beginning of the XX century by Pachioskii (1912, 1914), Pop (1931) and other (cite by Yanushevich and Pelyakh, 1971). According quoted authors area of distribution was at the banks of rivers Prut, Dnestr, Danube and in Kisinev district and these wild grapevine resources are indeed true *Vitis vinifera*, belonging to West-European area.

Follow-up studies of Makovetskii (1946) were concerned with wild grapevine on Dnestr river. The last extensive studies, including the expedition in 1961-1969 (Yanushevich and Pelyakh, 1971) allowed a complex characterization of wild grapevine resources in the Republic of Moldova. It were identified and described 8 sites were wild grapevine grew in their native habitat. Also were described the specimens from early accumulated herbarium from all the territory of republic, summarized all descriptions from references. In general were described 54 sites. These studies reconfirmed belonging of wild grapevine from Moldova to West-European area. Based on Negrul's classification (1946, 1965) it was establish that on the territory of Moldova grows all variation of wild grapevine - *V. silvestris var. typica* Negr., *V.silvestris var. aberrans* Negr. and *V.silvestris var. balcanica* Negr., as well as intermediary forms. At the same time it was established a dramatically diminution of growing area, in comparison with early described, damage of plants as a result of human activities and climatic factors.

During the ensuing 30 years it was not effectuated special expedition concerning the wild grapevine resources in the Republic of Moldova and all accumulated data were concomitant to investigations of forest communities. According the Red Book of rare and endangered species of the Republic of Moldova, it was established conservation of *Vitis silvestris*, especially in natural forest reserve Tețcani (Briceni district), Bisericeni (Glodeni district), Valea Mare (Ungheni district), Chițcani, Copanca (Slobozia district), Nemțeni, Cotul Morii (Hânceşti district), Dubăsarii Vechi (Dubăsari district).

In these condition is necessary the reevaluation of the area of growing, of the sanitary state of plants, complete description and evaluation of wild grapevine resources, its future utilization. These estimations are actual due to increasing anthropogenic pressure, climate fluctuation. At the same time are attested new populations, 15-20 years ago not presented in this area.

The scientific attainments accumulated during these years, elaboration and development of new methods of scientific researches, including genomic analysis, allow a new approach in studies and solution of some questions, especially: the place and role of wild grapevine in origin and evolution of grapevine cultivars, the potential and possibilities to involve it in breeding programs. *Vitis silvestris* has relative "young experience" in this direction. For example, including of *V.labrusca* in culture in US dates only few centuries, species *V.riparia, V.rupestris V.berlandieri* and other American are used as genetic resources in breeding program for creation of stocks varieties about one century (Alleweldt, 1988). Less than one century are used wild grapevine varieties in creation of cultivars: *V.amurensis* in creation of varieties tolerant to winter conditions or tropical wild varietie in creation of cultivars adapted to these conditions (Ramishvili, 1988). *V.vinifera ssp. silvestris* is used in creation of stock varieties (Gigle et other, 2005).

These studies also will allow elaboration and realization of relevant actions for preservation, conservation *in situ* of this species, that is vital for its save.

Preliminary estimations were carried out in 2002 in two areas in land-flood of river Prut near the villages Zberoaia and Barboieni (Nisporeni district). Early references don't attest the presence of this species in this area 15-20 years ago. For this populations is characteristic distribution of plant in compact groups, but occur and a single plants. As natural supports are used trees or, if absent, they form a compact carpet on the soil, especially on clearing, roads (Figure 1). According visual observations phytosanitary state of plant is satisfactory.

Fig. 1. Aspects of wild grapevine population near locality Zberoaia, Nisporeni district

For future studies and descriptions were selected 14 specimens. In the spring were collected inflorescences from five plants (no. 1, 2, 3, 9 and 10). It was established presence of two female (no. 1 and no.10) and two male specimens (no.2 and no.3). One inflorescence (no. 9) had the berries already formed. Therefore these specimens corresponds by this character to wild grapevine, in with population are presented only dioecious plants. The inflorescences with male flowers are large, branchy as compared with the female plants that are little, with one axis and 35-50 flowers. It was established also a difference between plants by density of hairs on the lower side of leaves: prostrate hairs are not presented on the leaves; specimen no.10 is without hairs; specimens no.1 and no.9 had sparse and no.2 and no.3 medium density of erect hairs; specimens no. 2 and no.3 had also high density of erect hairs on petiole. Mature leaves are entire or has three slightly distinguished lobes. General shape of petiole sinus is wide or very wide. Collected grapes are little, very lose, with little black berries.

In conservation purposes *ex situ*, for future studies and descriptions, in autumn were collected shoots and grapes. Obtained seedlings in 2004 were planted in the collection.

Important contribution in study, mobilization and preservation of wild grapevine resources had the realization in period 2003-2007 of regional program "Conservation and Sustainable use of Grapevine (*Vitis vinifera*) genetic resources in the Caucasus and northern Black Sea region" under the direction of IPGRI (Bioversity International, Rome) and financial support of CRP Gabriel Lipman (Luxembourg). Participating countries were Armenia, Azerbaijan, Georgia, Moldova, Russia and Ukraine. Parallel with the activities regarding preservation, description and evaluation of old autochthonous varieties, at all meetings (Tbilisi,

2003; Yalta, 2004; Chişinău, 2005; Luxemburg, 2006 and Krasnodar, 2007) were discussed problems concerning the identification, evaluation, description and conservation of genetic resources of wild grapevine. This project facilitated the exchange of information and biological material between partners, as well as offered new possibilities for continuation of identification, description and estimation of wild grapevine in the Republic of Moldova. 42 seedlings have been created in a greenhouse from seeds sent by the Project's partners to our institute.

In September of 2005 were initiated preliminary documentations in Natural Reservation "Padurea Domneasca" (Glodeni district, village Moara Domneasca). It was studied one group of plants growing near the ditch on the road side (Figure 2, a) - specimens no. 1-3; b) - specimen no.5). The ratio of plant with female and male flowers is 1:5 (according the number of plants with grapes), that denote dioic character of population. The grapes collected from plant no.5 are little, very lose, with little black berries (Figure 2, c). General shape of petiole sinus is wide or very wide.

Fig. 2. Aspects of wild grapevine population in Natural Reservation "Padurea Domneasca" (Glodeni district)

Mobilization *ex situ* of wild grapevine had began with the foundation of Ampelographical collection. The biological material were collected during expedition on the territory of republic, also were obtained from Crimea. Absence of special care on experimental plots (irrigation, for example) and some unhappy administrative decisions had lead to loss of these resources in Collection. Actually specimens of wild grapevine are registered in Collection on 4 addresses. Preliminary studies denote the distinctions

of these specimens with true *Vitis silvestris* – all plants are monoic. More closely with *Vitis silvestris* is specimen S-24 (Figure 3), which probably represents an intermediary form. Mature leaves are entire or has three slightly distinguished lobes. General shape of petiole sinus is open. Size of grapes, seeds and berry are characteristic for wild grapevines, but all vegetative organs (leaves, stems) are cover with dense erect hairs, that is not characteristic for *Vitis silvestris*.

Fig. 3. Wild grapevine specimen S-24 in Ampelographical collection of National Institute for Viticulture and Oenology

Also was estimated, in conditions ex-situ, wild grapevine accessories collected in 1986 during the expedition in Kapet-Dag, Turkmenia (Dr. Gh.Savin from Moldova and Dr.V.Nosulchyak from V.I.R. Station, Kara-Kala) (Figure 4).

a)

b)

Fig. 4. Wild grapevine specimen from Kapet-Dag in Ampelographical collection of National Institute for Viticulture and Oenology

Observations in Ampelographical Collection of genotypes collected in Turkmenia established that majority of them are monoic plants, have big bunch of grapes, big berries.

The shape of berries is in most cases elongated. In the same time are few samples with characteristic specific to wild grapevine – small leaves, grapes and berries. For example, specimen DK-07 (Figure 4, a) has female flowers, relatively small and lose grapes. Specimen DK-09 has white berries and shape of seeds similar to *Vitis silvestris*. Number of lobes of the leaves vary from 3 to 5 or 7. All established facts are in accordance with affirmations of Negrul' and Milovanova (1940), that about 70% of wildly growing grapevine in Kopet-Dag mountains are not really wild grapevine, but are cultivars becomes wild.

Realizing the importance of the genetical resources of wild grapevine for viticulture and their damaged situation, are undertaking new efforts for inventory, their evaluation. Actually investigations are effectuated by international collectives in the frame of special programs and cover the territories of more than one country. It were initiated European programs AGRI GEN RES 870/2004 with financial support of the European Commission and South East European Development Network (SEEDNet) on PGR between the Partners in South East Europe for a period of 10 years with the support of Swedish International Development Cooperation Agency (Sida). Our involvement in these programs offers new possibilities in identification, description, preservation and evaluation of wild grapevine resources.

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INTRODUCTION OF FRACTAL ANALYSIS IN AMPELOGRAPHY

INTRODUCEREA ANALIZEI FRACTALE ÎN AMPELOGRAFIE

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Abstract. *In this work the authours present the fractal analysis in order to characterize the structure/architecture of the leaves from the table grapevine varieties and from wine grapevine varieties. The determination of the fractal dimension of the leave contour and of the degree of section can differentiate this varieties. The fractal analysis permets us the application of the fractal geometry in the leave ampelometry domain, the leave being the specific morphologic organ of the vitaceae used in characterisation of the varieties. This method can be added to the classical method used in amplographye and it broach the subject of the usefulness of informatic resourceless in this science.*

Rezumat. *Autorii prezintă metoda de analiză fractală pentru caracterizarea structurii/arhitecturii frunzelor la unele soiuri de viță de vie pentru struguri de masă şi pentru struguri de vin. Determinarea dimensiunii fractale a formei frunzelor şi a gradului de sectare a limbului permit astfel diferențierea soiurilor. Metoda de analiză fractală permite aplicarea geometriei fractale în ameplometria frunzei la vița de vie, care este organul morfologic al vitaceelor pentru caracterizarea soiurilor. Ea completează metodele clasice folosite în ampelografie şi deschide calea aplicării mijloacelor informaționale în această stiință.*

Key words: fractal dimension, grapevine leaves, Box-Counting Method, HarFA soft, ampelography

INTRODUCTION

The term “fractal” was coined by Benoît Mandelbrot in 1975 in his book „The Fractal Geometry of Nature” and was derived from the Latin “fractus” meaning "broken" or "fractured." In order to characterize an irregular natural structure. A fractal has two important characteristics: self-similarity and fractal dimension. Selfsimilarity, this interesting property that results from fractal’ definition, means that part of fractal seems with whole fractal (the fractal apperas identical at different scales). The fractal dimension, a quantitative property, is a fractional quantity and it is a direct measure of the relativ complexity. The fractal dimension is greater than its topological dimension (5),(11).

“God does not play dice,” said Einstein. Neither a plant nor an animal can growth accidentally. Plant development and growth are markedly influenced by morphology and architecture of the plant and its parts.

Morphological characterization of grapevine leaves uses two methods: ampelometric method based on the characters and quantitative measurements of anatomical elements of the leaf, i.e. angles, area, teeth number, petiole length, and ampelographic descriptor method with their codification standardized by OIV-IBPGR-UPOV charts 1983 (10). Although grapevine leaves lack the self-similarity of the theoretical fractals, leaves are candidates for characterization using fractal analysis because of their highly complex structure. The grapevine leaves have irregular shapes and structure and it is thus it is possible to employ the fractal analysis to characterize them (4). Fractal dimension calculated for one species leaves grown in very different environments did not show any statistically significant modification revealing that fractal dimension could be considered environment-independent (3).

The fractal analysis has been used to study the plant leaves for different species of trees (1), (2), (9). A means of quantification of plant root branching, specifically under stress, is of importance for evaluating the contribution of plant roots to water and nutrient uptake and subsequently plant growth. (6), (7).

MATERIAL AND METHODS

Fractals in nature are very irregular and they have statistical self-similarity. Many methods to determine the fractal dimension and to characterize these fractals have been reported.

The fractal diemnsion (Hausdorf-Bezicovith dimension) is given by (http://paginas.fe.up.pt/~jmsa/Fractal%20Modeling%20-2001.pdf):

$$D = \frac{\log N}{\log(L/l)}$$

One of the most common methods for calculating the fractal dimension of a self-similar fractal is the Box Counting Method. To determine the fractal diemnsion need to cover a structure with boxes of length l and to count the number N which cover it (Fig.1).

The fractal dimension D is obtained as a slope of the straight line log N = f (log l) (11),(12)

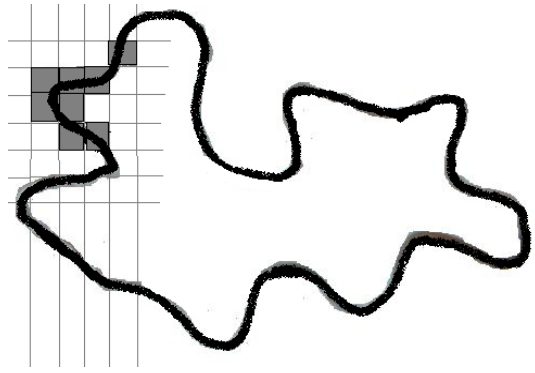

Fig.1 –Box - Counting Method for fractal dimension

In this work, HarFA soft has been used. It is an analyzer of fractal images from Institute of Physical and Applied Chemistry, Brno University of Technology, Cehia. In HarFA is used a modification of traditional Box Counting method. By this modification on obtain three fractal dimensions, which characterise properties of black plane DB, black-white border of black object DBW (and this information is the most interesting) and properties of white background DW. The fractal dimension is the slope of the straight line „Black&White" (14).

To explore HarFA soft the images need to be prepared as in figure 2.

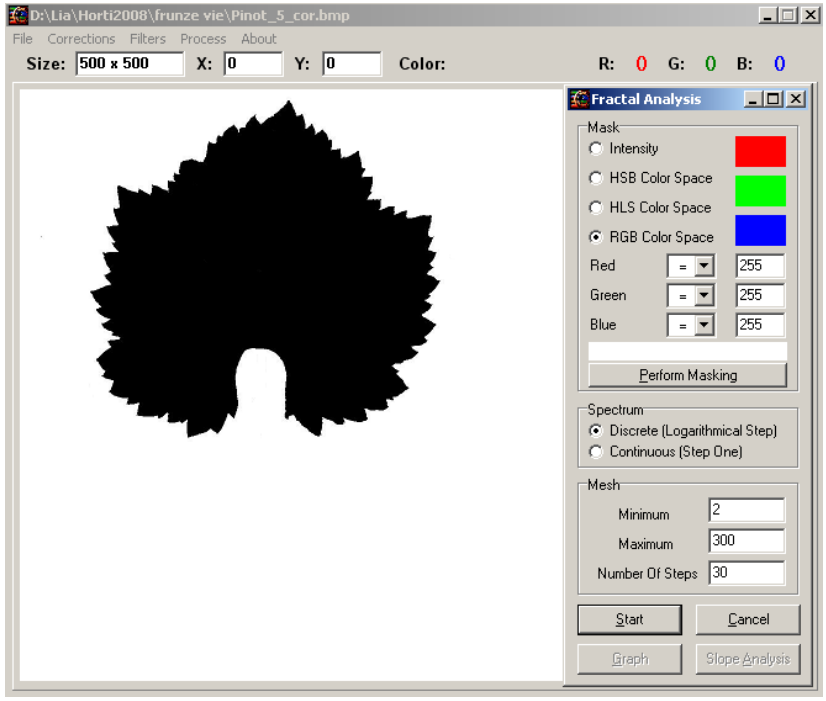

Fig.2 – Harfa Screen with Pinot noir leave

In this work, the fractal analysis has been used to study the grape vine leaves from 10 varieties: 5 for table grapevine (Muscat de Hamburg, Muscat de Adda, Napoca, Bicane and Ceaus) and 5 for wine (Berbecel, Feteasca neagra, Tamaioasa romaneasca, Merlot and Pinot noir).

5 samples for every studied varieties have been collected from the grapevine collection of the Faculty of Horticulture of the University of Agricultural Sciences and Veterinary Medicine from Iasi.

RESULTS AND DISCUSSIONS

In Figures 2 and 3 the fractal dimension for Pinot noir and Muscat Hamburg are given.

We have presented our results of fractal dimension in table 1 and table 2

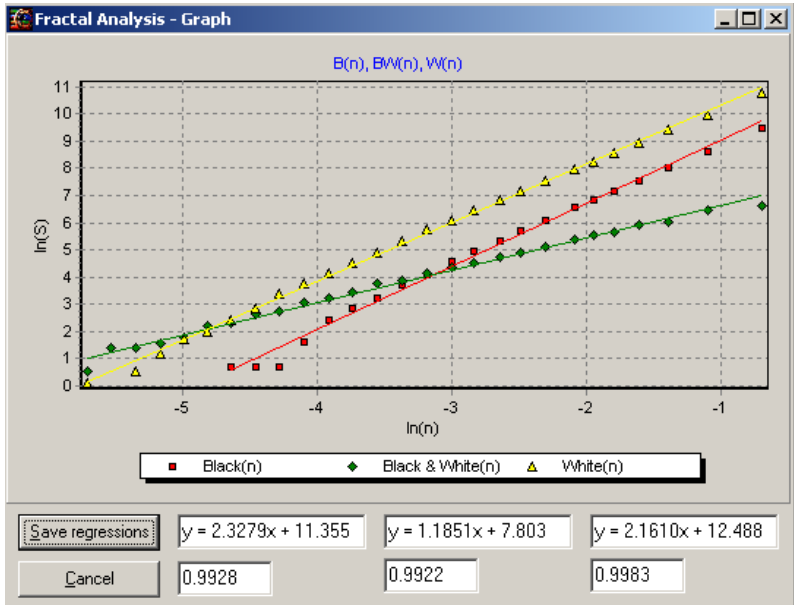

Fig.3 – Fractal dimension for Pinot noir leave

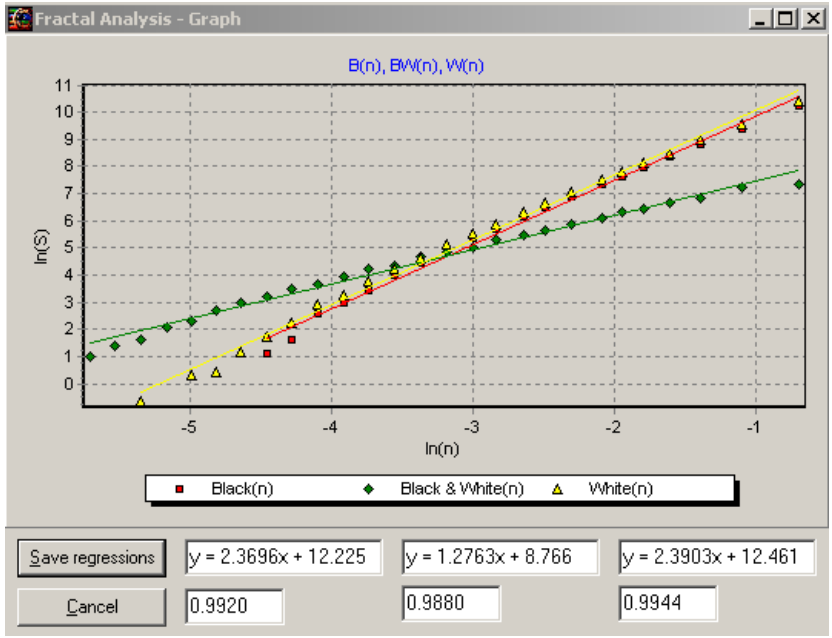

Fig.4 - Fractal dimension for Muscat Hamburg leave

Table 1

Fractal dimensions of table grapevine leaves

No. leave / Variety	Muscat de Hamburg	Muscat de Adda	Napoca	Bicane	Ceaus
1	1.2398	1.3158	1.3291	1.3255	1.3122
2	1.2763	1.2939	1.2783	1.3291	1.2915
3	1.2437	1.2827	1.3357	1.3158	1.2527
4	1.2791	1.2851	1.27	1.2478	1.3489
5	1.2465	1.267	1.2618	1.2979	1.2626
Mean	**1.25708**	**1.2889**	**1.29498**	**1.30322**	**1.29358**
Standard deviation	**0.0189**	**0.01789**	**0.0374**	**0.0332**	**0.0338**

Table 2

Fractal dimensions of wine grapevine leaves

No. leave / Variety	Berbecel	Feteasca neagră	Tamaioasa românească	Merlot	Pinot noir
1	1.2699	1.2537	1.3412	1.1808	1.1663
2	1.3504	1.271	1.246	1.2501	1.1415
3	1.2457	1.2612	1.2214	1.2833	1.2405
4	1.2444	1.2264	1.28	1.2171	1.2015
5	1.1968	1.2393	1.2763	1.2138	1.1851
Mean	**1.26144**	**1.25032**	**1.27298**	**1.22902**	**1.18698**
Standard deviation	**0.0563**	**0.0358**	**0.0368**	**0.0382**	**0.053**

We also calculated the ratio d_1/N_2, d_1 being the distance from the base of the superior sinus to the petiole point and N_2 the length of superior lateral vein by ampelometric method (13) (table 3 and table 4).

Table 3

Ampelometric values of d_1/N_2 for table grapevine leaves

Variety	Muscat de Hamburg	Muscat de Adda	Napoca	Bicane	Ceaus
Mean	0.401425	0.42602	0.493666	0.316411	0.278326

Table 4

Ampelometric values of d_1/N_2 for wine grapevine leaves

Variety	Berbecel	Feteasca neagră	Tamaioasă românească	Merlot	Pinot noir
Mean	0.559759	0.448449	0.42244	0.457845	0.652667

CONCLUSIONS

The fractal dimension could be used as a descriptive, scale-invariant, condensed, morphological parameter in ampelographic research. Our measurements permit us to obtain the following general conclusions:

1. The species of table grapevine leaves, with sectional leaves and great teeth, rare or of saw shape (Ceaus, Bicane) are characterized by great fractal dimensions and small values of ampelometric ratios.

2. The aromatic species (for table or wine grapevine) have similar fractal dimensions and also ampelometric ratios (Muscat de Hamburg, Muscat de Adda and Tamâioasă românească).

3. A good negative correlation it is found, after Colton classification (8), between the fractal dimensions and nervier ratios, the correlation coefficient being -0.9 (excluding the hybrid varieties Napoca and Berbecel).

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THE INFLUENCE OF GRAPES VARIETY ON THE CHROMATIC STRUCTURE AND "CHEMICAL AGE" OF THE RED WINES

INFLUENȚA SOIULUI DE STRUGURI ASUPRA STRUCTURII CROMATICE ŞI "VÂRSTEI CHIMICE" A VINURILOR ROŞII

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Abstract.. *Red wines of Merlot and Pinot Noir from Recas vineyard (from the grapes harvested in 2005 years), young and aged in bottle were characterized due to their chromatic structure, monomeric anthocyanins content, chemical age and the degree of pigment coloration during the ageing (3, 6, 12 and 18 months). The chromatic structure was evaluated by percent of monomeric anthocyanins, copigmented anthocyanins and polymeric pigments from the wine color. The monomeric anthocyanins content decreased from 179.44 to 122.29 mg/L for Merlot wine and 132.81 to 85,72 mg/L for Pinot Noir wine. By ageing, the fraction of colour due to polymeric pigment increased on the basis of decreasing of colour percent due to monomeric and copigmented anthocyanins. During the ageing the value of indices on the basis was quantified the red wines chemical age was increasing for all analysed wines due to colour stabilisation. The value of these indices is very different in rapport with grapes variety and the age of analysed red wines.*

Rezumat.. *Au fos caracterizate din punct de vedere al structurii cromatice, conținutului de antociani monomeri, vârstei chimice şi gradului de colorare al pigmenților, vinuri roşii tinere şi invechite in butelii de sticlă (3, 6, 12 şi 18 luni). Vinurile au fost obținute în podgoria Recaş în anul de recoltă 2005 din struguri Merlot şi Pinot Noir. Structura cromatică s-a evaluat pe baza ponderii diferitelor categorii de pigmenți antocianici: monomeri, copigmentați şi polimeri din culoarea totală a vinului. Conținutul de antociani monomeri scade de la 179,44 la 122,29 mg/L în cazul vinului Merlot şi de la 132,81 to 85,72 mg/L în cazul vinului Pinot Noir. Prin învechire, fracțiunea de culoare datorată pigmenților polimeri creşte prin diminuarea ponderii antocianilor monomeri şi copigmentați la culoarea vinului. De asemenea, prin învechire, valoarea indicilor prin care se exprimă vârsta chimică a vinului au crescut pentru toate probele analizate, datorită stabilizării culorii. Valorile acestor indici au fost foarte diferite în raport cu soiul de struguri şi vârsta vinurilor analizate.*

The color of red wines is one of the most important qualities yet it has proven itself to be one of the most poorly understood. Red wine color has been elusive to define because it is controlled by many factors. The factors include anthocyanin content, co-pigmentation, procyanidins, acetaldehyde, free bisufite, acids and polymeric pigments which all contribute to the color of red wines. This level of complexity makes red wine color both intriguing and difficult to understand. Over 30 years ago Somers observed as red wines aged they went through a change in spectral characteristics [12]. The wine color

changed from red to brick red as it aged. Malvidin-3-glucoside, the most abundant anthocyanin, principally responsible for wine's red color had declined over time [11, 12]. The remaining colored compounds had unknown structures but were defined by their ability to resist bisulfite bleaching and became known as polymeric pigment. Work over the last thirty years trying to define the chemical structures of polymeric pigment has yielded very few conclusive results. Some of the results have demonstrated that anthocyanins are not lost during wine aging; in fact anthocyanins form covalent adducts with tannin, undergo derivatization by keto-acids, and are linked to tannins by acetaldehyde. The color of red wine derives from the phenolic class anthocyanidins. As a wine ages, this process of direct condensation causes anthocyanidin pigment to accumulate in the polymeric form, leading to improved color stability [9]. Polymeric pigments are known to have different characteristics than malvidin-3-glucoside. They are resistant to bisulfite bleaching and are not as pH dependent as malvidin-3-glucoside. These two combined features spawned the term "stable color." The olymeric pigment is more resistant to the change in pH than total anthocyanins. Somers estimated that polymeric pigments retained more than 50% of their maximum color at wine pH, whereas anthocyanin only retained about 23% of their color [12]. This demonstrates that at wine pH a significant portion of the color is coming from polymeric pigment.

Copigmented anthocyanins are the complexes that result by reaction between anthocyanins and copigments molecules or co-factors. Co-factors are colorless compounds that when added to a solution containing anthocyanins will act to enhance the color of the solution. This phenomenon causes a hyperchromic effect and a bathochromic shift. The most important copigments in wine are expected to be the flavan-3-ols and flavanols, hydroxycinnamic acids and even the antocyanins molecules [1,5]. As wine ages the free anthocyanins react to form polymeric pigments, this shifts the equilibrium to replenish free anthocyanins by releasing them from the co-pigmented stacks. So therefore, as wine ages the stacks tend to break-up and co-pigmentation decreases as a result of this equilibrium [4]. During the wine ageing in bottle take place the structural changes, and one of the most studied of those changes concern red wine colour evolution, called wine ageing. In the ageing time, it has been demonstrated that initially present grape pigments slowly turn into new more stable red pigments. This phenomenon goes on for weeks, months and years [6-10]. Anthocyanins are present in solution in several different forms. These forms exist in an equilibrium that is pH dependent. Based on an understanding of the pH equilibrium and the different bleaching effect of SO_2 on monomeric and polymeric anthocyanins, as well as the preferential binding of SO_2 with acetaldehyde rather than anthocyanins, it was developed a set of spectral measures to determine the fraction of color due to each pigments: monomeric, polymeric and copigmented anthocyanins, the chemical age of the wine and the degree of pigment coloration [12].

MATERIALS AND METHODS

The sample for analysis. In this study were analyzed red wines of Merlot (M) and Pinot Noir (PN) harvested in 2005, from Recas vineyard. Five red wines categories were analyzed: young red wines, immediately after conditioning (0-M, 0-PN), and aged in bottle for: 3, 6, 12 and 18 months, respectivelly: 3-M, 3-PN, 6-M, 6-PN, 12-M, 12-PN, 18-M, 18-PN.

Reagents and equipment. All chemicals and reagents were analytical grade or pure quality purchased from Merck, Fluka, Sigma and Chimopar. For color analysis it was used Specord 205 by Analitik Jena.

The pH-differential method [2] it was used for *total monomeric anthocyanin determination.* Monomeric anthocyanins pigments (mg/L) will be calculated as cyanidin-3-glucoside.

Glories method [3] it was used for *chromatic parameters evaluation.* By this method, followed parameters it were quantified: color intensity (IC), tonality (T) and yellow, red and blue pigments contribution, expressed in percent (%) to the wine color.

The red wine color analysis was effectuated in accord with Boulton method [1]. The red wine color fraction due to monomeric, polymeric and copigmented anthocyanins was in order: MA (%), PA (%) and CA (%).

The red wine "chemical age" is quantified by two indices. The first index, I1 represent the ratio between color due to polymeric anthocyanins and color due to total anthocyanins and the second index I2 - the ratio between color due to polymeric anthocyanins and color due to monomeric anthocyanins. The degree of pigment coloration (α) gives a measure of the amounts of monomeric anthocyanins in the colored form [12].

RESULTS AND DISCUSSIONS

From the Table 1 it can be observed the chromatic structure obtained by Glories method. From these data results that, during the wine ageing, the yellow pigments percent increased and the red pigments percent decreased, but the both pigments categories are more equilibrated in the aged wines. The class of blue pigments participate to the red wines color in low measure (in the range 8.43-9.26% for M and 7.93-9.55% for PN). The most red pigments percent were registered in the case of yong red wines. The yellow pigment class contributed with less than 45% to the red wine colour. By ageing, the absorbance values at λ=520 nm decreased, accompanied of the increasing of absorbance at λ=420 nm and 620 nm. This phenomenon is responsible for shift of anthocyanins from monomeric to polymeric form [11].

Table 1

Chromatic parameters of red wines determined by Glories method

Wine type	A_{420}	A_{520}	A_{620}	I.C	T	Chromatic structure		
						(%) yellow pigments	(%) red pigments	(%) blue pigments
0-M	3.231	4.298	0.693	8.22	0.75	39.30	52.27	8.43
3-M	3.255	4.187	0.705	8.15	0.78	39.95	51.39	8.65
6-M	3.306	4.103	0.713	8.12	0.81	40.70	50.52	8.78
12-M	3.349	4.007	0.724	8.08	0.84	41.45	49.59	8.96
18-M	3.563	3.704	0.742	8.01	0.96	44.49	46.25	9.26
0-PN	2.566	3.379	0.512	6.46	0.76	39.74	52.33	7.93
3-PN	2.629	3.247	0.519	6.40	0.81	41.11	50.77	8.12
6-PN	2.677	3.153	0.536	6.37	0.85	42.05	49.53	8.42
12-PN	2.732	3.078	0.548	6.36	0.89	42.97	48.41	8.62
18-PN	2.773	2.805	0.589	6.17	0.99	44.97	45.48	9.55

The highest values of colour intensity were registered in the case of young red wines, in particular, for the Merlot young red wine (8.22). The smallest values for IC were observed for aged red wines (for 18-PN the IC value was 6.17). By ageing the chromatic structure was modified, because the colour stabilisation phenomenon. From the data present in the table 2 results that, the monomeric anthocyanins content decreased from 179.44 to 122.29 mg/L for Merlot wine and 132.81 to 85,72 mg/L for Pinot Noir wine.

Table 2.

The wines color structure evolution during the ageing

Wine type	PA (%)	MA (%)	CA (%)	Monomeric anthocyanins (mg/L)
0-M	10.33	54.18	35.49	179.44
3-M	18.71	48.92	32.37	167.44
6-M	27.96	43.88	28.16	153.27
12-M	44.55	32.68	22.77	135.18
18-M	53.99	26.82	19.19	122.29
0-PN	26.68	50.61	22.71	132.81
3-PN	34.39	46.16	19.45	124.39
6-PN	51.1	32.52	16.38	115.83
12-PN	53.8	34.17	12.03	97.38
18-PN	67.96	21.17	10.87	85.72

The percent of colour due to polymeric pigments increased and due to monomeric and copigmented anthocyanins decreased. In the ageing time, the monomeric anthocyanins turn into polymeric anthocyanins with different moleculare mass. In practice, the phenomenon of red wine color evolutions is named *"wine ageing"*. The colour stabilization can be attributed to diminishing of monomeric and copigmented anthocyanins content. As a result of these changes appears the combinations between tannin and anthocyanins, polymeric pigments, and intermolecular associations that have the red colour. The polymeric pigments are the very stable compounds responsible for colour of aged red wine. Copigmented anthocyanins are the complexes that result by reaction between anthocyanins and copigments molecules. This phenomenon causes an enhancement of colour due to the association of anthocyanins with co-factors.

The class of monomeric pigments participate in the highest measure to the young red wines and their contribution decrease in raport with ageing. From the data showed in the table 2 it can be observe that the copigmented anthocyanins are distroyed by ageing. The polymeric pigments are present in a low measure in the young red wine Merlot (10.33) and the participation percent to the total red wine color for this category increases by ageing. From these value results that the young red wines colour is unstable. The time for colour stabilisation is different in raport with grape variety, maturation and ageing conditions. The small value of copigmented anthocyanins founded in Pinot Noir is due to grape variety specific that contain a little amounts of cofactor [1]. Therefore, the colour percent due to copigmented anthocyanins is low in

young wine Pinot Noir (22.71%). In the case of Merlot, the colour due to copigmented antocyanins is in the range 19.19-35.49%. By ageing of Pinot Noir wine, the color due to polymeric pigments increased until 67.96%. The polymeric pigments is the stable compounds responsible of the aged red wine. From these data results that the Pinot Noir colour is more stable than Merlot. The Merlot requires more ageing time for colour stabilisation. This process could be extended during several months or even years. From the data showed in the Table 1 and 2 it can be observed that, by ageing, the colour intensity decreasing was correlated with the diminishing of copigmented and monomeric anthocyanins.

The data of the Table 3, showed the "chemical age" evolution through red wine ageing. This parameter were quantified by two indices I1 and I2. The ratios are close to zero in new wine, but increase to about 1.0 and 0.9, respectively, for wines older than 10 years.

Table 3

Chromatic The values of "chemical age" indices and degree of pigment coloration

Wine type	Chemical age (I1)	Chemical age (I2)	α (%)
0-M	0.1033	0.2734	46.78
3-M	0.1871	0.35.15	52.18
6-M	0.2796	0.41.30	60.42
12-M	0.4455	0.5312	71.33
18-M	0.5399	0.6487	82.38
0-PN	0.2668	0.3578	33.54
3-PN	0.3439	0.4236	41.32
6-PN	0.5110	0.4997	48.73
12-PN	0.5380	0.6669	57.46
18-PN	0.6796	0.7743	68.19

It can be observed that I1 represent the measure on the base it we can be apreciatte the percent of polymeric pigments from red wines. From these data results that the color due to polymeric pigments represents 5.99% from colour due to total anthocyanins for Merlot and 67.96% for Pinot Noir. On the basis of I2 values results that the polymeric pigments replaced the monomeric anthocyanins in a measure in the range 27.34-64.87% for Merlot and between 35.783-77.43% for Pinot Noir. On the basis of these indices, it can be observed the gradual conversion of monomeric anthocyanins to polymeric form during the wine ageing. The "α"values indicate that, 46-82% from total anthocyanins are in flavilium form for Merlot, and in the range 33-68% for Pinot Noir wine.

CONCLUSIONS

The color structure of red wines were changed during the ageing. In the ageing wines the yellow pigments percent is higher than in the young wines so Merlot and Pinot Noir. During the ageing, the colour intensity decreased and the tonality increased. The highest value of colour intensity was registered for the young red wine Merlot (8.22) and the smallest values for 18-PN (6.17). In the tonality case, the highest value was registered for 18-PN (0.99) and the smallest for 0-M (0.75). By ageing, the percent

of colour due to polymeric pigments increased and due to monomeric and copigmented anthocyanins decreased. The percent of colour due to copigmented anthocyanins is lower in Pinot Noir so young wine (22.71%) and aged wine (10.87%), because the Pinot Noir grapes contain a little amounts of cofactor. For Merlot wine, the percent of colour due to copigmented antocyanins is in the range 35.49-19.19%. In the case of Pinot Noir, during the ageing for 18 months, the percent of colour due to polymeric pigments increased to 67.96%. By ageing, the values for I1 and I2 increased in different manner in accord with the grape variety; the stabilisation time for Pinot noir colour is lower comparativelly with Merlot wine.

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STUDY OF THE BASIC INDEXES IN CLASSIC SPARKLING WINES PRODUCTION

STUDIUL INDICILOR DE BAZĂ LA PREPARAREA VINURILOR SPUMANTE CLASICE

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Abstract: *Basic indexes for qualitative appreciation of sparkling wines are froth making and playing properties, which depend on many factors: used sucheau of yeast, technological schemes of wine material processing etc.*

Rezumat. *Indici de bază pentru aprecierea calitativă a vinurilor spumante sunt proprietăţile de spumare şi perlare, care se află în dependenţă de mai mulţi factori: de suşele de levuri utilizate, de shemele tehnologce de tratare a vinurilor materie primă ş.a.*

Cuvinte cheie: vinuri spumante, suşe de levuri., vin materie primă, proprietăţi de spumare şi perlare.

INTRODUCTION

Froth making and playing properties of finished product are specific criterion of sparkling wines quality appreciation.

Forming of classic sparkling wines typical properties depends on a number of factors: method of obtaining and technological processing of wine materials assambleaj and cupaj, their physico-chemical composition, used sucheau of yeast byocatalical properties, tecgnological regimes of secondary fermentation process etc. The goal of this work consists in carrying out study of improvement of technological regimes of processing of classic sparkling wines with advanced qualitative properties.

The main problems for achievement of the goal consist in the following:

1. Generalizing of previous studies on the influence of different technological schemes of processing of wine materials, which are destined for sparkling wines production for improvement of finished product quality.
2. Study of the influence of different compounds (proteins, amino acids, polysaccharides) upon froth making and playing properties of finished product.
3. Study of different sucheau of yeast for their utilization in sparkling wines production.

MATERIAL AND METHOD

Experimental and production assambleajes and cupajes for classic sparkling wines production;

- Auxiliary materials – bentonites, tannin, pectin, sihatannin, albutec etc.;
- Fermentation blend;
- Amino acids;
- Cuvee with different maturation term 1, 2, 3, 6, 9, 12, 18, 24 and 36 months;
- Selected sucheau of yeast from microorganisms collection of NIVW and of production;
- Finished products.

The methods recommended of OIVW, as well as the methods elaborated of NIVW were used in research carrying out. The reserch was carrying out with utilisation of assambleajes and cupajes of wine materials Aligote, Chardonnay and Pinot group.

RESULTS AND DISCUSSIONS

The carryed out researsh and obtained results in the reference to comparative characteristic od different schemes of processing of wine materials assambleajes and cupajes showed that obtaining these wines with high qualitative properties depends on a number of factors – wine materials physico-chemical composition in technological processing, pasting substances, used technological schemes of processing.

Results generalizing and comparative technological appreciation of researched technological shemes permit to offer utilisation of bentonites 1,5 g/dm^3 + fish glue 0,1 g/dm^3; albutec 0,5 g/dm^3; sihatanni 0,6 ml/dm^3 + bentonites 1,0 g/dm as optimal scheme for processing of assambleajes and cupajes of wine materials for sparkling wines production.

The previous carryed out study needs research carrying out by studying tensioactive substances alterations during secondary fermentation and cuvee maturation and their influence upon froth making and playing properties of sparkling wines.

Research was carryed out by physico-chemical analysis of production cupajes during cuvee maturation (term of maturation 9 months).

The results of carryed out studies of byochemical composition of initial cupajes (control) and cuvee showed that proteins mass concentration after secondary fermentation and maturation decreases insignificantly – in average 10-12 per cents. In the result of tensioactive substances coagulation and their sedimentation polisaccarides mass concentration decreases with 50-55 per cents of their content in initial cupajes. Polisaccarides considerable diminuation is on the basis of neutral polisaccarides, which do not take part in forming hydrogenic linkages with carbon dioxide. Phenolic substances mass concentration decreases insignificantly and correspond to these compounds content for white sparkling wines (200-230 mg/dm^3).

Carryed out analysis of amino acids composition indicated these compounds evident increasing from 45 to 85 per cents comparing with initial

data. It is explicated by utilisation of different sucheau of yeast, as well as by initial wine infusing on yeast sediment.

Carryed out research of cuvee physico-chemical composition showed that tensioactive substances are undergone to different alterations during cuvee maturation. These compounds were added in fermentation blend (metionin, triptofan – from 6 to 12 mg/dm^3, and pectin from 30 mg/dm^3) on the basis of obtained results and carrying out of research of the influence of free amino acids and polisaccarides, and pectin, forth making and playing properties of sparkling wines. The added compounds influence upon forth making and playing properties was appreciated by determination of these properties and carbon dioxide in link form in cuvee with term of maturation 9 months.

Mathematical processing of obtained results permited to establish the positive influence upon forth making and playing properties at pectin adding.

Obtained results analysis indicate that determinde amino acids content influences upon carbon dioxide content and playing properties, and forth making properties depend on pectin content.

For sparkling wines the factor characterizing finished products qualities is playing (min.), with optimal parameters pectin (X_1), triptofan (X_3) and metionin (X_2) regression ecuation is the following:

$$Y_1 = 259{,}125 - 2{,}02\ X_1 - 36{,}07\ X2 - 4{,}781\ X_3 + 0{,}08\ X_1X_2 - 0{,}01\ X_1X_2 +$$
$$+ 0{,}12\ X_2\ X^3 + 0{,}01\ X_{12} + 4{,}54\ X_{22} + 0{,}23\ X_{32} \quad [1]$$

Regression ecuation shows the influence of researched factors (pectin, metionin, triptofan) upon playing properties of sparkling wines.

Carryed out scientific research and mathematical processing of obtained results confirmed the considerable influence upon white sparkling wines forth making and playing properties, amino acids and pectin optimal contents.

Improvement of classic sparkling wines forth making and playing properties after adding in fermentation blend of metionin, triptofan (from 6 and 12 mg/dm^3), and pectine (30 mg/dm^3) was obtained on the basis of carryed out study. Sparkling wines quality depends on used sucheau of yeast, which in combination with byochemical processes is the base of technology of these wines production. Research was carryed out by using of sucheau of yeast from National Collection of Winemaking Microorganisms of national Institute for Viticulture and Winemaking (NCWM) of species Saccharomyces cerevisiae Rara-Neagra-2 (29), Rcatiteli-6 (30), Cahuri-2 (47), Cricova-1 (51), UCD-1 (64), LPS (81), SV-91 (89), as well as active dry yeast (ADY). After finishing of secondary fermentation process the complete analysis of physico-chemical indexes and fermentated cuvee organoleptic appreciation were carryed out. The fermented varieties of suchea of yeast nr.29 Rara-Neagra, nr. 30 Rcatiteli-6 şi nr.89 SV-91 were appreciated with good organoleptic mark. From ADY samples with utilisation BCS-103 and Fermactiv Champagne C of 20 g/hl were inregistrated with maximal organoleptic mark. The utilisation of sucheau of yeast from NCWM nr.29 Rara-Neagra, nr. 30

Rcatiteli-6 was recommended, generalizing carryed out research on the basis obtained results.

CONCLUSIONS

1. Realized experimental research conditioned elaboration technological regimes of processing of wine materials for sparkling wines, which provide production od stable wines with regulated content of tensioactive substances.

2. The improvement of classic sparkling wines forth makinf and playing properties were obtained by addind in fermentation blend of metionin, triptofan (6 and 12 mg/dm^3), and pectin (30 mg/dm^3).

3. The utilisation of selected sucheau of yeast Saccharomyces cerevisiae Rara-Neagr and Rcatiteli-6 were evidented, argumented and realized, including endurance of finished products forth making and playing properties.

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STUDY OF TECHNOLOGICAL SCHEMES OF TREATMENT OF BASE WINE AND THEIR INFLUENCE ON FOAMY PROPERTIES OF SPARKLING WINES

STUDIUL SCHEMELOR TEHNOLOGICE DE TRATARE A VINURILOR DE BAZĂ PENTRU SPUMANTE ŞI INFLUENŢA LOR ASUPRA PROPRIETAŢILOR DE SPUMARE

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Abstract. *Technological schemes of treatment of cuvee and blends of base wine considerably influence physico-chemical parameters and foamy properties of the treated wines. Values of foamy properties of researched wines vary depending on the origin and doses of fining material in treatment process.*

Rezumat: *Schemele tehnologice de tratare a asamblajelor şi cupajelor de vinuri de bază pentru spumante exercită o influenţă semnificativă asupra indicilor fizico-chimici şi proprietaţilor de spumare a vinurilor tratate. Valorile proprietaţilor de spumare a vinurilor cercetate se variază în dependenţă de originea materialelor de cleire şi dozele de administrare în procesul de tratare.*

Keywords: base wine for sparkling wines, fining material, wine treatment, bentonite, fish glue, tannin, gelatine, foamy properties, stability, physico-chemical parameters.

Cuvinte cheie: Vin de bază pentru spumante, materiale de cleire, tratarea vinurilor, bentonită, clei de peşte, tanină, gelatina, proprietaţi de spumare, stabilitate, indici fizico-chimici.

INTRODUCTION

The quality of sparkling wines in a large measure is due to the content of superficial active substances, that contribute formation of foamy and frothy properties, being characteristic of this kind of special wines (effervescent wines). The superficial active substances content of base wine is highly correlated with the technological schemes of technological treatment and fining material used.

In oenological practice it was determined that physico-chemical parameters and organoleptic appreciation of base wines vary depending on the use of different technological procedures of their physico-chemical stabilisation (Taran, Soldatenco, 1995, Prida, 1999).

The experimental results obtained by Merjanian (1965), Gherjicova (1968) et al. indicate that both wine fining with proteins (casein, fish glue,

gelatine) and technological treatment in combination with the use of tannin and potassium hexacyanoferrate (II) contribute amelioration of foamy properties of wines used in sparkling wines production. Polyphenols are known to be strong stabilizators of wine foam not only as macromolecular compounds, that form elastic absorbtion stratum, but as compounds that form a gel structure in combination with proteins in wine (Valuico, Zincenco, 1987: Ejov, Gherjicova, 1996).

But after wine treatments with substances of mineral origin (bentonite, coloidal solution of SiO_2) the foamy and frothy properties of treated wines become lower comparatively with wine treatment with fish glue and tannin, that can be explained by proteins absorbtion by bentonite (Taran, 1995).

The references study reflects fragmental information concerning the role of technological treatment on physico-chemical parameters and foamy properties of base wine for sparkling wines.

Goal of the study. The aim of this study was to determine the influence of different schemes of treatment, doses of fining material on physico-chemical parameters and foamy properties of base wine for sparkling wines.

MATERIALS AND METHODS

Scientific research had been effectuated in the laboratory „Sparkling Wines and Microbiology" and section „Microwinemaking" at the National Institute for Viticulture and Winemaking (NIVW) during 2006-2008.

In our study we used the blends of wines made from different grape varieties: Chardonnay, Pinot blanc, Pinot gris, Sauvignon, Riesling and Aligote.

Physico-chemical parameters of base wine had been determined according to the methods recommended by OIV and modificated ones at NIVW. Foamy parameters of base wines had been determined instrumental according to the international method, using the special installation „Mossalux" (France). Determination of the wines foamy properties is based on the intrerruption of infra-red light bunch by the foam of studied wine because of injection of the gas carbon dioxide (CO_2) in standart conditions through a filter with calibrated porous fibres. The foamy properties of wines are expressed by the determination of the following parameters:

- maximal height of the foam (MH)
- height of the foam stabilisation(HF)
- time of the foam stabilisation (TF)

RESULTS AND DISCUSSIONS

Determination of foamy properties of wine blends for sparkling wines in different wineries in the Republic of Moldova (wine factory „Cricova" S.A., winery„Vismos" S.A., NIVW şi al.) allows us to find out the major influence of blend composition on this parameter. The use of the base wine from varieties Chardonnay and Pinot group contributes increasing of the foamy properties of studied blends, and vice versa the use of wines from varieties Aligote, Riesling de Rein, Sauvignon leads to decreasing of this parameter of sparkling wines. If for blends of wines made from varieties Chardonnay and Pinot foamy parameters

range in the interval: maximal height of the foam (MH) from 60 up to 110 mm, height of the foam stabilisation(HF) from 46 up to 85 mm, then for blends made from Aligote, Riesling de Rein and Sauvignon, maximal value of MH ranges up to 56 mm and HF only 45 mm.

In order to find out the influence of different technological schemes of treatment of base wines on foamy properties we have studied fining material: bentonites from Italy, France, Georgia, tannin, fish glue, gelatine used at different doses and combinations.

The blends of wines after treatment with different materials and at different doses have been subjected to physico-chemial analysise, inclusively and analysise of foamy properties.

Obtained results show a major influence of treatment schemes depending on the doses of bentonite solution on physico-chemical parameters or degree of clarification of base wine for sparkling wines.

The table shows the influence of technological treatment on foamy properties of base wines.

Table1

The influence of different technological treatment schemes on foamy parameters of base wine for sparkling wines.

№	Substance name	Dose, g/dm^3	Maximal height of the foam MH, (mm)	Height of the foam stabilisation HF, (mm)	Time of the foam stabilisation TF, (sec)
Control (initial wine)		-	56	45	
1	Bentonite (Italy)	0,3	54	43	234
2		0,5	49	38	147
3		1,0	34	28	136
4		1,5	32	27	123
5	Bentonite (France)	0,3	33	29	152
6		0,5	23	20	131
7		1,0	18	15	55
8		1,5	8	7	39
9	Bentonite (Georgia)	0,3	28	17	152
10		0,5	23	15	143
11		1,0	16	10	124
12		1,5	8	7	43
13	Tannin and fish glue	0,1/0,1	56	41	246
14		0,1/0,2	49	38	138
15		0,2/0,2	12	11	105
16	Bentonite and gelatine	0,05/0,5	21	16	165
17		0,1/0,5	19	14	143
18		0,1/1,0	10	8	106

It was found out that among the bentonites used for wine treatment, bentonite from Georgia and France has the hardest influence on foamy parameters, its foamy parameters (HF and MH) have decreased at 3-7 times, but for bentonite from Italy - at 1,7-1,8 times (doses 1-1,5 g/dm^3).

Also the treatment of wine blend after the schemes: bentonite+gelatine has been appreciated negatively with obtaining of decreased foamy properties and can not be recommanded for implimentatin in winemaking practice in the sparkling wines production process.

CONCLUSIONS

The composition of the blends of base wines plays a main role in formation of their qualitative foamy properties. Wine blends, that contain base wine from varieties Chardonnay and Pinot group are characterized by high parameters of the foam formation and rate of the foam stabilisation.

Technological schemes of treatment of cuvee and blends of base wines considerably influence physico-chemical parameters and foamy properties of the treated wines.

This study allows us to establish, that bentonite from Georgia and France has the hardest influence on foamy parameters, its foamy parameters (HF, MH and TF) have decreased at 3-7 times, but for bentonite from Italy these parameters decreased only at 1,7-1,8 times. With increasing of the bentonite dose (from 0,3 up to 1,5 g/dm^3) more considerable decreasing of foamy properties of the blends of base wines is observed.

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STUDY OF THE INFLUENCE OF TECHNOLOGICAL PROCESSES OF SPARKLING WINES PRODUCTION ON THEIR FOAMY PARAMETERS

STUDIUL PROCESELOR TEHNOLOGICE LA PRODUCEREA VINURILOR SPUMANTE ŞI INFLUENŢA LOR ASUPRA PARAMETRILOR DE SPUMARE

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Abstract: *Foamy and frothy properties of sparkling wines depend in a large measure on grape varieties, technological conditions of grape process, technological schemes of blends and cuvee treatment. At the secondary fermentation the quality of sparkling wines depends both on used yeasts and technological conditions of sparkling wines treatment.*

Rezumat.: *Proprietăţile de spumare a vinurilor spumante în marea măsură se află în dependenţă de mai mulţi factori:de tehnologia prelucrării strugurilor şi obţinerea vinurilor materie primă, de procesul fermentaţiei secundare, utilizarea suşelor de levuri, de procesele tehnologice de tratare*

Keywords: grape variety, technological conditions of grape process, must fermentation, selected yeast culture, secondary fermentation, cold stabilisation treatment, isobaric filtration, sparkling wine.

Cuvinte cheie: struguri, vin spumant, fermentaţie secundară, suşe de levuri, tratarea vinurilor, proprietaţi de spumare.

INTRODUCTION

One of the main parameters, that characterize the quality of sparkling wines, is foaming and frothing of effervescent wines, which allows us to differ this category of wines from the other. The quality of sparkling wines in a large measure is due to high properties of base wines and at first to foamy properties. At the grape process the quality of base wine depends on respecting of technological conditions and directly both on forestalling of over - enrichment with extractive substances, especially with polyphenols, and avoiding of wine oxydation (Ribereau-Gayon, 1984; Cotea V. 1985, 1988). Physico-chemical parameters of organoleptic appreciation of base wines also vary in a large measure after different technological procedures with the aim of clarification and physico-chemical stabilisation (Taran, Soldatenco, 1995, Prida, 1999).

But in oenological practice no scientific research on stabilisation of the influence of technological processes at different stages of sparkling wines production on foamy properties is effectuated with the aim to improve the quality of final product.

The aim of this study is to find out the influence of technological procedures of sparkling wines production on foamy properties at the following stages:

- grape process;
- must fermentation;
- base wine treatment;
- secondary fermentation of sweetened wine;
- cold stabilisation treatment and filtration of sparkling wines.

MATERIALS AND METHODS

Scientific research had been effectuated both in the laboratory „Sparkling Wines and Microbiology" and section „Microwinemaking" at the National Institute for Viticulture and Winemaking (NIVW) and at the Wine Factory „Cricova" during 2006-2008.

In our study we used: must made from grape varieties Chardonnay, Pinot blanc, Pinot gris, Sauvignon, Riesling and Aligote; active dry yeast; base wine and sparkling wine after secondary fermentation.

Physico-chemical parameters of base wine had been determined according to the methods recommended by OIV and modificated ones at NIVW. Foamy parameters of base wines had been determined instrumental according to the international method using the special installation „Mossalux" (France). Determination of the wines foamy properties is based on the intrerruption of infra-red light bunch by the foam of studied wine because of injection of the gas carbon dioxide (CO_2) in standart conditions through a filter with calibrated porous fibres. The foamy properties of wines are expressed by the determination of the following parameters:

- maximal height of the foam (MH)
- height of the foam stabilisation(HF)
- time of the foam stabilisation (TF)

RESULTS AND DISCUSSIONS

Foamy properties of base wines depend in a large measure on the grape variety, from which they are made. The content of superficial active substances, that form foam and froth in effervescent wines in general, and in sparkling wines in particular, is a specific feature of grape varieties. The study during 2006-2008 has shown that all varieties used in sparkling wines production may be divided in 3 groups:

1. Grape varieties with high foamy properties: Chardonnay and Pinot group (gris, franc, blanc).
2. Grape varieties with midle foamy properties: Traminer, Aligote, pinot meunier.

3. Grape varieties with low foamy properties: Sauvignon, Rcatiteli, Suholimanschii belii etc.

Grape varieties of new selection are characterized with low foamy properties of obtained dry wines and also is refered to the proup 3.

The technological grape process has a major influence on physico-chemical parameters and foamy properties of base wines. The method of grape pressing and must separating directly influence foamy properties, but corect selecting of yeast culture for must fermentation allows us to increase considerably the content of substances, that form extract, and to improve foamy properties of obtained wines.

The study, effectuated in production conditions at the Wine Factory "Cricova" (2007-2008), allowed us to find out the influence on the content of sugar-free extract and base wines foamy properties of the following technological factors:

- Temperature of must fermentation;
- Doses of SO_2;
- Duration of young wine maintaining on yeast sediment.

At the treatment and stabilisation of base wines we found out the following the most important technological procedures, that influence foamy properties:

- The origin of fining and treatment materials;
- Doses of used materials in treatment process;
- The conditions of wine cold stabilisation treatment and filtration at low temperature;
- Duration of the base wine maintenance.

At the secondary fermentation of the sweetened wine we studied and established the influence of the following technological factors:

- The influence of selected yeast culture at the secondary fermentation;
- Cold stabilisation treatment and filtration of sparkling wine;
- The use of expedition liqueur.

CONCLUSIONS

1. The influence of grape varieties on physico-chemical parameters and foamy properties of base wines has been established. Obtained results allowed us to classify base wine for sparkling wines in 3 groups after foamy properties.
2. The influence of technological conditions of grape process and wine production on physico-chemical parameters and foamy properties of base wines has been established.
3. The influence of technological treatments and secondary fermentation procedures on the content of sugar-free extract and foamy properties of base wines and final sparkling wines has been established.

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THE APPRECIATION OF THE NATURALNESS OF GRAPE WINES OF AROMATIC VARIETIES

APRECIEREA NATURALITĂȚII VINURILOR DE STRUGURI DIN SOIURILE AROMATE

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Abstract. *In order to develop the method of determination of the naturalness of aromatic varieties of grape wines, there was carried out an identification, using the method of masspectrometry of the chromatic mass of aroma compounds of natural wines and of synthetic aromatizers used by manufacturers in grape wine production.*

Rezumat: *În scopul elaborării metodei de determinare a naturalității vinurilor de struguri din soiuri aromate, s-a efectuat identificarea cu ajutorul masspectrometriei de masă cromatice a compuşilor de aromă a vinurilor naturale şi a aromatizatorilor sintetici utilizați de producători la fabricarea vinurilor de struguri.*

Keywords: grape wines of aromatic varieties (Traminer, Muscat), synthetic aromatizers, masspectrometry of chromatic mass.
Cuvinte cheie: vinuri de struguri din soiuri aromate (Traminer, Muscat), aromatizatori sintetici, masspectrometrie de masă cromatică

INTRODUCTION

Due to demands of wines of aromatic varieties, during the last years, the cases of wine manufacturing using synthetic aromatizers have become frequent.

The utilization of the organoleptic method of appreciation of the quality of the synthetic compounds added is subjective. This fact rises up the problem of development of an objective instrumental method of detection of wines containing synthetic aromatizers.

MATERIAL AND METHOD

There have been investigated the aroma compounds in wines of Muscat and Traminer varieties and of the corresponding synthetic aromatizers.

The analyses have been carried out with extracts of diethyl ether of natural wines and synthetic aromatizers.

The determination and identification of volatile components have been carried out by means of masspectrometry of chromatic mass in conditions of ionization with electric shock and subsequent separation on the capillary column HP-5MS and registration of the characteristic connections in conditions of ionic current.

RESULTS AND DISCUSSIONS

In the extracts of diethyl ether of the wines of Muscat and Traminer varieties there have been identified nearly 40 aroma compounds. In the tables 1 and 2 are included the aroma compounds that are in larger quantities in these wines. The identification of the volatile components by means of the method of masspectrometry of chromatic mass has proved that the content of the volatile components in the extract of diethyl ether of the studied wines is rather rich in aroma compounds. The surface of the peak of a certain component is directly proportional to the percentage concentration from the sum of all volatile substances. Having compared the content of the volatile components of the extract of diethyl ether of wines of Muscat and Traminer aromatic varieties, it has been noticed an important quantity of β-phenyl-ethanol, that constitutes nearly 40% of the amount of all extracted volatile compounds. So, the main role in Traminer and Muscat wines aroma formation is due to this compound. Aromatic compounds in small quantities are also present, with a small perception threshold and that in combination with the β- phenyl-ethanol give specific shades to Traminer and Muscat wines varieties. In the extract of diethyl ether of the Muscat dry white wine in comparison with that of Traminer, there have been detected compounds with strong aromatic features: Phenylethyl Alcohol., 1,1-dimethoxy dodecane., 3-methyl butanoic acid, 2- methyl butanoic acid, 3-tridecanol., 1-butanol-3-methyilacetate., 2,3-pentylene oxide etc. (tables 1, 2). Phenylethyl Alcohol represents a strong floral aroma and may be considered as the main component in the formation of specific aromas of Muscat and Traminer wines. This fact is confirmed by the analysis of the content of the diethyl ether of the corresponding synthetic aromatizers (tables 3 and 4), where Phenylethyl Alcohol is present in both of the synthetic aromatizers.

Table 1.

Volatile compounds content in the extract of diethyl ether of the dry white wine Traminer

Nr. peak	Retention time, RT min	Peak area %	Name of chemical compound	CAS/Nist98
1	2,41	0,60	2,3-Butylene glycol	513-85-9
9	5,23	1,12	Succinic anhydride	108-30-5
11	5,76	1,46	Isobutyric acid, methyl ester	547-63-7
12	6,73	39,04	Phenylethyl Alcohol	60-12-8
14	7,60	11,56	diethyl succinate	123-25-1
30	11,00	12,07	p-Hydroxyphenethyl alcohol	501-94-0

Having analyzed the experimental results of the aromatic complex of the synthetic aromatizers, it has been proved that the main component of "Traminer" synthetic aromatizer is (R)-(+)-β-citronelool (42% of the amount of all the volatile compounds), then α-linalool, Phenylethyl Alcohol and geranyl butilate (table 3). The comparison of the volatile components from the extract of diethyl ether of the Traminer natural wines and of the "Traminer" synthetic aromatizers showed that in both cases it has been detected Phenylethyl Alcohol, but the Traminer natural wines do not contain (R)-(+)-β-citronelool, α-linalool and geranyl buterate.

Table 2.

Volatile compounds content in the extract of diethyl ether of the dry white wine Muscat

Nr. peak	Retention time, RT min	Peak area %	Name of chemical compound	CAS/Nist98
1	2,39	1,46	2,3-Butylene glycol	513-85-9
3	2,70	0,23	1,1-dimethoxy dodecane	14620-52-1
4	2,87	0,20	3-methyl butanoic acid	503-74-2
5	2,98	0,12	2-methyl butanoic acid	116-53-0
7	3,30	0,22	3-Tridecanol	10289-68-6
8	3,35	0,23	1-butanol, 3-methyl, acetate	123-92-2
10	4,08	0,20	2,3-pentylene oxide	5405-41-4
20	6,45	0,26	β-Linalool	78-70-6
21	6,70	38,48	Phenylethyl Alcohol	60-12-8
22	7,53	13,84	diethyl succinate	123-25-1
36	10,8	13,02	Ethyl caprinate	110-38-3

Table 3.

Volatile compounds content in the extract of diethyl ether of the synthetic aromatizer „Traminer"

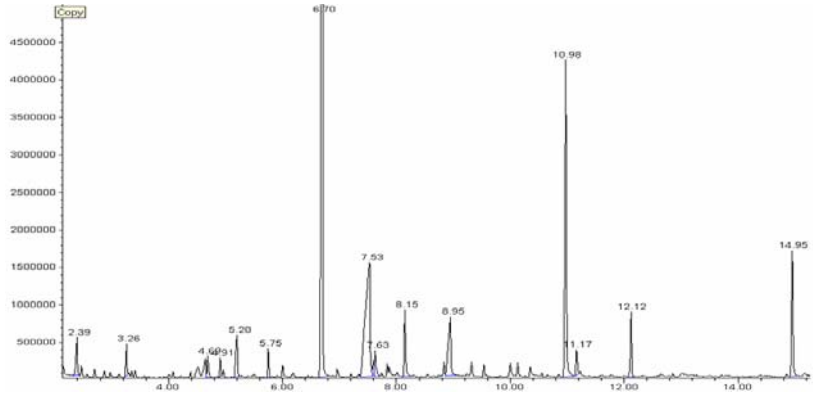
Nr. peak	Retention time, RT min	Peak area %	Name of chemical compound	CAS/Nist98
3	6,68	8,97	Phenylethyl Alcohol	60-12-8
8	8,30	42,05	(R)-(+)-β-Citronellol	1117-61-9
9	8,69	12,18	α-linalool	22564-99-4
21	12.63	5,05	geranyl buterate	106-29-6

The main component of the "Muscat" synthetic aromatizer, researched by us, is the ethyl ether of the succinic acid (42% of the total amount of all the volatile compounds), then Phenylethyl Alcohol., Cis-linalooloxide, α-linalool, acetic acid, 2-phenylethyl ester, β-terpinol (table 4). The comparison of the volatile components of the extract of ethyl ether of the Muscat natural wines and of the Muscat synthetic aromatizer, have shown that the Phenylethyl Alcohol and the diethyl succinate, but in the Muscat natural wine there have not been detected linalooloxoid, α-linalool and β-terpinol.

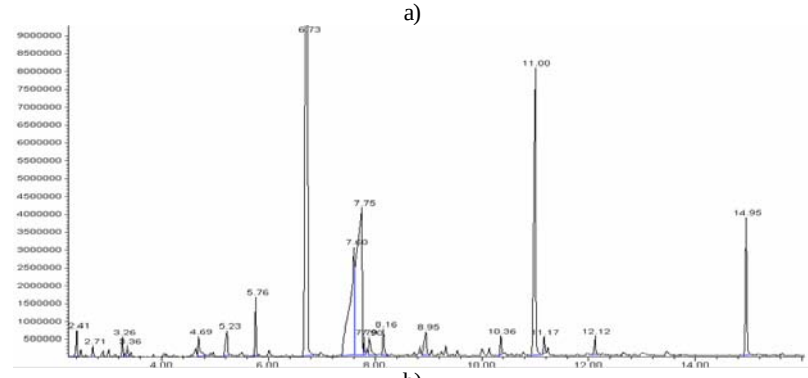
Table 4.

Volatile compounds content in the extract of diethyl ether of the synthetic aromatizer „Muscat 4"

Nr. peak	Retention time, RT min	Peak area %	Name of chemical compound	CAS/Nist98
8-9	6,33	5,13	Cis-linalooloxide	121-97-4
10	6,47	2,44	α-linalool	22564-99-4
11	6,80	9,78	Phenylethyl Alcohol	60-12-8
13	7,18	0,60	β-terpinol	150-76-1
14	7,71	41,51	diethyl succinate	123-25-1
18	8,77	1,94	acetic acid, 2-phenylethyl ester	103-45-7



a)



b)

Fig 1. Aromograme of volatile compounds in the extract of diethyl ether of dry white wines a)Muscat; b) Traminer

CONCLUSIONS

The obtained results of the identification by means of the masspectrometry of chromatic mass may serve as a basis for the methodology of expertise carrying out, in view to determine the naturalness of the grape wines of aromatic varieties (Traminer and Muscat).

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FOOD INFORMATIONAL MATRIX

INFORMAȚIA MATRICEI ALIMENTARE

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Abstract. *Food represents human's ecological niche, that's why the permission to food and a proper alimentation is a fundamental human right Man, using all irrational action, changed the natural food chain; thus, nowadays, he has the duty for himself and for the nature to try to maintain biodiversity. Otherwise, unhealthy food will harm us! Alimentation and its metabolic pathways affects deeply the humans' evolution and the health status, by complex mechanisms between genetic activity and metabolism. A major part of the vital information needed for our existence it has to be provided through food that becomes ' Biologic information carrier". Therefore, it has been resulted the notion of " Food Matrix " that it is in the same time a "Biological and a Genetic Matrix". Beyond traditional or conventional food, new genetic modified organisms (gmo's) food or deriving from gmo's food emerged on market. In this context, it is the specialists responsibility to apply the precaution principle and to monitories gmo's food, which in fact, it represents a deep bioethics item.* ***Maybe, the best way is to harmonize ourselves with Nature, if considering that "our nature is still natural".***

Rezumat. *Alimentul reprezinta nisa ecologica a omului, de aceea dreptul la aliment si la o alimentatie corespunzatoare este un drept fumdamental al omului. Omul, prin actiunile sale irationale, a modificat lantul natural alimentar, de aceea astazi mai mult ca oricand are datoria fata de el insusi dar si fata de natura sa incerce sa mentina biodiversitatea. Altfel, "alimentele bolnave " ne vor inbolnavi ! Alimentatia si lantul metabolic ne influenteaza sanatatea prin mecanisme complexe intre activitatea genetica si metabolism. Alimentatia şi efectele sale metabolice influențează profund evoluția şi starea de sănătate a organismului, prin mecanisme complexe de legătură mediată prin semnale între activitatea genetica si metabolism. Asadar, a rezultat notiunea de "Matrice alimentara"care este in acelasi timp si "matrice biologica" si "matrice genetica". Pe langa alimentele traditionale au aparut si alimente care sunt sau provin din organisme modificate genetic. In acest sens, intra in responsabilitatea specialistilor din domeniu sa aplice principiul precautiei si sa monitorizeze organismele modificate genetic, ceea ce de fapt reprezinta o profunda problema de bioetica. Poate, cea mai buna cale este aceea de a ne armoniza cu natura, in masura in acre "Natura noastra mai este naturala!".*

If considered from the point of view of the quantum physics, Universe is a huge computer which processes information in the most accurate way, allowed by the natural laws.

A universal informational matrix crosses the Universe and substance cannot be separated from information in anyway.

Sub-atomic Universe (quantum) and the atomic one are organized by a dynamic information matrix - ISET: Informational, Substantial, Energetic, Temporal.

The Computer Universe is calculating. It calculates itself, it calculates the quantum fields, the chemical substances, the living beings, human included, stars and galaxies.

Consequently, all living beings, human included, are some open informational systems featured by self-regulation, self-reproduction and evolution and they are ruled by ISET matrix organizing patterns.

A living system is defined by a configuration of its sub-systems, stored in ISET matrices which determines the material structure of the system.

The dynamic continuous process of concretization of these patterns stored in the ISET matrices means LIFE.

The whole Universe is ruled by an informational matrix. All the beings living on the Earth are organized and function according to an informational matrix. Man himself is an information – energetic- substance, sited in a dynamic balance and directly connected to the universal informational matrix. The humans being's connection to the ISET matrices is done through various information channels. Food is one of the human's strongest information channel.

Food is made up by the over-atomic and quantum Universe elements and it is the subject to these laws, being an information bearer.

Food's information is the deepest and most important feature of the food quality, triggering its nutritional effect and its biological value.

Food, as environmental element, is one of the most important epigenetic factor which connects every living being to the universal informational matrix.

More the food becomes man made, more its information gets changed, triggering effects on the individual and on the environment.

Ecologically speaking, man is sited on the top of food chains pyramid, being their integrator.

Man has being developing as a biologic being first and later as a social-cultural being, using an extremely various food for several hundreds of thousands of generations.

Food represents information – bearing particles belonging to the environment. These particles constituents are ingested, metabolized and then integrated into the consumer's information.

Analyzing the food contents, we find out that it is made up of vegetal or animal cells, tissues and organs, micro-organisms, composed by macronutrients, micro-nutrients, non-nutrients, additives.

The constituents of a natural food matrix belong to a substance information network which carries environment information, as epigenetic signals. All these are indispensable for the individual proper connection to his own species and to the upper levels of the ecosystems and biosphere.

When processed the food matrix is subject to information alterations. Strongest the processing is, stronger the alterations are.

The food matrix maybe strongly altered and the links between macro and micro-nutrients maybe modified as quality and quantity in an information chemical, biochemical and physical manner. These alterations are converted in a lower biological value from the point of view of nutritional aspect.

The true, healthy food, useful for the humans is a global information borne by a well-balanced and various diet, respecting a constantly practice sport activity.

This way, food and diet (a diet means the total of aliments and of their combinations within a nutritional behavior) supply to humans information nutrients framed in stereo-chemical structures of chemical substances.

The information of individual food matrices and of diet mean major epigenetic factors, which interact directly with the organizing pattern, informational matrix of human and its own genetic information. Nowadays this approach is the subject of study of **Nutrigenome.**

This inter-action determines the state of health or illness at individual and social level.

The man made food and environment have proved that man didn't succeeded to discover the real laws of harmonization with Nature and triggered serious ecological damages.

All these lead to major composition alterations of food matrix. These altered food matrices transmit to the human metabolism information which is completely foreign towards its organization pattern and creates a strong organization and information stress.

If the human organization pattern could find the resources for facing the negative effects of the information altered – food, the human species would survive in a new created equilibrium.

A great part of the life information must be supplied by food to human body. Altered food or improperly processed food cannot be recognized by human metabolism and lead to illness, usually.

The **Nutrigenome,** the inter-action diet-genome, means allow the quantification of one key nutrient, for instance, a micro-nutrient in organic matrices on the profile of expression of thousands genes.

Food contains regulators of the gene's expression, such as:

- nutrients (fat acids, selenium, zinc);
- non – nutrients (phyto-chemicals);
- metabolites of food compounds (eicosanoides);
- final-products of gut-bacteria.

The control of the gene expression maybe done by one single nutrient, but usually this control is complex. It is performed by inter-connections between nutrients or nutrients and hormones.

Food nutrients and non-nutrients interact with the genome-set, influencing the concentration and functions of the cell proteins, by adjusting the gene

expression at different levels, by means of transcription factors. An example might be the lipids metabolism.

The cell receivers have a major parting the intra and inter chemical signals (mainly, an informational signal).

CONCLUSIONS

The Computer Universe is calculating. It calculates itself, it calculates the quantum fields, the chemical substances, the living beings, human included, stars and galaxies.

Everything is contained in a quantum informational matrix.

This is what life is! From the cell level up to Biosphere the living systems networks connected to the universal information matrix calculate and give signals inside and outside themselves. They tend to an integrating dynamic evolution balance.

Living beings, including humans, are information – substance –energy with a space-time existence.

Alimentation and its metabolic pathways influences the health status of humans, by complex mechanisms between genetic activity and metabolism.

Food is a major epigenetic factor and has an important integrating part. Living beings process the food information, the epigenetic environmental factor, very important in the maintenance of system's functions and of its integration in the superior structures.

Food is not only a nutrient but an information. Its combination in a diet gives more value than the value of each food product.

Therefore, the diet is a manner of organizing better the information network with real benefits on individuals and species.

Maybe, the best way is to harmonize ourselves with Nature, if considering that "our nature is still natural"!

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HOW TO GET AN ECOLOGICAL INTEGRAL USE OF BLUEBERRIES FRUITS (*VACCINIUM MYRTILLUS* L.)

POSIBILITĂȚI DE VALORIFICARE ECOLOGICĂ INTEGRALĂ A FRUCTELOR DE AFIN NEGRU (*VACCINIUM MYRTILLUS* L.)

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Abstract: *The phyto-therapeutic virtues of blueberries–as fruits or as natural juices – are due to the richness of their "vital principles" induced by photosynthesis as: glucides, lipids, proteins, enzymes, vitamins (A, B1, B2, C, E, P, PP), minerals (K, Ca, Cl, Fe, P, Mg, S), pigments, organic acids, phyto - hormones etc. Blueberries are an ideal raw material - " noble fruits" – for making natural bio-stimulating juices, valorous and indispensable for the human body. The well-known american doctor, D.C,Jarwis, great fun of phyto-therapy stated that blueberries fruits are " vegetal blood". Knowing the chemical composition of blueberries fruits featured by a lot of phyto-therapeutic, bio-stimulating and nutritive qualities, we must capitalize them in large wide range of appreciated, natural products. The imperative aim and the efforts for capitalization of blueberries are paid back by the following range of products: natural juices; half-preserved juices; concentrates from natural juices; natural colorants - ingredients for food industry.*

Rezumat *- Virtuțile fitoterapeutice ale afinelor – ca atare sau sub formă de sucuri naturale – rezultă din bogăția „principiilor vitale" inoculate „fotosintetic" sub forma: glucidelor, lipidelor, protidelor, enzimelor, vitaminelor (A, B1, B2, C, E, P, PP) mineralelor (K, Ca, Cl, Fe, P, Mg, S), pigmentilor, acizilor organici, fitohormonilor etc. Afinele se prezintă ca materie primă ideală – „fructe nobile" – pentru obținerea sucurilor naturale biostimulatoare, atât de valoroase şi de indispensabile organismului, pe care cunoscutul medic american, adept al fitoterapiei, D.C. Jarwis, le-a denumit „sânge vegetal". În baza cunoaşterii compoziției chimice atât de complexe a fructelor de afin, din care se desprind valoroasele lor calități terapeutice, biostimulatoare şi nutritive, valorificarea lor integrală se impune cu atât mai mult cu cât ele generează o gamă de produse naturale dintre cele mai apreciate. Imperativul-deziderat al valorificării superioare integrale ale afinelor răsplăteşte efortul investit prin următoarea gamă de produse: sucuri naturale; sucuri semiconservate – produs semifinit; concentrate din sucuri naturale; coloranți naturali; ingrediente pentru industria alimentara.*

The blueberries' quality is due to their well-balanced complex composition on one hand, and to its small, very juicy fruits on the other hand; we all know that in the cells' membranes there are lots of vitamins, minerals, pigments and flavours, so that there is a very high contents of "noble" elements per surface-unit, higher than larger fruits. Blueberries are also rich in anti-oxidants, such as vitamins and anthocyanins, the latest are also very useful pigment with a synergic part. The blueberries' bio-chemical composition is described in the following table:

Table 1

Blueberries' Bio-Chemical Composition

Item No.	Composition	Content
1.	Dry matter %	13 – 15
2.	Total sugars %	5,5 – 7,0
3.	Total acidity (malic acid)	1,28 – 1,68
4.	Harmonic Ratio % Total sugars / % Total acidity	5,5 7,0 1,28 1,68
5.	Pectins %	1,98 – 2,76
6	Proteins %	1,94 – 2,70
7.	Tannins %	0,93 – 1,42
8.	Minerals %	2,92 – 3,56
9.	Potassium mg/100 g	187
10.	Calcium mg/100 g	20
11.	Magnesium mg/100 g	5
12.	Phosphorus mg/100 g	16
13.	Iron mg/100 g	1,38
14.	Copper mg/100 g	1,73
15.	Manganese mg/100 g	1,28
16.	Ascorbic acid mg/100 g	110 – 169
17	B Carotene mg/100 g	1,2
18	Anthocyanins %	0,736

In order to obtain more natural products with important therapeutic features, we included the following procedures into the blueberry processing technological scheme:

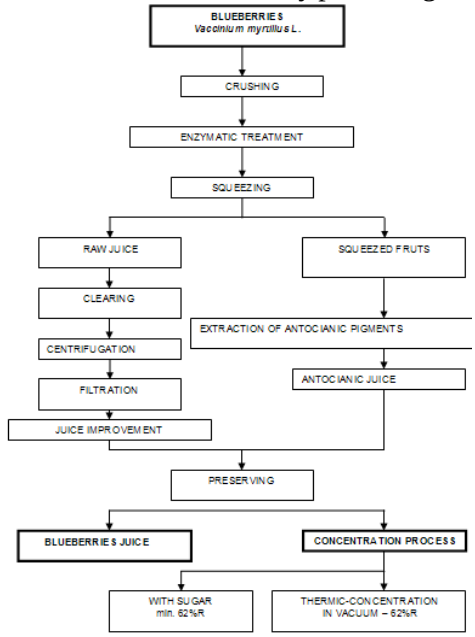

Fig. 1. Blueberry processing technological scheme
Products and sub-products got from the blueberries' processing

The following products and sub-products are gained thanks to the overall processing of blueberries.

Table 2

Products and sub-products got from the blueberries' processing

Item no	Products and sub-products	%
1	Fresh blueberry fruits	100,00
2	Selected fruits	93,07
3	Fruits pure'	22,82
4	Raw blueberry juice	67,63
5	"Blueberry cake" = blueberries leftovers	25,19
6	Structural wastes (seeds, peels)	10,25

As you can see in table no.2, we deal with major sub-products quantities and qualities obtained after the blueberries processing, featured by anthocyanins high content.

Various ways of capitalizing blueberries after its processing

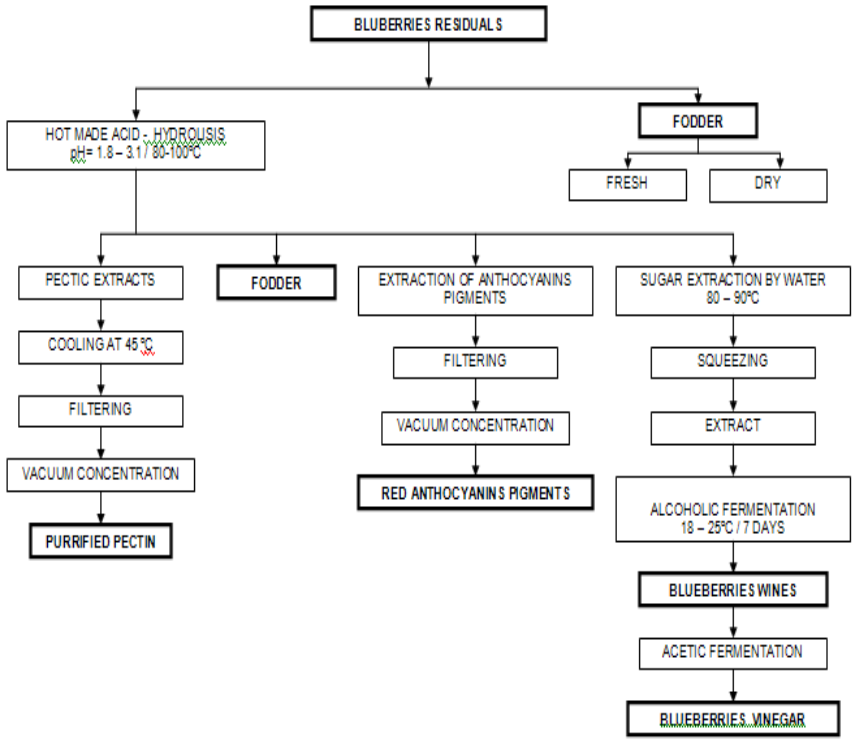

Fig. 2. Blueberries' residuals processing technological scheme

CONCLUSIONS

- This paper describes a pattern of better capitalizing blueberries, considering them a precious raw material from which we obtain – natural juice, in a first stage, and – after squeezing sub-products rich of anthocyanins, i.e. the "blueberry cake".
- The achievement of natural pigments for food products obtained from natural sources is a major purpose as we must substitute the chemical dyeing products harmful for health.
- The quite high acidity of the vacuolar juice (in the blueberry pulp) is a strong lasting pigment for purple red stabilizer for colouring juice and hydro-alcoholic extracts.
- The blueberry leftover cake is an ideal raw material with high uses and outputs.
- Other advantages: the technology used is low energy consumer and no polluting
- Wastes deriving from processing are used fresh or dry or powder because of their nutritional and bio-stimulating functions due to vitamins and minerals.

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SWEET CORN HYBRIDS THAT ARE SUITABL FOR PRESERVING

METODE DE PROCESARE A HIBRIZILOR DE PORUMB ZAHARAT

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Abstract. *Corn (Zea mays L.) is a multi-purpose high-output cereal. Sweet corn beans are used in making preserves when immature, before sugar is converted into starch.Six hybrids of sweet corn, that are cultivated in Moldova, were studied. They were grown on the testing fields in Bacioi, Chisinau, belonging to the National Commission charged with the study of plants. The results of the chemical and technological testing were presented. Two technological mainframes were used: with kernels steamed before and after being removed from the cobs. The research has revealed the hybrids that are best suited for canning.*

Rezumat. *Porumbul zaharat (Zea mays L.) este o cultură cerealieră cu o productivitate sporită şi destinat multiple. Pentru fabricarea conservelor se utilizează porumb zaharat în stadie de maturitatelapte cu conținut maxim de glucide în boabe. S-au studiat şase hibrizi de porumb zaharat după indicii chimici, tehnologici şi organoleptici a materiei prime şi conservelor. Culturile au fost recoltate pe parcelele Comisiei de Stat pentru încercarea soiurilor a Republicii Moldova în s.Bacioi mun Chişinău. Cercetările s-au efectuat în două direcții: blanşarea ştiuleților integrali şi tăerea boabelor; tăerea boabelor cu blanşarea ulteriorea a acestora. În rezultatul cercetărilor s-u stabilit hibrizii de porumb zaharat* acceptabili pentru conservare

At present 28,6 % of sugar corn is used to process on the food purpose in the world. The area seeded with sugar corn constitutes 1,027 million ha (between 2001-2005) in the world. The main producing countries are USA, Hungary, Canada, France, Japan [1-4]. The Republic of Moldova is a favorable region to cultivate the corn. To produce the canned corn it is necessary to cultivate the sugar corn of certain sorts. The production of canned sugar corn comprised 3492 tons in 2005, 4837 ton – in 2006. During the last years, in the Republic of Moldova the sugar corn hybrids of local and import selection are intensively developed.

Research purpose: To determine the use of new and perspective sugar corn hybrids to produce the canned and congealed food.

MATERIAL AND METHOD

The sugar corn hybrids of local and import selection harvested in the milky ripeness have been tested:

- Bonus F_1, (Holland);
- Jubileu, F_1 (Holland);

- Porumbeni -340 F_1;
- Porumbeni – 341 F_1;
- Porumbeni 198 F_1 marker, *;
- Lumina F_1 (USA).

* Institute of Phytotechny and Plants Amelioration.

Sugar corn was cultivated on the land plots of State Commission of sorts testing of the Republic of Moldova in the village of Bacioi, city of Chisinau, in 2002 -2006, in conformity with „Method indications for the chemical – technological testing of fruit, vegetables, berries sorts destined for the industrial processing".[5]

The traditional methods of preserving and namely preserving by the sterilization and congelation were used for the technological tests.The use of the sugar corn hybrids was established based on the results of the physical – chemical, technological and organoleptic research. The products samples have been produced in accordance with the technological instructions on the canned and congealed sugar corn production. The corn has been cut in the industrial machine MTBP-500.

The research of the biometric parameters of the sugar corn has been carried out in accordance with the method of measuring, gravimetry and chemical method. The following has been established: average mass; length and maximal diameter of the ear; percentage of coating leaves and output of kernels per one ear; mass fraction of: the dry substances (according to the refractometer and by drying); titrable acids (recalcelated in the malic acid); glucose; fructose; saccharose; starch; cellulose; active acidity.

RESULTS AND DISCUSSIONS

Based on the results of the research of the biometric characteristics of the hybrids it has been established that as per the form, ear length, kernel color and consistency, the sugar corn hybrids correspond to the requirements of industrial processing. Depending on the hybrid, the mass of the kernels constitutes 45,3 – 49,5 % of the mass of the ear with the leaves, of the leaves 23,3 – 32,0%, bald ear -22,7-28,5%, height of the cut kernels – 6,0-9,1 mm. The mass of the ear varies between 184 - 296 g, the length of the ears is 160-240mm, diameter of the ears is 37-54 mm. The results of physical – chemical tests are presented in the table 1.

The milky ripeness of the sugar corn hybrids is characterized by the content of 20,9-28,3% of the soluble dry substances, constituting 85,0-95,0% of the mass fraction of the total dry substances in the kernel.

The mass fraction of the carbohydrates constitutes depending on the sugar corn hybrid: 12,3-19,5% of starch, sum of saccharose, glucose and fructose - 1,45 – 3,86 %, saccharose predominates 74-77 %, glucose and fructose are of insignificant quantity.

The sugar corn refers to the raw material with a high content of proteins, the value of which, depending on the sort constitutes 3,3-4,5% and it is a neutral raw material according to pH indexes.

The content of the mineral substances and toxic elements in the sugar corn is presented in the table 2. The high content of potassium and magnesium is characteristic of the sorts presented.

Table 1

Physical chemical indexes of the sugar corn

№	Hybrid name	Mass fraction ,%			Mass fraction of the carbohydrates, %					Active acidity (pH)
		soluble dry sub-stances (by refract omete r)	dry substan -ces, (by drying)	prot e-ins	fru c tos e	glu cos e	sac cha ro-se	starc h	cellu - lose	
1	Bonus F_1	20,9	22,6	3,8	0,12	0,39	1,23	12,3	0,69	7,26
2	Jubileu F_1	26,2	27,5	3,3	0,17	0,49	1,05	13,35	0,54	7,08
3	Porumbeni 340 F_1	28,3	32,7	4,5	0,08	0,45	1,00	19,49	0.93	6.90
4	Porumbeni 341 F_1	25,9	30,4	3,9	0,03	0,41	1,01	18,6	0,82	6,98
5	Porumbeni 198 F_1	22,0	-	-	0,12	0,88	2,86	-	-	6,75
6	Lumina F_1	26,5	-	-	0,14	1,24	2,12	-	-	6,80

Table 2

Content of the mineral substances and toxic elements in the sugar corn

№	Hybrid name	Content of mineral substances, mg/kg						Content of toxic elements, mg/kg			
		K	Na	Ca	Mg	Fe	Mn	Pb	Cd	Cu	Zn
1	Bonus F_1	162,5	12,9	107,5	50,7	6,75	1,45	<0,01	not found	0,54	6,0
2	Jubileu F_1	179,8	12,9	72,5	109,4	2,82	1,48	not found	not found	0,56	7,2
3	Porumbeni 340 F_1	166.3	25,9	50,9	93,2	11,88	1,3	<0,01	not found	0,63	7,1
4	Porumbeni 341 F_1	165,8	25,4	50,6	93,8	11,20	1,25	<0,01	not found	0,67	7,0

The members of the tasting commission have noted that the sugar corn hybrids presented may be used to produce the canned sugar corn and the other canned food the by the thermal processing and congelation.

The canned corn of the sort „Porumbeni 198" obtained most of the points in the organoleptic evaluation. The canned corn of the hybrid „Porumbeni 341" have a pleasant appearance and taste. The samples of the congealed sugar corn presented in the tasting

have the good organoleptic characteristics and may be used in the production of this type of the products (table 3).

Table 3

Organoleptic indexes of the canned sugar corn by sterilization and congelation

№	Hybrid name	Processing method	
		canned	congealed
		Average grade	
1	Porumbeni 198 F_1	4,7	4,4
2	Porumbeni 341 F_1	4,3	4,1
3	Lumina F_1	4,5	4,2

The samples offered to be tasted have a fine consistency, a sweet taste characteristic for the sugar corn in the milky ripeness and a pleasant aroma.

The process flowsheet of the sugar corn processing for the preserving includes : leaves removing, tips cutting, washing of the ear remnants, steaming of the ears, their cooling, kernels cutting, flotation, separating of kernels from water,

The technological process foresees cutting of kernels from the steamed ears or cutting of kernels from the unsteamed ears and their consecutive steaming. It has been asserted that the output of the kernels in the processing with the prior steaming of the ears constitutes 41,2%, but in case of cutting of kernels from the unsteamed ears it is 36,8%. Thus, the second method of processing leads to the increase of the raw material consummation. At the same time, choosing the flowsheet of the sugar corn processing, it is necessary to take in account that at the steaming of the ears the heating consummation is more than in the steaming of the kernels.

CONCLUSIONS

1. The research has been carried out on the sorts of the sugar corn of the local and imported selection: Bonus F_1, Jubileu F_1, Porumbeni -340 F_1, Porumbeni – 341 F_1, Porumbeni 198 F_1, Lumina F_1.

2. The biometric and physical chemical characteristics of the sugar corn hybrids have been established.

3. The sorts researched may be used to produce the canned sugar corn.

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CONTRIBUTION TO THE KNOWLEDGE OF THE PROPAGATION TECHNOLOGY OF THE *CRYPTOMERIA JAPONICA* DON. SPECIES

CONTRIBUȚII LA CUNOAŞTEREA TEHNOLOGIEI DE ÎNMULȚIRE A SPECIEI *CRYPTOMERIA JAPONICA* DON.

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Abstract. *In this paper there are presented the results regarding the propagation technology for the species Cryptomeria japonica, which is a species with rapide development and everly green. The study has been made on a three years period, in three vegetation period during the year (March, August, October) and has been focused on establishing the optimal period for regeneration of Cryptomeria japonica plants.*

Rezumat. *În această lucrare sunt prezentate rezultatele cu privire la tehnologia de înmulțire a speciei Cryptomeria japonica, care este una dintre speciile cu o dezvoltare rapidă şi permanent verde. Studiul s-a desfăşurat pe o perioadă de trei ani, în trei perioade de vegetatie din timpul anului (Martie, August, Octombrie) şi s-a axat pe stabilirea perioadei optime de regenerare a plantelor de Cryptomeria japonica.*

The denomination of the species *Cryptomeria japonica* Don. come from the greek language krypto = hiden, meros = which refere to the hidden part of the flower. Is originary from the southern east of China, south of Japan and has been introduce in Europe in 1842. *Cryptomeria japonica* Don. species have a rapide development and everly green which can reach up to 70 m.

MATERIALS AND METHODS

The research has been made during 2003 – 2005, for establishing the optimal period for regeneration, in order to obtain new plants of *Cryptomeria japonica*. There has been choosen 3 vegetation period: March (before the begining of the vegetation), August (during the vegetation) and October (before the begining of the vegetative repose). There has been made both apical and basal shoots of the studied species.There has been collected basal and apical shoots with a length ranged between 15-20 cm, 15 copse from each type of shoot and there has been used 5 rooting substrated. All the research has been made in the climatic conditions of the Botanical Garden „Al. Buia" of the University of Craiova.

RESULTS AND DISCUSSIONS

During the first year of the study, during the first rooting period (March), the best results for the apical shoots of *Cryptomeria japonica* has been obtained on the rooting substrate made from sand and peat with a percentage of 66,6% (table 1), the lowest values has been recorded for the rooting substrates made from peat and perlite, peat and sand (table 1).

In the second period (August) the best results has been obtained on the rooting substrate made from sand and perlite with a percentage of 46,6% (table 1), and the lowest values has been recorded for the rooting sbstrate made from peat and sand with a percentage of 33% (table 1).

In the third period (October) the best results has been obtained on the rooting substrate made from sand and perlite with a percentage of 60% (table 1), and the lowest values has been recorded for the rooting sbstrate made from peat and sand with a percentage of 40% (table 1, fig. 1).

The basal shoots of *Cryptomeria japonica* has been given the best results during march on the rooting substrate made from sand + perlite, followed by October with 66,6% on the same rooting substrate and 60% on the rooting substrate made from perlite + sand (table 2, fig.2).

Table 1

The rooting percentage for apical shoots of *Cryptomeria japonica* (%) - 2003

Period	Rooting substrate				
	Peat	Perlite	Sand	Sand+Perlite 1:1	Perlite+Peat 1:1
March	46,6	60	46,6	66,6	46,6
August	33,3	40	33,3	46,6	40
October	40	53,3	46,6	60	46,6

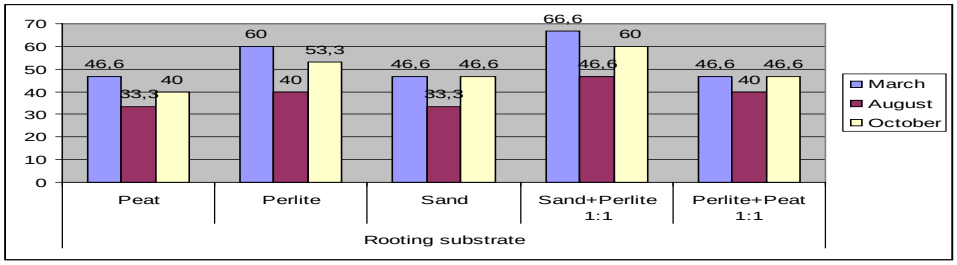

Fig. 1. The rooting percentage for apical shoots of *C. japonica* (%) – 2003

Table 2

The rooting percentage for basal shoots of *Cryptomeria japonica* (%) - 2003

Period	Rooting substrate				
	Peat	Perlite	Sand	Sand+Perlite 1:1	Perlite+Peat 1:1
March	46,6	53,3	60	73,3	60
August	40	46,6	33,3	53,3	40
October	53,3	60	60	66,6	53,3

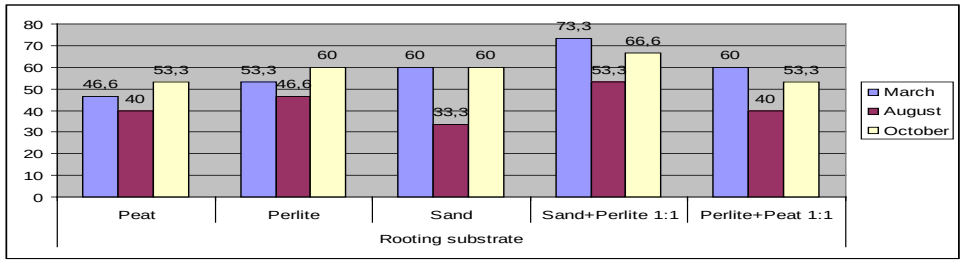

Fig. 2. The rooting percentage for basal shoots of *C. japonica* (%) - 2003

On the second year of the study there has been obtained the following results:

- At the apical shoots made in March the best results has been obtained on the rooting substrate made from sand + perlite 1:1 on which has rooted 60% from the shoots, followed by the rooting substrate made from perlite + peat 1: 1 with 53,3% and only 40% for the rooting substrate made only from peat and perlite (table 3, fig.3).

Regarding the basal shoots of *Cryptomeria japonica* during March has rooted 66,6% on the rooting substrate made from perlite + peat 1:1 followed by the substrate made from sand + perlite 1:1 with 60% rooted shoots, 53,3% on the rooting substrate made from perlite or sand and 46,6% on the rooting substrate made from peat (table 4).

Table 3

The rooting percentage for apical shoots of *Cryptomeria japonica* (%) - 2004

Period	Rooting substrate				
	Peat	Perlite	Sand	Sand+Perlite 1:1	Perlite+Peat 1:1
March	40	40	46,6	60	53,3
August	26,6	26,6	26,6	33,3	26,6
October	53,3	46,6	40	60	66,6

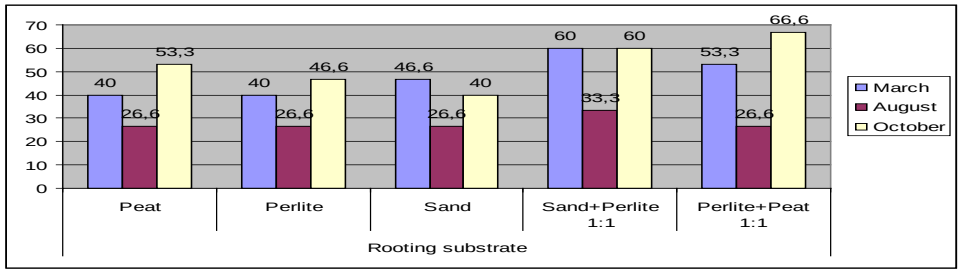

Fig. 3. The rooting percentage for apical shoots of *C. japonica* (%) - 2004

Regarding the second rooting period, in 2004 during August the recorded values has been lower than the ones from the previous rooting period. For the basal shoots of *Cryptomeria japonica* there has been recorded only 33,3% rooted shoots on the rooted substrate made from perlite and perlite + peat 1:1, followed by the substrate made from peat and sand + peat 1:1 with 26,6% rooted shoots and only 20% on the substrate made from sand (table 4, fig.4).

Table 4

The rooting percentage for basal shoots of *Cryptomeria japonica* (%) – 2004

Period	Rooting substrate				
	Peat	Perlite	Sand	Sand+Perlite 1:1	Perlite+Peat 1:1
March	46,6	53,3	53,3	60	66,6
August	26,6	33,3	20	26,6	33,3
October	53,3	46,6	53,3	60	60

Regarding the apical shoots, during August, there has been recorded only 33,3% rooted shots on the substrate made from sand + perlite, on all the other substrate the percentage of rooted shoots has been of 26,6% (table 3).

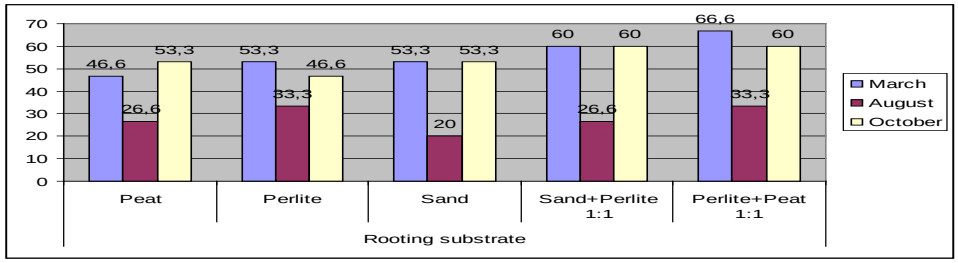

Fig. 4. The rooting percentage for basal shoots of *C. japonica* (%) - 2004

During the third rooting period (October 2004) the best results has been obtain with the apical shoots using the rooting substrate made from perlite + peat 1:1 with 66,6% rooted shoots followed by the substrate made from sand + perlite with 60% rooted shoots; 53,3% and 46,6% on the substrate made from peat or perlite and only 40% on the substrate made from sand (table 3). In October, for the basal shoots, the recorded values has been higher than the ones recorded in the second rooting period.

Thus, on rooting substrate made from sand + perlite 1:1 and perlite + peat 1:1 there has been recorded a percentage of 60% rooted shoots followed by the rooting substrate made from peat with 53,3% rooted shoots and 46,6% rooted shoots on the perlite rooting substrate (table 4).

In the third year of research, 2005, during the first rooting period (March), the apical shoots presented a 60% rooted shoots on the substrate made from sand + perlite 1:1, 46,6% rooted shoots on the sunbstrate made from perlite + peat 1:1 and 40% roote shoots on the substrates made from perlite or sand (table 5, fig.5).

Table 5

The rooting percentage for apical shoots of *Cryptomeria japonica* (%) 2005

Period	Rooting substrate				
	Peat	Perlite	Sand	Sand+Perlite 1:1	Perlite+Peat 1:1
March	46,6	40	40	60	46,6
August	26,6	33,3	26,6	40	33,3
October	46,6	46,6	40	53,3	53,3

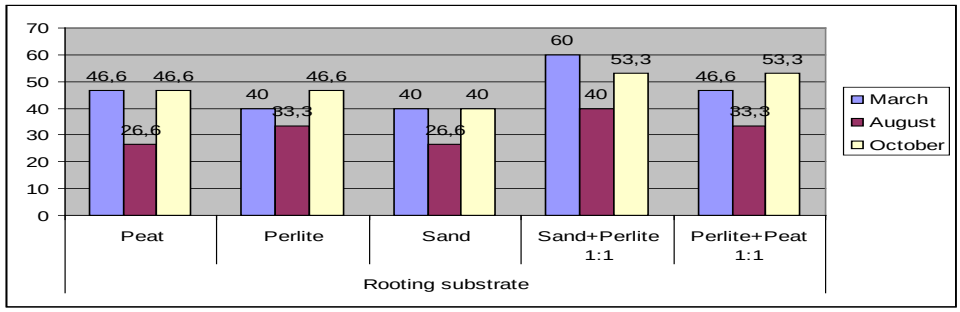

Fig. 5. The rooting percentage for apical shoots of *C. japonica* (%) - 2005

In the same period the basal shoots has rooted in a percentage of 66,6% on the rooted substrate made from sand + perlite 1:1, 60% on the substrate made from perlite + peat 1:1, 46,6% on the substrates made from perlite or sand and 40% on the substrate made only from peat (table 6, fig.6).

In the second rooting period (August), the percentage of the rooted shoots decrease comparative with the previous rooting period (March). Thus, the percentage of rooted shoots has been of 40% on the substrate made from sand + perlite 1:1, 33,3% on the substrate made from perlite + peat 1:1 or perlite and only 26,6% rooted shoots on the substrate made from peat or sand (table 5). Regarding the basal shoots in the same rooting period, the percentage of rooted shoots has been of 40% on the substrate made from sand + perlite, 33,3% on the substrates made from peat, perlite and perlite + peat 1:1 and only 26,6% on the rooting substrate made only from sand (table 6).

In the third rooting period, October, the apical basal has rooted in a percentage of 53,3% on the substrates made from sand + perlite 1:1 and perlite + peat 1:1 followed by the substrates made from perlite or peat with a rooting percentage of 46,6% and 40% on the substrate made from sand (table 5). In October 2005 at the basal shoots the rooting percentage has been of 60% on the substrate made from sand + perlite 1:1, 53,3% on the substrates made from perlite, sand and perlite + peat 1:1 and 46,6% on the substrate made from peat (table 6).

Table 6

The rooting percentage for basal shoots of *Cryptomeria japonica* (%) 2005

Period	Rooting substrate				
	Peat	Perlite	Sand	Sand+Perlite 1:1	Perlite+Peat 1:1
March	40	46,6	46,6	66,6	60
August	33,3	33,3	26,6	40	33,3
October	46,6	53,3	53,3	60	53,3

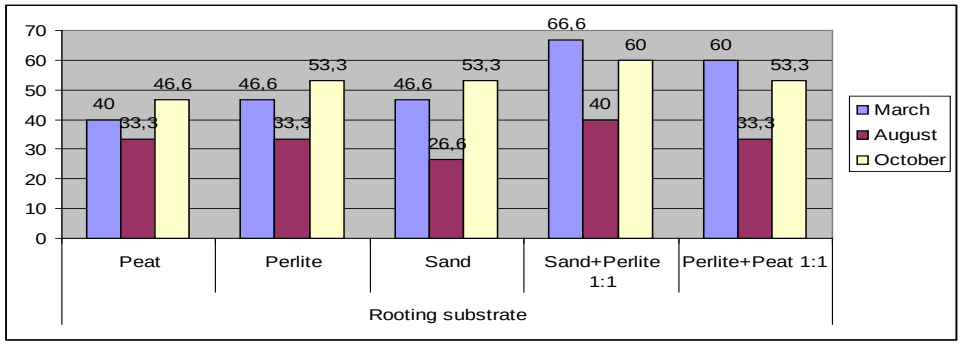

Fig. 6. The rooting percentage for basal shoots of *C. japonica* (%) - 2005

Regarding the average rooting during the vegetation period we noticed that: the year 2003 has been the most significantly regarding the average percentage values of the rooted shoots. Thus, in March has been recorded the highest rooting percentage for the species *Cryptomeria japonica* comparative with the years 2004 and 2005 (table 7). In 2004 the average rooting percentage has been significantly in October with 53,9%

comparatively with March and August when there has been recorded average values of 51,9% respectively 27,9% (table 7).Also in 2005 the highest percentage value has been recorded in October with 50,6% comparatively with the previous period March and August with percentage value 49,2% respectively 32,6%.

CONCLUSIONS

During 2003 the best results for the vegetative propagation for the spesies has been obtained using basal shoots on the rooting substrate made from sand + perlite 1:1, on which 73,3% shoots rooted from the shoots made in March.

In 2004 the percentage of rooted shoots has been of 66,6%, using apical shoots made in October, the same value has been recorded for the basal shoots made in March on the rooting substrate made from perlite + peat 1:1.

In 2005 the highest rooting percentage 66,6%, has been obtained using basal shoots in march on the rooting substrate made from sand + perlite 1:1. Regarding the basal shoots the rooting percentage has been of 66,6% made in March on the rooting substrate made from sand + perlite 1:1. The highest percentage 55,9% of the rooting average has been recorded in March 2003.

From the three year of research regarding the vegetative propagation of the species *Cryptomeria japonica* it come out that favourable period has been March 2003, on the substrate made from sand + perlite 1:1 with a percentage of 73,3% from the basal shoots (significantly percentage).

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ASSESSMENT OF THE PEDOCLIMATIC POTENTIAL FOR ECOLOGICAL VEGETABLE GROWING IN IASSY COUNTY

EVALUAREA POTENȚIALULUI PEDOCLIMATIC PENTRU LEGUMICULTURA ECOLOGICĂ ÎN JUDEȚUL IAŞI

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Abstract. *Research carried out in six communes of Iassy county with largest area, greatest yields and a well-known tradition. The main criteria for assessment are based on emplacement of the vegetable fields and pedological and climatic characterizations. The results show that there are very favourable conditions for onion, carrot, cabbage, cucumber and leafy vegetable crops and favourable conditions for thermophilic vegetable as tomato, pepper and egg plant crops.*

Rezumat. *Cercetările au fost realizate în şase comune din județul Iaşi cu cele mai mari suprafețe şi producții de legume şi cu o tradiție recunoscută. Au fost culese informații privind amplasamentul terenurilor legumicole, caracterizarea pedologică şi climatică, în comparație cu un standard optim. Rezultatele demonstrează că sunt întrunite condiții foarte favorabile pentru culturile ceapă, morcov, varză, castraveți şi legume verdețuri şi favorabile pentru legumele termofile ca tomate, ardei şi pătlăgele vinete.*

Iaşi county, although situated in north-eastern hillocky area of România, has great possibilities for vegetables growing, a few microzones like those around Tg. Frumos town or those from Lunca Prutului became traditional zones.

In the last years, 12000 hectares have been cultivated with vegetables, in Iaşi county, obtaining over 13-14 t/ha of average production (Statistical Yearbook of Romania, 2005).

Onion, garlic, carrot, parsly, cabbage, cucumber, pepper and tomato crops find extremely favourable conditions in traditional microzones.

The main propitious factors for a sustainable development of a vegetable crop are: environmental conditions, tradition and know-how as well as a good market (towns of Iaşi, Paşcani, Tg. Frumos, Huşi and Hîrlău).

These circumstances generated the idea of assessing the promoting possibilities for the ecological vegetable crops. Following the technical exigencies demanded by this system. In this paper, the evaluation of the pedoclimatic potential belonging to this vegetables production was proposed.

MATERIAL AND METHOD

The researches were carried out in six places from Iaşi county: Belceşti, Bosia, Focuri, Golăeşti, Răducăneni and Tg.Frumos. The tradition as well as the area and relatively high yield were the criterions for choosing this places. The assessmant of the pedoclimatic potential for vegetable yield has been made using the informations regarding the location of the vegetable plots, pedological and climatic characterization compared to an optimum standard.

Data collection was carried out by field documentation using pedological and climatic data from the pedological and agrochemical county's offices but also from the nearest weather station.

RESULTS AND DISCUSSIONS

The importance of the vegetables grown in the studied communes occurs from table 1.

Table 1

Vegetable yield in by communes

Commune	Total surface (ha)	Total yield (t)	Average yield (kg/ha)	Main cultures (ha)
Belceşti	500	8658	17315	Tomatoes (75), carrot (55), onion (80)
Bosia	245	3029	12367	Cabbage (50), pepper (40), onion (25)
Focuri	289	3893	13471	Onion (50), cabbage (50), tomatoes (40)
Golăeşti	241	3670	15245	Tomatoes (40), cabbage (40), pepper (40)
Răducăneni	320	4535	14173	Tomatoes (60), cabbage (60), onion (30), cucumber (30)
Tg. Frumos	250	4473	17891	Carrot (50), cabbage (50), cucumber (30)

Technical information regarding the placement and the cultivation system occurs from table 2.

Table 2

Placement and cultivation systems used in communes

Commune	Placement				Cultivation systems		
	meadow	terrace	plateau	easily flooded soil	field	polytunnel	greenhouse
Belceşti	x	x	x	x	x	x	
Bosia	x	x	x	x	x	x	x
Focuri	x	x	x	x	x	x	x
Golăeşti	x	x	x	x	x	x	x
Răducăneni	x	x	x	x	x	x	x
Tg. Frumos	x	x	x	x	x	x	x

Vegetable crops from the studied communes are on meadow lands, often on easily flooded lands and also on terraces and plateaus. The vegetables are cultivated mainly in the fields, followed by polytunnels (the biggest area in Tg. Frumos) and much more less in greenhouses (under 2,5 ha).

The pedological characterization of the cultivated fields occurs table 3.

Table 3

Pedological characterization of vegetable fields

Location	Geomorphology	Lithology	Soil type	
			Name	Characteristics
Belceşti	hills and hillocks with valleys and meadows in between	loess deposits	chernozem rich in humus carbonaceous	loam-clayey texture
			chernozems	loam-clayey texture
			alluvium soils	loam-clayey texture
Bosia	Lunca Prutului, terraces I and II	alluvial deposit	solonetz on fluviatile materials	clayey texture
			epicalcaric chernozems	loam-clayey texture
			carbonaceous chernozem	loam-clayey texture
Focuri	fragmentated plateau with aspect of a hill and meadow	loess deposits	epicalcaric chernozems	medium loam texture
			mezocalcaric cambic chernozems	medium loam texture

Location	Geomorphology	Lithology	Soil type	
			Name	Characteristics
Golăeşti	Lunca Prutului, terraces I and II	alluvial deposit	alkali soil on fluviatile materials	clay-loam texture
			epicalcaric rich in humus chernozems	loam-clayey texture
			carbonaceous rich in humus chernozem	loam-clayey texture
Răducăneni	medium altitude plateau, low-medium fragmentated	Loess deposits, gault clay, sandstone and sands	cambic chernozems	loam texture
			mezocalcaric cambic chernozems	loam texture
Tg. Frumos	hills and hillocks with valleys and meadows in between	loess deposits	mezocalcaric cambic chernozems	loam-clayey texture
			proxycalcaric chernozems	loam-clayey texture
			epicalcaric rich in humus chernozems	loam-clayey texture

By geomorphological point of view, the vegetables fields are located on meadows and their terraces, but also on valleys, on hill slopes or divided plateaus. Because of that, the fields are parceled into relatively small areas owing good geomorphological conditions.

Soils mainly developed on loess deposits, by assuring them a typical evolution. In Lunca Prutului, Bosia and Golăeşti communes, the deposit is alluvial.

The main soil types are high quality chernozems (in different ways of evolution). In the meadows there are typical soils like solonetz on fluviatile materials, known as very fertile soils able to sustain vegetables growth.

Soils texture is mainly loam-clayey with different evolutionary layers. This texture favorizes the crust developing and confers a middle to hard characteristic.

The vegetable crops sown directly in soil (leafy green vegetables, peas, beans, onion) need special tilling methods for crust control and, then, for loosing the soil.

Climate characterization is specific to the north-eastern romanian area: a temperate continental climate with severe winters and warm summers often droughty. The microclimat main elements of studied communes are presented in table 4.

Table 4

Characterization on the communes microclimat

Location	The annual average temperature (°C)	The annual precipitation (mm)	Potential evapotranspiration (mm)	Aridity factor	Average data		Extreme data			
							The first frost		The last frost	
					The first frost	The last frost	The earliest	The latest	The earliest	The latest
Belceşti	9,6	475	675	28	15.10	17.04	10.09	25.11	2.03	21.05
Bosia	9,6	518	675	26	15.10	17.04	10.09	25.11	2.03	21.05
Focuri	9,2	466	665	24,4	15.10	17.04	10.09	25.11	2.03	21.05
Golăeşti	9,6	518	675	26	15.10	17.04	10.09	25.11	2.03	21.05
Răducăneni	9,5	523	672	27	15.10	17.04	10.09	25.11	2.03	21.05
Tg. Frumos	9,6	475	675	29	15.10	17.04	10.09	25.11	2.03	21.05

The annual average temperature varies around 9,6ºC, without obvious differences. Amount of precipitation is quite different, the annual average values are between 466 mm (Focuri) and 523 mm (Răducăneni). By comparing it with the annual evapotranspiration of 670 mm, the result is that the area is generally drought-stricken and some of the vegetable crops can suffer from, but at the same time, ensure conditions less favourable for the appearance and development of the diseases.

The unfavourable meteorological accidents coast by temperature are relatively reduced. The last frost (in spring) is around 17.04 and the first frost (in autumn) appears near 15.10, resulting a period of more or less six months (181 days) without frost.

Compared with the average values, the latest frost was on 21.05 and the earliest on 10.09, so the termophile vegetables (tomatoes, peppers, eggplants, beans) are damaged or even destroyed.

CONCLUSIONS

1. Vegetables crop from the six studied communes is carried out mainly in the field and then in polytunnels (Tg. Frumos);

2. The fields, wich is practised vegetable growing, are fragmented in relatively small areas, but with good conditions in terms of geomorphologic, fertile soil, suitable for ecological system

3. By climatic point of view, during the growing season, the drought-stricken areas can seriously affect some vegetable crops;

4. The meteorological accidents coast by temperature are relatively reduced, but when occuring can affect or even destroy the termophilic vegetables;

5. In general, the conditions are very favourable for crops like onion, carrot, cabbage, cucumber and leafy green vegetables and favourable for termophilic vegetables as tomatoes, peppers and eggplants.

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YIELD COMPARATIVE STUDY OF SOME LOCAL POPULATIONS OF RUNNER BEAN (*PHASEOLUS COCCINEUS* L.)

STUDIUL COMPARATIV AL PRODUCȚIEI UNOR POPULAȚII LOCALE DE FASOLE MARE (*PHASEOLUS COCCINEUS* L.)

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Abstract. *Ten local populations of runner bean were studied in the environmental conditions from Iassy county. The local populations showed a large variability regarding vigurosity, flower colour, size, shape and colour of grains. The highest yields were obtained by the local populations Coccineus 5 (3946 kg/ha), Coccineus 2 (2809 kg/ha) and Coccineus 9 (2608 kg/ha).*

Rezumat. *Zece populaţii locale de fasole mare au fost studiate în condiţiile de cadru natural din zona judeţului Iaşi. Populaţiile locale au prezentat o mare variabilitate în ceea ce priveşte vigoarea plantelor, culoarea florilor, dimensiunea, forma şi culoarea semințelor. Cele mai ridicate producţii s-au înregistrat la populaţiile Coccineus 5 (3946 kg/ha), Coccineus 2 (2809 kg/ha) şi Coccineus 9 (2608 kg/ha).*

Runner bean (*Phaseolus coccineus* L.) is a species well known in our country, but on areas relatively small, being met especially into population gardens from rural area. The plant is grown especially for its dried or green beans. The forms cultivated for pods are less known.

The species is original from South America, being brought at the same time with common bean (*Phaseolus vulgaris* L.), without making a net distinction between those two species. In Europe it is known since 17^{th} – 18^{th} century and in our country since 18^{th} – 19^{th} century (Stan and colab. 2003). In Romania are known exclusively climbing forms.

Runner bean found favourable conditions for growing and this fact was demonstrated by its large currency in all country areas, because of its alimentary and ornamental utilities. Despite of all these aspects, the species did not imposed as a species with an economical importance, probably because of the following factors: low attractiveness for climbing forms of bean, less suitable for mechanization, the lack of an ameliorated assortment (being cultivated only local populations), variable yields from one year to another (depending on meteorological conditions), the lack of a modern or/and standard growing technology and others.

The lack of systematized (scientific) knowledge about biology and ecology of the species in the specific conditions from our country was also an element that had a contribution to the reduced "progress" of this species.

Previous studies (Munteanu, 2006; Popa and colab. 2006; Munteanu and colab. 2007; Popa and colab. 2007) underlined the large diversity of the existent populations in the collection of University of Agricultural Sciences and Veterinary Medicine Iasi from different perspectives: morphological, physiological and agro productive. The yield is considered to be a determining factor for the promotion of a new cultivar. Therefore, our research aimed to evaluate production capacity of some valuable local populations.

In order to accomplish the proposed aim, some objectives have been settled: (1) – general characterization of studied populations and (2) – comparative evaluation of dried beans production for these populations.

MATERIAL AND METHOD

Table 1

Meteorological data from experimental period (Iaşi, 2005-2007)

Month/decade	Average temperature (°C)				Rain (mm)			
	2005	2006	2007	aver.	2005	2006	2007	aver.
IV/I	9,4	10,2	9,9	9,83	0,0	10,6	4,0	4,86
IV/II	12,9	10,5	10,0	11,13	10,6	41,2	16,6	22,8
IV/III	9,6	13,6	13,0	12,06	98,6	1,2	9,0	36,26
Average for April	10,7	11,4	11,0	11,03	109,2	53,0	29,6	63,93
V/I	14,0	12,6	13,6	13,40	99,6	12,2	4,0	38,60
V/II	14,9	17,2	20,3	17,46	19,2	7,2	4,2	10,20
V/III	20,5	17,9	24,5	20,96	12,0	43,2	25,2	26,80
Average for May	16,6	16,0	19,6	17,40	130,8	62,6	33,4	75,60
VI/I	16,8	15,9	22,7	18,46	51,0	64,4	1,2	38,86
VI/II	19,9	19,0	23,8	20,90	23,4	14,6	8,0	15,33
VI/III	20,2	24,1	22,8	22,36	22,2	3,4	12,8	12,80
Average for June	19,0	19,7	23,1	20,60	96,6	82,4	22,0	67,00
VII/I	20,4	21,2	23,9	21,83	84,6	16,2	7,0	35,93
VII/II	21,3	20,1	25,4	22,26	20,0	71,2	32,6	41,26
VII/III	24,5	23,2	26,3	24,66	10,6	11,4	5,4	9,13
Average for July	22,2	21,6	25,2	23,00	115,8	98,8	45,0	86,53
VIII/I	22,2	22,0	20,7	21,63	27,4	12,6	73,0	37,66
VIII/II	20,1	23,1	23,7	22,30	42,4	29,4	4,0	25,26
VIII/III	21,1	18,7	23,4	21,06	12,0	45,8	35,6	31,13
Average for August	21,0	21,2	22,6	21,60	81,8	88,0	112,6	94,13
IX/I	18,6	17,3	17,0	17,63	0,0	12,6	50,2	20,93
IX/II	17,5	16,4	15,1	16,33	7,6	0,0	37,6	15,06
IX/III	16,0	16,6	15,8	16,13	0,2	2,6	0,0	0,93
Average for Sept.	17,4	16,8	16,0	16,73	7,8	15,2	87,8	36,93
X/I	14,6	16,9	13,9	15,13	0,0	7,6	7,9	5,16
X/II	8,8	9,2	9,4	9,13	25,6	7,8	3,4	12,26
X/III	8,8	11,3	8,9	9,66	1,4	9,2	36,4	15,66
Average for Oct.	10,7	12,4	10,7	11,26	27,0	24,6	15,9	11,02
Average TOTAL	16,8	17,01	18,3	17,37	81,28	60,65	49,47	62,16

The research was accomplished in the experimental field of Faculty of Horticulture during 2005-2007. The experiences were settled on an average leached chernozem (cambic) with an average supply of nutritive elements, 3,8% organic matter and an pH of 5,8. Meteorological conditions (average temperature and rains) during the vegetation period are presented in the table 1.

Experimental variants consisted in 10 local populations (table 2) considered "perspective" species from the productivity point of view (based on the evaluation made in the collection).

Table 2

Experimental variants

Variant		Source (citycounty)	Reference data Flowers and seeds colour
No.	Specification		
1.	Coccineus 1	Great Britain	White flowers, white seeds
2.	Coccineus 2	Great Britain	White flowers, white seeds
3.	Coccineus 3	Galaţi	White flowers, white seeds
4.	Coccineus 4	Bacău	White flowers, white seeds
5.	Coccineus 5	Vaslui	White flowers, white seeds
6.	Coccineus 9	Bacău	White flowers, white seeds
7.	Coccineus 10	Iaşi	White flowers, white seeds
8.	Coccineus 12	Botoşani	Red flowers with white wings, beige seeds with brown drawing
9.	Coccineus 16	Suceava	Red flowers, lilac seeds with black drawing
10.	Coccineus 17	Iaşi	Red flowers, lilac seeds with black drawing

The experience was settled in a experimental plot of randomized blocks with three repetitions and the size of each variant from repetition being of 8 m^2 (1,60 m x 5,00 m). The crop was made by direct sowing during 3^{rd} –10^{th} of May depending on meteorological conditions of experimental years. The sowing was accomplished in nests, each of them with three seeds at 50 cm, on equidistant rows at 80 cm, resulting a density of 25 000 nests (75 000 plants)/ha. In each plot – variant from the repetition were placed 20 nests (60 plants).

The plants were tied with synthetic strings as in figure 1 (after Munteanu and colab. 1989) on an individual trellis for every row.

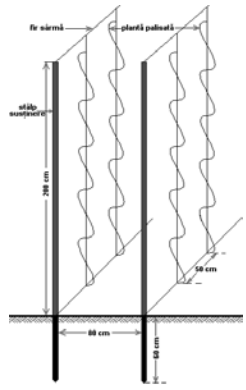

Fig.1. – Possibility of tiding the plants of runner bean

During fertilization period were applied common care operations: 3-4 annual hoeing, phase fertilization with almost 300 kg of complex chemical fertilizers (NPK), drip irrigation once a week, treatments to control bean's ladybug (three times at two weeks during blooming period).

During vegetation period some observations and biometric determinations were accomplished regarding the main morphological, physiological and yields characteristics. Experimental data regarding the yield were statistically worked by using analysis of variance and yield differences were appreciated by using differences – limit based on Student (t) test (Săulescu and Săulescu, 1967).

RESULTS AND DISCUSSIONS

General, morphological and physiological characterization of the studied assortment is presented in Table 3.

Table 3

Morpho-physiological characterization of the assortment from comparative crop (Average data, 2005-2007)

Variant	Morphological characters								Physiological characters (days no.)				
	No. of ramifications	Leaves colour	Vigour	Flower colour	Pod size (L/l) (cm)	No. of seeds in pod	Seed size (mm)	Seed colour	Sowing - rising	Rising-first leaf with three lobes	Rising-First flowers	Rising-first pods	Rising-the end of vegetation
C_1	3-4	dark green	big	white	20/1,7	5-7	22	white	7-10	7	35	71	120-125
C_2	4-7	dark green	big	white	17/1,9	4-6	20	white	7-10	8	35	66	120-125
C_3	3-4	green	big	white	10/1,9	2-3	17	white	7-10	3	34	74	120-125
C_4	3-4	green	big	white	10/1,8	2-3	17	white	7-10	3	34	74	120-125
C_5	2-3	dark green	big	white	10/1,9	2-3	19	white	7-10	3	35	73	120-125
C_9	2-3	green	average	white	10/1,8	2-3	18	white	7-10	4	35	70	120-125
C_{10}	2-3	green	average	white	9/1,7	2-3	20	white	7-10	4	33	70	120-125
C_{12}	2-3	dark green	average	red with white wings	11/2,3	3-4	19	beige with brown drawing	7-10	6	32	71	120-125
C_{16}	3-5	dark green	big	red	10/1,9	2-3	17	lilac+ black	7-10	6	34	71	120-125
C_{17}	3-5	dark green	big	red	12/1,6	3-4	17	lilac+ black	7-10	4	33	71	120-125

In accordance with data presented above, it can be noticed a variation of morphological characters into those 10 populations taken for this study. Comparatively, physiological characters presented a relatively restrained

variability; this aspect could be determined of high temperatures which made uniform the behaviour of the populations.

Referring to the dried seeds/beans production; this is presented for each experimental year and as an average for all three years of research.

Table 4

Synthesis data regarding seeds yield

Variant		Dried beans quantity (kg/ha)			
No.	**Specification**	**2005**	**2006**	**2007**	**Media**
1.	Coccineus 1	2712	2010	2164	2295
2.	Coccineus 2	2809	2237	2108	2385
3.	Coccineus 3	1733	1548	916	1399
4.	Coccineus 4	1507	1445	1369	1440
5.	Coccineus 5	2946	2701	2239	2629
6.	Coccineus 9	2608	2380	1755	2248
7.	Coccineus 10	2348	2160	1852	2120
8.	Coccineus 12	1460	1401	1493	1451
9.	Coccineus 16	1506	1395	1313	1405
10.	Coccineus 17	2576	2407	2449	2477
Experience average $\overline{x}$		2221	1968	1766	1985

According to table 4, total yield of dried beans varied in large limits, being of 2946 – 916 kg/ha during those three experimental years with an average of experience of 1985 kg/ha.

The yield obtained in 2005 is presented in table 5.

Table 5

Dried beans yield in 2005

Variant		Yield		Differences face to $\overline{x}$	Differences significance
No.	**Specification**	**Kg/ha**	**% face to $\overline{x}$**		
5.	Coccineus 5	2946	132	+725	Xxx
2.	Coccineus 2	2809	126	+588	Xxx
1.	Coccineus 1	2712	122	+431	Xx
6.	Coccineus 9	2608	117	+387	X
10.	Coccineus 17	2576	115	+355	X
7.	Coccineus 10	2348	105	+127	–
Experience average $\overline{x}$		2221	100	0	
3.	Coccineus 3	1733	78	-488	00
4.	Coccineus 4	1507	67	-714	000
9.	Coccineus 16	1506	67	-715	000
8.	Coccineus 12	1460	65	-761	000

DL 5% = 270 kg/ha
DL 1% = 409 kg/ha
DL 0,1% = 587 kg/ha

As it can be noticed in table above, the highest yield registered in the case of Coccineus 5 population (2946 kg/ha) with a very significant positive difference toward the experience average (2221 kg/ha). In the same time, the lowest value registered at Coccineus C_{12} (1460 kg/ha), with very significant negative differences

face to the experience average. Growth face to average also registered at C_2, C_1, C_9, C_{17}, C_{10} populations, while inferior yields being obtained in the case of C_3, C_4, C_{16} and C_{12} populations. The yield obtained in 2006 is presented in table 6.

Table 6

Dried beans yield in 2006

Variant		Production		Differences face to $\overline{x}$	Differences significance
No.	Specification	Kg/ha	% face to $\overline{x}$		
5.	Coccineus 5	2701	137	+733	xxx
10.	Coccineus 17	2407	122	+439	xx
6.	Coccineus 9	2380	121	+412	xx
2.	Coccineus 2	2237	114	+269	x
7.	Coccineus 10	2160	110	+192	–
1.	Coccineus 1	2010	102	+42	–
Experience average $\overline{x}$		1968	100	0	
3.	Coccineus 3	1548	79	-420	00
4.	Coccineus 4	1445	73	-523	00
8.	Coccineus 12	1401	71	-567	00
9.	Coccineus 16	1395	71	-573	00

DL 5% = 248 kg/ha
DL 1% = 377 kg/ha
DL 0,1% = 638 kg/ha

In 2006 the dried beans yield varied between large enough limits into the assortment. The biggest yield was obtained at Coccineus 5 population (2701 kg/ha) and the smallest was obtained at Coccineus 16 population while the experimental average was of 1968 kg/ha. Positive differences face to average were accomplished by Coccineus 17, Coccineus 9, Coccineus 2, Coccineus 10, Coccineus 1 populations while negative differences were noticed at Coccineus 3, Coccineus 4, Coccineus 12 and Coccineus 16 populations.

The yield obtained in the experimental year 2007 is presented in table 7.

Table 7

Dried beans yield in 2007

Variant		Yield		Differences face to $\overline{x}$	Differences significance
No.	Specification	Kg/ha	% face to $\overline{x}$		
10.	Coccineus 17	2449	139	+683	xxx
5.	Coccineus 5	2239	127	+473	xxx
1.	Coccineus 1	2164	123	+398	xx
2.	Coccineus 2	2108	119	+342	xx
7.	Coccineus 10	1852	105	+86	–
Experience average $\overline{x}$		1766	100	0	
6.	Coccineus 9	1755	99	-11	–
8.	Coccineus 12	1493	85	-273	00
4.	Coccineus 4	1369	78	-397	00
9.	Coccineus 16	1313	74	-453	000
3.	Coccineus 3	916	52	-850	000

DL 5% = 178 kg/ha
DL 1% = 267 kg/ha
DL 0,1% = 431 kg/ha

Comparing with previous year, in 2007 the dried beans yield was more reduced. On average, its value was of 1766 kg/ha. The yield varied from 2449 kg/ha (Coccineus 17) to 916 kg/ha (Coccineus 3). As it can be noticed, Coccineus 17 population accomplished a yield superior to average with a significant difference. The results also demonstrate negative differences than average for Coccineus 3, Coccineus 4, Coccineus 9, Coccineus 12 and Coccineus 16 population.

The average yield accomplished during 2005-2007 is presented in table 8.

Table 8

Dried beans yield during 2005–2007

Variant		Yield		Differences face to $\overline{x}$	Differences significance
No.	**Specification**	**Kg/ha**	**% face to $\overline{x}$**		
5.	Coccineus 5	2629	132	+644	xxx
10.	Coccineus 17	2477	125	+492	xx
2.	Coccineus 2	2385	120	+400	xx
1.	Coccineus 1	2295	116	+310	x
6.	Coccineus 9	2248	113	+263	x
7.	Coccineus 10	2120	107	+135	–
Experience average $\overline{x}$		1985	100	0	
8.	Coccineus 12	1451	73	-534	000
4.	Coccineus 4	1440	72,5	-545	000
9.	Coccineus 16	1405	71	-580	000
3.	Coccineus 3	1399	70	-586	000

DL 5% = 254 kg/ha
DL 1% = 386 kg/ha
DL 0,1% = 521 kg/ha

After three experimental years, the highest average yield was registered at Coccineus 5 (2629kg/ha) population, in the conditions of an experimental average of 1985 kg/ha. With one exception (from 2007) the Coccineus 5 population had the best results in the assortment taken for study. This population accomplished (during the experimental period) yields very significant from a statistic perspective.

CONCLUSIONS

1. Meteorological conditions from experimental period were average favourable to runner bean crop; the exception was registered in 2007 that presented a major risk factor: the drought from atmosphere.

2. The dried beans yield (over all three experimental years) varied in large limits (between 2946 – 916 kg/ha) into the assortment taken for study.

3. For both 2005 and 2006, as for all years taken as average, the highest yield was accomplished at Coccineus 5 local population with an multiannual average of 2629 kg/ha. Coccineus 5 obtained in all yield years results that framed

between 2239 – 2946 kg/ha with significant positive differences than experimental average.

4. Comparing with Coccineus 5 population, during experimental period Coccineus 1, Coccineus 2, Coccineus 9, Coccineus10 and Coccineus 17 populations assured yields with positive differences than average while Coccineus 3, Coccineus 4, Coccineus 12 and Coccineus 16 populations registered yields with negative differences than average.

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THE INFLUENCE OF ORGANIC FERTILIZATION OVER GROWTH AND FRUCTIFICATION ELEMENTS OF TOMATOES – RADA HYBRID

INFLUENȚA FERTILIZĂRII ORGANICE ASUPRA UNOR ELEMENTE DE CREŞTERE ŞI FRUCTIFICARE LA TOMATE - HIBRIDUL RADA

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Abstract. *In order to realize an ecological cultural environment, we proposed that for tomatoes, Rada hybrid, to use organic materials as fertilizers, which can be gathered from natural sources. Using for planting hole fertilization garden-mould, fermented marc and forest soil, both simple and in mixes, we were able to record differences regarding growth and development rate of the plants, as well as productivity increases, especially early productions. As a result, we studied the growth rate dynamic, which at the time of the top removal for fertilized variants, recorded an increase compared to the witness of up to 21,7% for the height of the plants, up to 17,9% for the diameter and up to 25,4% for leaf numbers. The number of inflorescences per plant was between 5,4 – 6,8% with an increase of up to 25,9%, while the productivity differences were up to 26,4%.*

Rezumat. *Pentru realizarea unui mediu de cultură cât mai ecologic, ne-am propus ca pentru tomate, hibridul Rada, să utilizăm ca fertilizanți, materiale organice, care pot fi procurate din resurse naturale. Folosind pentru fertilizarea la cuib mranița, tescovina fermentată, pământul de pădure – simple sau în amestecuri, s-a reuşit a se obține diferențieri în privința ritmului de creştere şi dezvoltare al plantelor şi sporuri de producție, în special timpurie. Ca atare s-a urmărit în dinamică creşterea plantelor, care în momentul cârnitului la variantele fertilizate s-au înregistrat sporuri față de martor de până la 21,7% pentru talie, de până la 17,9% pentru diametru şi de până la 25,4% pentru numărul de frunze. Numărul de inflorescențe pe plantă a oscilat între 5,4 – 6,8%, cu un spor de până la 25,9%, iar diferențele de producție s-au ridicat la 26,4%.*

MATERIAL AND METHODS

The researches were carried at the vegetables growth sector of the Horticulture Faculty from Craiova, within Banu Mărăcine Didactical Station.

Five variants were taken into study (V1 – V5), of which specific is represented by the use of organic materials, composted in advance, simple or mixed and which represented the base for organic fertilization, alongside an witness variant that wasn't organically fertilized (V6).

The experiments were set up in the field, early culture, by using Rada hybrid, which was planted at the beginning of may, taking into account the environmental conditions. The experiment had three repetitions.

During the vegetation period, growth and fructification elements of the tomato hybrid were studied in accordance with the specific of the variants. This specific is presented with the help of tables that present data of the analyzed elements.

RESULTS AND DISCUSSIONS

Based on determinations and observations recorded in dynamic, values of morphological and production elements were recorded which are presented in tables 1 and 2 as well as chart number 1.

A synthesis of growth elements that report to height variations, diameter and medium number of leafs, under the aspect of absolute and relative values and with the absolute differences per variants are presented in table 1.

It is ascertainable that regarding the height, the witness variant (V6) was surpassed by all the organic fertilized variants, with absolute values of 4,0 – 30,2cm, the highest values being recorded for V5, which surpassed the witness by 30,2cm (21,7%) and V4 with a difference of 18,6 cm (13,5%).

Regarding the diameter of the plants, the values are between 9,36 – 10,82 mm for the organic fertilized variants, compared with 9,18mm recorded by the witness, and the absolute values were 0,18 – 1,64 mm (2,0 – 17,9%) with smaller differences in report with the witness, but with the highest recorded values for the same variants.

Differences were recorded regarding the number of leafs per plant, with absolute values of 1,4 – 4,0 and relative values of 9,8 – 28,2%.

The most obvious differences were manifested in the case of variants fertilized with garden mould mixed with forest soil, but are also considered the values recorded by the variants of garden mould mixed with marc, the latter being found in sizeable quantities within the station due to the presence of a winery.

Table 1

THE INFLUENCE OF ORGANIC FERTILIZATION OVER THE GROWTH ELEMENTS OF TOMATOES, RADA HYBRID, AT THE TIME OF TOP REMOVAL

Variant	Specif. var.	Height			Plant diameter			No. of leafs		
		cm	± d. cm	%	mm	± d. mm	%	Nr.	± d nr.	%
V1	Fert. with garden mould	146,0	8,0	105,8	9,36	0,18	102,0	16,0	1,8	112,7
V2	Fert. with marc	148,0	10,0	107,2	9,42	0,24	103,1	16,2	2,0	114,1
V3	Fert. with forest soil	142,0	4,0	102,3	9,88	0,70	107,6	15,6	1,4	109,8
V4	Fert. with g. mould + marc	156,6	18,6	113,5	10,74	1,56	117,0	17,8	3,6	125,4
V5	Fert. with g. mould + forest soil	168,0	30,2	121,7	10,82	1,64	117,9	18,2	4,0	128,2
V6	Mt. - unfertilized	138,0	Mt.	100,0	9,18	Mt.	100,0	14,2	Mt.	100,0

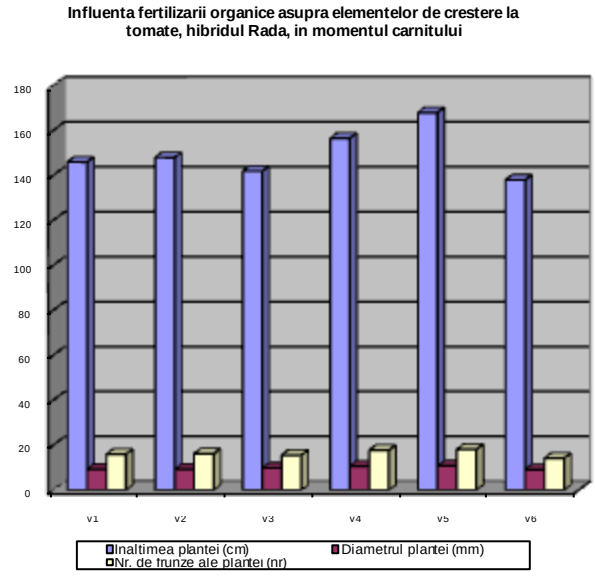

Fig.1 – The influence of organic fertilization over the growth elements of tomatoes, Rada hybrid, at the time of top removal

The fructification elements are presented in table 2 and are reported to the number of inflorescences, number of harvestable fruits, medium weight of the fruits, respectively obtained and statistically calculated productions.

Tabelul 2

THE INFLUENCE OF ORGANIC FERTILIZATION OVER THE FRUCTIFICATION ELEMENTS OF TOMATOES (Rada F1)

Var	Inflorescences/ plant		Harvestable fruits/ plant		Medium weight of the fruit		Production / plant	
	Nr.	%	Nr.	%	g/fruit	%	kg	%
V1	5,8	107,4	21,0	105,0	70,2	106,36	1,474	111,67
V2	5,8	1107,4	22,0	110,0	64,2	97,27	1,412	107,00
V3	5,7	105,5	21,0	105,0	66,4	100,61	1,394	105,60
V4	6,6	122,2	21,0	105,0	74,4	112,73	1,562	118,33
V5	6,8	125,9	22,0	105,0	75,8	114,85	1,668	126,40
V6	5,4	100,0	20,0	100,0	66,0	100,0	1,320	100,0

Differences were recorded regarding the fructification elements, the most prolific variants being, as it can be noticed from table 2, variants 4 and 5 which surpassed the witness with up to 25,9% regarding the number of inflorescences, and up to 14,85% regarding the medium weight of the fruits, the medium number of harvestable fruits per plant recording smaller differences.

The medium production per plant varied between 1,394 – 1,668 kg at V1-V5 compared to 1,320 kg at V6 (Wt) the percentage difference being up to 26,40%.

The recorded and statistically calculated production (table 3) presents high values, between 55,76 – 66,74 t/ha at V1 – V5 compared to 52,80 t/ha at V6 (Wt). The absolute production differences are between 2,96 – 13,94 t/ha, which represents a percentage increase of 5,60 – 26,40%, increases that are statistically assured as significant at V1, distinctly significant at V4 and very significant at V5.

Tabelul 3

THE FRUIT PRODUCTION PER HECTAR – UNDER THE INFLUENCE OF THE ORGANIC FERTILIZATION (Rada F1)

Var.	The specific of the variants	Production		%	Significance
		t/ha	±d. t/ha		
V1	Fert. with garden mould	58,96	+ 6,18	111,67	X
V2	Fert. with marc	56,48	+ 3,68	107,00	–
V3	Fert. with forest soil	55,76	+ 2,96	105,60	–
V4	Fert. with g. mould + marc	62,48	+ 9,68	118,33	XX
V5	Fert. with g. mould + forest soil	66,74	+ 13,94	126,40	XXX
V6	Mt. - unfertilized	52,80	Mt.	100,0	–

CONCLUSIONS

Morphological elements of the plants, per variant have presented differences between them as well as the witness that are explained as a result of the organic fertilization.

Compared to the witness the height of the plants presented increases of up to 21,7%, the diameter an increase of up to 17,9% and the medium number of leafs increased up to 18,2%.

The values of the fructification elements for the fertilized variants were situated with 25,9% over the witness regarding the medium number inflorescences per plant, with up to 14,85% regarding the medium weight of a fruit.

The production increase per plant as well as production per variant, presented different values, the increases being of 5,60 – 13,94 t/ha and the relative differences being of 5,6 – 26,4%, the best statistical assurance being at V4 – distinctly significant and V5 very significant.

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THE INFLUENCE OF THE SOIL MULCHING BY POLYETHYLENE FILM ON LETTUCE IN PROTECTED CULTURE

INFLUENȚA MULCIRII SOLULUI CU POLIETILENĂ ÎN CULTURA PROTEJATĂ A SALATEI

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Abstract. *The present paper shows the results of experience concerning the effect of mulching soil with two types of polyethylene films (black and silver) on the growing, production and quality of lettuce in protected culture. The experience followed during two years since 2006 until 2007. Regardless the type of the mulching films, the production increased with 42%, and we obtained a higher quality of the rosette. By mulching the soil with silver polyethylene film, were obtained a rosette with an average weight between 216 and 261g, and an average diameter between 24.5-24.58cm. Compare with the control - no mulching (average weight 136.75-178.66g and rosettes diameter 21.08-22.33cm), a higher results were found in the case of mulching with black polyethylene film, were obtained a rosette with an average weight between 187.25-226 g and an average diameter between 24.66-25.75cm. The results showed also multiple advantages of soil mulching contributing to the extension of an important part in the vegetables crops.*

INTRODUCTION

It is known that soil mulching give better results for all the vegetable species, especially in the first phases of vegetation for the plants with habits reduce: lettuce, spinach, cauliflower and pepper, (R.Ciofu and colab. 2003).
With all the multiple advantages of soil mulching, this technique isn't wildly used in our country, we hope in this paper to contribute for the extension of this methods in a large scale to improve the production and vegetable quality.

Lettuce is cold resistant specie, and it is cultivated in early spring and late autumn, in anticipates, associated and successive culture, in the field glace house and tunnel. It is specie with a short cycle of vegetation which has a high income for the farmers, being one of the first vegetables on the market, reducing the stock deficit in the spring period. Using different types of mulching film amplified the temperature modification of the soil with the implication on the root absorption and on growing and plant development respectively.

MATERIAL AND METHODS

This research was made in interval of two years (2006-2007) in the vegetables department of the University of Agronomic Sciences and Veterinary Medicine Bucharest.

The experiment was carried out in the high tunnel covering with transparent polyethylene films in which was mulched with two types of polyethylene films: silver and black compared with a control (no mulched).

The monofactorial experiment was organized following the linear block method with 4 repetitions, on an area of 120 m^2

The lettuce culture was established following a planting scheme with 2 rows distanced 30+40 /25 cm resulting 12 plant in square meter.

The following variants resulted:

- **V1 - Control - without mulch**
- **V2 - PE silver mulch**
- **V3 - PE black mulch**

The studied specie – had lettuce *Ilona* variety

For all the variants were applied uniform maintenance conform to the technology of growing lettuce in the tunnel.

Observations and measurements

It is known that the lettuce is a sensible specie, with a fast reaction with the micro-climate modifications, by growing these plants in tunnels in mulched conditions with different film types (black and silver), we investigate the mode in which the plant react with the new conditions of development and what are the implications on the production level and vegetable quality. The determinations of the lettuce rosette weight, diameter and root system in the harvest time for each variant separately. In each repetition were analyzed 10 plants.

The statistical analyses we conducted Tukey test.

RESULTS AND DISCUSSIONS

Soil mulching has increased the rosette diameter in those two years of culture with a significant difference (10-22%) compared with the control (non mulched variant) indifferent of the film color.

Between those two types of mulching film, in 2006 was observed a significant increasing of the rosette diameter (6%) for the variant mulched with black film (V3), but in 2007 the difference was non significant - 0.36%, (Fig. 1).

Table 1

The influence of soil mulching on the lettuce rosette diameter

Variant	*2006*			*2007*		
	Rosette diameter cm	***Takey Test***	***Differences from the control (%)***	***Rosette diameter cm***	***Takey Test***	***Differences from the control (%)***
V1 - Control without mulch	*21.08*	*c*	*100*	*22.33*	*b*	*100*
V2 - PE silver mulch	*24.50*	*b*	*116*	*24.58*	*a*	*110.07*
V3 - PE black mulch	*25.75*	*a*	*122*	*24.66*	*a*	*110.43*
	Sd = 0.5682; GL = 36			Sd=1.3351; GL = 36		

Table 2

The influence of soil mulching on the lettuce rosette weight

Variants	2006			2007		
	Rosette weight g	Tukey Test	Difference from the control (%)	Rosette weight g	Tukey Test	Difference from the control (%)
V1 - Control without mulch	178.66	c	100	136.75	c	100
V2 PE silver mulch	261.58	a	146	216.50	a	158
V3 PE black mulch	226	b	126	187.25	b	137
	Sd = 16.195 GL = 36			Sd = 22.859 GL = 36		

By soil mulching with film PE was observed a significant increasing of the rosette weight in comparison with the control by (26-58%).

Regarding the mulching influence on the lettuce rosette weight was observed the fact that indifferent the year of culture, the mulched variants covered with silver polyethylene film give the best results (261g/piece), with a difference of 46-58% with the control and 16% with the black film (tab. 2).

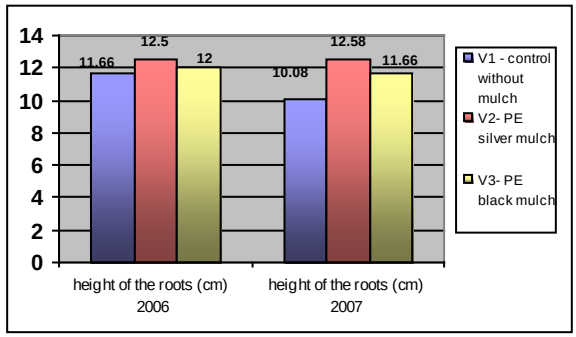

Fig. 1. Influence of soil mulching on the height of the lettuce roots

Mulching the soil influence the growing of the radicular system of the lettuce plants. In those two years, the height and the weight of the root system were superior to the control.

In 2006 the height of the root system had an average of 0.84cm for the silver PE mulched and with 0.34 cm for the black bigger than the control (non mulched), but in 2007 the differences were 2.5cm and respective 1.08cm (fig.1).

The mulching influence on the weight of the root system was much higher than in the case of their height. In 2006 were registries significant difference with the control, 2.59g for the silver film and 2g for the black one. In 2007 differences were significant in

comparison with the control (2.92-3.25g) and between the film types. The best results were obtained for the mulched variant with silver PE (fig.2).

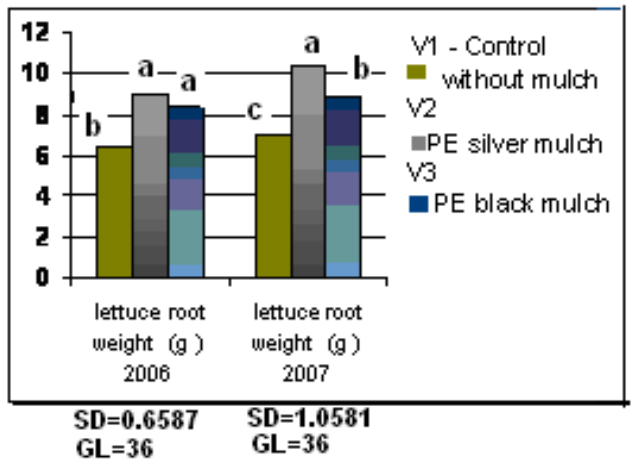

Fig. 2. Influence of soil mulching on the lettuce root weight

CONCLUSIONS

- Indifferent the mulching film type it influence significant the diameter increasing (10-22%) and a weight of the lettuce rosette (26-58%).
- The black film influences the increasing of the rosette diameter, but the silver film determines the increasing of the lettuce rosette weight.
- The mulched soil to favor the increasing of the root system, silver film help to get a good result regarding the height and the weight of the roots.
- By the benefic influence on the increasing the capacity of the root system to help the plant to get water and nutritive elements, soil mulching determine the increasing of the lettuce rosette and implicit the production.

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AGROBIOLOGICAL STUDY OF SOME CLIMBING GARDEN BEAN VARIETIES AND LOCAL POPULATIONS

STUDIUL AGROBIOLOGIC AL UNOR CULTIVARE ŞI POPULAŢII LOCALE DE FASOLE URCĂTOARE

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Abstract. *The paper present information about the main morphological and physiological and productive characteristics of ten varieties and local population of climbing garden bean. The research was carried out at the Vegetable Research Station Bacau, during 2002-2004, period in the open field environmental conditions.*

The studied biological material shows a large variability regarding shape, size and color of pods and grains; also a great variability has the number of pods/plant. The most productive variants (varieties) were Verba, Aurie de Bacau and Violeta.

Rezumat. *Lucrarea prezintă informaţii despre principalele caracteristici morfologice, fiziologice şi productive a zece cultivare şi populaţii locale de fasole de grădină urcătoare. Cercetările au fost realizate la Staţiunea de Cercetare şi Dezvoltare Legumicolă Bacău, în perioada 2002-2004, în condiţii de câmp.Materialul biologic studiat prezintă o mare variabilitate privind forma, mărimea şi culoarea păstăilor şi seminţelor; de asemenea o mare variabilitate a prezentat şi numărul de păstăi/plantă. Cele mai productive variante (soiuri au fost Verba, Aurie de Bacău şi Violeta)*

In the North-East and Central area of Moldavia there are known over 150 of local populations of garden climbing beans. Among these a large part is being cultivated as garden beans (of its green pees). From among these there have been created, through specific improvement methods, 4 breeds that in fact represent the official breed for this culture in our country. This breed comprises the breeds (crops): Aurie de Bacău, Verba, Violeta de Iaşi şi Dragomir.

The agro biological study has as goal to put at the disposal of the production and research specialists detailed info regarding the morphological, physiological and production characteristics of some breeds and populations of garden climbing beans, under some very well-defined culture and natural environment

In order to achieve the purpose we have proposed the following:

- describing the morphological characteristics;
- describing the fenological characteristics and the endurance to illnesses;
- evaluation of the production;

MATERIAL AND METHOD

In order to achieve the objectives set in mind, in the period 2002 – 2004 at the Vegetable Research and Development Station Bacau there has been undergone a collection study using a number of 10 breeds and local populations (table 1).

The vegetables cultivators will have at their disposal precise info about the official breeds and local populations that are being cultivated in the area, allowing them to choose in awareness the most suitable breed for culture, according to the conditions and more precisely the demands of the market. The improvers and seed producers will have the possibility to choose in awareness the most suitable material as source of germen-plasma for the improvement works, respectively for creating new cultures. The seed producers will know based on our results, the distinctive characteristics of the cultures form the official list and of the local populations bearing interest to the local cultivators.

Tabel 1.

The collection's experimental variants

Variant		Short description
nr	**specification**	
1	Aurie de Bacău	rosy flower, yellowish long and flat pod, beige - brownish seed
2	Verba	white flower, greenish very long and flat pod, white seed;
3	Violetă de Iaşi	violet flower, violet long and a little flat pod, beige seed
4	Dragomir	white flower, greenish, long and a little flat pod, seed
5	L -1 BC (Bălană)	white flower, yellowish, long and flat pod, dark-brown seed
6	L -3 BC (Verde dungat)	rosy flower, greenish medium long and flat pod, beige seed;
7	L - 8 BC (Grasă)	rosy flower, greenish – mottled, medium long and flat pod, mottled-beige seed;
8	L - 20 BC (Cafea)	violet flower, yellowish long and flat pod, brownish seed;
9	L - 46 BC (Grasă galbenă)	white flower, yellowish, long and flat pod, brownish seed;
10	L - 57 BC (Cartier)	violet flower, yellowish, long and flat pod, yellow-brownish seed

The collection cultivation has been achieved through an own technology, established by SCDL Bacau. The culture took birth by cultivation directly in the field in nests placed on two rows with a 80 cm distance between them, on beds with the width raised to the top beam of 120 cm; each nest has included 4-5 seed (plants), the distance between the nests being of 40 cm. The medium density was of 3.123 nests/m2, respectively 12,5 plants/m2.

The experience was organized in a lineal, superposed gadget, each variant occupying a parcel of 1,6 m x 5 m = 8,0 m^2, on a single raised bed, with two rows of nests, placed on the same espalier, comprising a number of 25 nests, respectively 100 plants.

RESULTS AND DISCUSSIONS

1. Morphological Description

The study of the main morphological characteristics has high lightened that the sort that has been studied presents a rather high variability. At the same time there is a combination noticeable of the characters, thus each variant (species or local population) has its own identity.

The experimental results regarding the morphological description are shown in the table nr. 2

Tabel 2.

The morphologic characterization of the studied assortment (dates from 2002-2004)

Variant		Flower's color	Pod's color	Pod's shape	Presence of threads in the pod*	Seed's color	Seeds form
nr	specificare						
1	Aurie de Bacău	rosy	yellow	flat	a	purple-beige	Reniform
2	Verba	white	green	flat	a	white	Oval
3	Violetă de Iaşi	violet	violet	flat-round	a	light beige	oval-reniform
4	Dragomir	white	green	flat-round	a (Aa)	white	Oval
5	L -1 BC (Bălană)	white	yellow	flat-straight	a (Aa)	brown	Reniform
6	L -3 BC (Verde dungat)	rosy	green	flat	a	purple-beige	Oval
7	L - 8 BC (Grasă)	rosy	mottled-green	flat	a	mottled-beige	Oval
8	L - 20 BC (Cafea)	violet	yellow	flat	a	brownish	Oval
9	L - 46 BC (Grasă galbenă)	white	yellow	flat	Aa	brownish	Elliptic
10	L - 57 BC (Cartier)	violet	pinkish-yellow	flat	a	brownish	Reniform

(*A = with threads; a = without threads; Aa = forms threads at the end of the technological maturity)

2. Fenologic description

The fenology of the assortment demonstrates a relatively reduced diversity of the assortment. This fact can be due to the fact that the entire assortment, both the breeds as well as the local populations have formed (through empirical selection) under similar conditions in the environment and the selection has been achieved mostly due to the production characteristics and less due to the fenologic ones.

Among the fenologic characters studied there has been a special attention granted to the plants' reaction towards the action of the pathologic agents. On the assortment the results prove a reaction manner generally resembling, but also with some obvious differences.

Tabel 3.

The phenologic characterization and disease resistance of the studied assortment (mean dates, 2002-2004)

Variant		Nr of days before			Nr of days until		Illnesses endurance	
nr	specification	blooming	first pods	end of vegetation	first flowers at the end of vegetation	first pods at the end of vegetation	mark	symbol*
1	Aurie de Bacău	38	50	129	90	81	6-7	MR
2	Verba	31	40	122	91	80	6	MR
3	Violetă de Iaşi	29	40	123	90	82	7-8	MR (R)
4	Dragomir	38	52	129	93	82	5-6	MR
5	L -1 BC (Bălană)	36	50	120	83	70	4	MR
6	L -3 BC (Verde dungat)	45	56	127	81	70	6	MR
7	L - 8 BC (Grasă)	44	55	130	86	73	3-4	MR
8	L - 20 BC (Cafea)	40	54	128	88	74	6	MR
9	L - 46 BC (Grasă galbenă)	43	53	129	84	72	4	MR
10	L - 57 BC (Cartier)	40	50	125	84	76	3	S

* R = rezistent; MR = medium rezistent; S = sensible.

1. Productivity description

The crops productivity is a complex characteristic, determined by the density of the pods, the number of pods on the plant, the number of seeds in the pod, the mass of 1000 seeds (MMB), insertion of the first pod (the distance from ground to the firs pods), evaluated productivity of pods and seeds.

The results regarding the main elements of productivity are presented in the table nr.4 and allow a classification of the studied assortment afterwards.

Tabel 4.

The assortment description regarding the main productivity elements (mean dates 2002-2004)

Variant		Nr of pods/ plant	Pod's dimension (cm)			Nr of seeds /pod	MMB	Insertion of the first pods (cm)	Evaluated production	
nr	specificar		lenght	width	thickness				pod (t/ha)	seed (kg/ha)
1	Aurie de Bacău	73	20	1,9	0,6	5-8	520	18-22	36	2400
2	Verba	60	26	2,1	0,9	4-7	710	28-30	42	2800
3	Violetă de Iaşi	66	19	1,2	0,9	5-7	490	30-32	30	2200
4	Dragomir	107	12	1,4	0,7	3-5	430	25-27	30	1800
5	L -1 BC (Bălană)	65	17	2,0	0,7	5-6	420	12-16	34	2000
6	L -3 BC (Verde dungat)	67	17	1,6	0,7	5-7	230	17-20	8	1800
7	L - 8 BC (Grasă)	103	14	1,8	0,5	5-7	525	17-20	29	1800
8	L - 20 BC (Cafea)	68	12	2,1	0,8	4-5	440	19-22	30	2000
9	L - 46 BC (Grasă galbenă)	56	17	2,1	0,9	5-7	410	19-20	35	2400
10	L - 57 BC (Cartier)	59	18	2,0	0,7	6-8	430	16-18	28	2300

CONCLUSIONS

In conclusion the studied assortment comprises species and productive local populations and with a good quality of the pods and at the same time, resistant or sufficiently resistant to the attack of the pathogen agents. In this sense there can be exemplified (in the order of productivity):

1. The Verba species is a highly productive species, with a big pod (both long and wide) with a green colour, without threads and medium resistant to illnesses;

2. The Soul Aurie de Bacău species is a highly productive species, with a big pod (long and wide), without threads, with a yellow colour and with a medium resistance to the main pathogen agents;

3. L-46 Bacău (Grasă galbenă) – population of high productivity, with a big pod (long and wide), with a yellow colour and red spots, without threads and with a medium to low resistance to the main pathogen agents;

4. Violeta de Iaşi – is a species of large to medium production, with a big pod (long and flatten cylindrical) without threads or vellum surface, with a violet colour, medium resistant to the pathogen factors;

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THE PRODUCTION CAPACITY OF AN ASSORTMENT OF CLIMBING GARDEN BEAN CULTIVATED IN ROMANIA

CAPACITATEA DE PRODUCȚIE A UNUI SORTIMENT DE FASOLE URCĂTOARE DE GRĂDINĂ CULTIVAT ÎN ROMÂNIA

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Abstract: *Research was organized at the Vegetable Research Station Bacau, during 2003-2005 period. Biolological material consist of four Romanian cultivars: Aurie de Bacau, Verba, Violeta de Iasi and Dragomir.*

Results are referring to dynamics of yield (during harvesting) period and level of early and total yield. The highest early yield were obtained by cultivars Aurie de Bacau (18,80 t/ha) and Verba (17,10 t/ha). For total yield, the best results were obtained by the cultivar Verba (48,69 t/ha) and Aurie de Bacau (44,57 t/ha).

Rezumat: *Cercetările au fost organizate la Staţiunea de Cercetare Legumicolă Bacău, în perioada 2003-2005. Materialul biologic constă din patru soiuri româneşti Aurie de Bacău, Verba, Violetă de Iaşi şi Dragomir.*

Rezultatele se referă la dinamica producţiei (în timpul recoltării) şi nivelul producţiilor timpurii şi totale. Cele mai timpurii recolte au fost obţinute de soiurile Aurie de Bacău (18,80 t/ha) şi Verba (17,10 t/ha). La producţia totală, cele mai bune rezultate au fost obţinute de soiurile: Verba (48,69 t/ha) şi Aurie de Bacău (44,57 t/ha).

The production capacity is the main agronomic characteristics of an assortment. The production is a character that is appreciated for each plant and in generally it represents the quantity of harvest. Due to the fact that it is quite difficult to establish and would not be utile for the production process, this character is establish per surface unit.

The production or commercial harvest, or what is capitalized reported at one plant, surface unit or time unit, define what is called especially in agrarian economy, productivity, in this peculiar case the varieties (cultivar) productivity.

The present experience aimed toward the appreciation of the production capacity at surface unit, so the productivity of an assortment of varieties (cultivars) that are currently utilized in Romania.

The observations made on productions, realized repeatedly by the researchers and presented in the literature underlined that the productivity of some plants is higher than the average value obtained at population level. This is very

well scientifically justified, but its variability can suggest that the influence of environmental conditions (the one realized in the cultivation technology) is rather high.

For the accomplishment of the goal the following objectives had been analyzed:

- the analysis of production's dynamic and phases;
- the analysis of early production;
- the analysis of total production.

MATERIAL AND METHODS

For the accomplishment of the proposed goal and objectives, during 2003-2005, in the experimental field from V.R.D.S. Bacau, was established a comparative culture with four varieties of climbing garden beans certified in Romania (table 1).

The experience was organized in an arrangement of randomized flats with three repetitions. Each parcel had a dimension of 1,6 m x 6 m = 9,6 m^2 (≈ 10 m^2), corresponding with the norms of experimental techniques for the crops with low density. On each parcel were planned 35 nests, with three plants.

Table 1.

The experimental variants in comparative culture of climbing beans in open field and greenhouse

Variant		Characterization
nr	specificare	
1	Aurie de Bacău	plant with middle vigor, light violet flowers, yellow pods of 17-19 cm length, wide
2	Verba	plant with high vigor, white flowers, green pods of 22-24 cm length, wide
3	Violetă de Iaşi	plant with high vigor, violet flowers, violet pods of 16-18 cm length, cylindrically
4	Dragomir	plant with middle vigor, white flowers, green pods of 14-16 cm, cylindrically

RESULTS AND DISCUSSIONS

1. Results regarding the production's dynamic and phases

The phases of harvests mean the quantity of harvest realized in a certain period of time and offers information regarding the assurance of the market for a certain date or for a certain period. The obtained results regarding the phases of the harvests are presented in table 2.

Table 2.

Pod's harvest echelon within the assortment (mean values 2003-2005)

Variant		Data of harvest's evaluation t/ha					
nr	**Specification**	**Until 10.06**	**10.06-20.06**	**20.06-30.06**	**30.06-10.08**	**10.08-20.08**	**Total**
1	Aurie de Bacău	7,3	11,5	11,6	9,2	4,9	44,5
2	Verba	6,4	10,7	10,7	11,3	9,5	48,6
3	Violetă de Iaşi	6,2	9,0	9,9	8,8	5,6	39,5
4	Dragomir	3,8	7,4	8,1	8,5	5,3	33,1
⊟	Media experienței	5,9	9,6	10,1	9,4	6,3	41,4

The dynamic of harvests means the level of total (cumulated) harvest realized from the beginning of harvest until a certain date (table 3).

For the varieties of climbing beans the early production is reported in the moment in which at least 30% from harvest can be realized. Taking into consideration the experimental dates but especially the average production, on appreciate that the early production can be considered the harvest realized until 20.06. In these conditions, the earliest variety is Aurie de Bacău, with 18,8 t/ha, followed by Verba (17,1 t/ha) and Violetă de Iaşi (15,2 t/ha).

Table 3

The dynamic of pod's harvest within the assortment (mean values, 2003-2005)

Variant		Data of cumulative production evaluation (t/ha)				
no	**Specification**	**10.06**	**20.06**	**30.06**	**10.08**	**20.08**
1	Aurie de Bacău	7,3	18,8	30,4	38,6	44,5
2	Verba	6,4	17,1	27,8	39,1	48,6
3	Violetă de Iaşi	6,2	15,2	25,1	33,9	39,5
4	Dragomir	3,8	11,2	19,3	27,8	33,1
⊟	Media experienței	5,9	15,6	25,7	35,1	41,4

The analysis of early production

The early production in comparative culture was analyzed for each year of production 2003, 2004 and 2005.

The results regarding the early production in the three analyzed years are synthetically presented in table 4.

Table 4

The early production obtained in the three experimental years within the assortment

Variant		Production (t/ha) per year of harvest			
nr	**Specification**	**2003**	**2004**	**2005**	**Media**
1	Aurie de Bacău	23,20	16,78	16,42	18,80
2	Verba	19,00	16,23	16,08	17,09
3	Violetă de Iaşi	19,32	13,28	13,00	15,21
4	Dragomir	13,06	9,86	10,68	11,21
⊟	Experience media	18,65	14,04	14,05	15,58

The media of experience for the three years was of 15,58t/ha, the higher early production was obtained in 2003 year, 18,65t/ha. As a media for the three years, the highest early production was obtained by the variety Aurie de Bacău (18,80t /ha), followed by Vebra (17,10t/ha), Violetă de Iaşi (15,21t/ha) and Dragomir (11,21t/ha).

The early production analyzed as a media for the three experimental years id presented in table 5.

The media of production on the three experimental years revealed the differences of production between the experimental variants in average experimental conditions. From the dates presented in table 4, we concluded that between these three experimental years there are evident differences, and through the variance analysis it results that this differences are significant.

This is the reason why it is necessary to see how these production differences are significant and the level of multi-annual productions.

Table 5.

The analysis of early multi-annual production

Variant		Production		Differences t/ha	The significance of differences
no	**Specification**	**t/ha**	**%**		
1	Aurie de Bacău	18,80	121	3.22	**
2	Verba	17,09	110	1,51	
4	Media experienței	15,58	100	0,00	
3	Violetă de Iaşi	15,21	98	-0,37	
4	Dragomir	11,21	72	-4,37	000

DL 5% = 1,57;
DL 1% = 2,38;
DL 0,1% = 3,83.

The analysis of total production

A synthesis of the production results regarding the quantity of pods obtained in comparative culture at the three varieties, in the three experimental years 2003, 2004 and 2005 is presented in table 6.

Table 6.

The total pods production obtained in comparative crops (2003-2005)

Variant		Production t/ha per cultivation year			
no	**Specification**	**2003**	**2004**	**2005**	**Media**
1	Aurie de Bacău	47,80	43,20	42,70	44,57
2	Verba	48,60	48,80	48,40	48,60
3	Violetă de Iaşi	41,60	39,80	37,70	39,70
4	Dragomir	30,60	35,70	33,00	33,10
4	Media experienței	42,15	41,88	40,63	41,55

The experimental dates show that in the three experimental years the total production of pods vary in wide limits, between 48,80 t/ha and 30,60 t/ha, respectively in the from of an amplitude of 18,20 t/ha, which represents almost 44% from the experimental average production.

The analysis of the total multi-annual production prove the measure in which the experimental results presented, have a value for the average environmental conditions and thus valid for the majority of the experimental years. The statistical analysis revealed how the productions realized in media by the experimental variants and their differences are statistically assured.

The results of the multi-annual media of the total production of pods obtained in comparative culture in open field as well as its mathematic analysis is presented in table 7.

Table 7.

The analysis of total multi-annual production

Variant		Production		Differences t/ha	The significance of differences
nr	**specificare**	**t/ha**	**%**		
2	Verba	48,60	117	7,05	**
1	Aurie de Bacău	44,57	106	3,02	*
4	Media experienței	41,55	100	0,00	
3	Violetă de Iaşi	39,70	96	-1,85	
4	Dragomir	33,10	80	-8,45	000

DL 5% = 3,96;
DL 1% = 5,33;
DL 0,1% = 7,09

In the three experimental years the classification of the four varieties is the one presented in table 7. The multi-annual average productions vary between 48,60 t/ha (Verba variety) and 33,10 t/ha (Dragomir variety). The experimental media was 41,55 t/ha.

CONCLUSIONS

The early production vary quite large from one year to another, but the genotypic differences between the varieties are sufficient higher to establish that in all these experimental years the classification of the experimental variants depending on the production value was kept. The differences statistically assured compared with the experimental media showed in all these years that the variety with the higher production is Aurie de Bacău and the variety with the lowest production is Dragomir.

In the case of total production on appreciate that in the classification of assortment the first place is taken by the variety Verba, followed by the variety

Aurie de Bacău. As you can see these two varieties make “exchanges of places” when comparing with the early production. This proves that the production potential at the variety Verba is more evident in the first half of the harvesting period, when it realized a inferior early production comparing with the variety Aurie de Bacău.

The presented results allow us to affirm that the variety Verba is a variety with a large production potential and the variety Aurie de Bacău is an early variety, with a high production potential. The variety Violeta, with a production around the average can be maintained in the top of cultivated varieties, for the quality, but especially the aspects of pods. The variety Dragomir, although considered as a perspective one, did not prove its superiority comparing with the other analyzed varieties.

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CONTRIBUTIONS REGARDING THE IMPROVEMENT OF TOMATO PLASTIC COVERED CULTURE SITUATED IN THE PEDOCLIMATIC CONDITIONS OF THE TRANSILVANIAN TABLELAND

CONTRIBUȚII PRIVIND ÎMBUNĂTĂȚIREA SISTEMULUI DE CULTURĂ LA TOMATELE DE SOLAR CULTIVATE ÎN CONDIȚIILE PEDOCLIMATICE ALE PODIȘULUI TRANSILVANIEI

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Abstract. *The research wants to reveal the importance of early spring tomato yields in modern plastic tunnel double covered, situated in the specific pedoclimatic conditions of the Transilvanian tableland with direct implications upon the quantity and quality of yield. The experimental field was founded in 2007 in the vegetable growing sector at the Faculty of Horticulture Cluj-Napoca, Romania. The experiment was conceived as a bifactorial one. The experimental factors where: biological material used (Cronos F1 tomato hybrid (control), Menhir F1 tomato hybrid, Shannon F1 tomato hybrid), plant density (80/40 cm - 31.250 plants/ha (control), 80/30 cm - 41.700 plants/ha) All experimental variants where mulched with black plastic film, and drip fertirigation. The highest blossom link (71.30 %) was recorded at the experimental variant Menhir F1 31.250 plants/ha. The yield dynamic recorded the highest value for Cronos F1 41.700 plants/ha variant. The best fruit quality was observed at the variant Shannon F1 41.700 plants/ha (85.90 % extra quality fruits). The combined influence, plant density and used cultivars revealed the highest production for the variant 80/30 cm (41.700 plants/ha) and Cronos F1 tomato hybrid (20.46 kg/m^2).*

Rezumat. *Experiența întreprinsă dorește să sublinieze importanța obținerii producțiilor timpurii de tomate în solarii cu acoperire dublă, în condițiile specifice Podișului Transilvaniei cu referiri directe la producția cantitativă și calitativă obținută. Cultura experimentală a fost înființată în anul 2007 în cadrul câmpurilor experimentale aferente Disciplinei de Legumicultură, Facultatea de Horticultură, Cluj-Napoca, România. Experiența a fost concepută bifactorial, factorii experimentali fiind următorii: materialul biologic folosit (Cronos F1 (mt.), Menhir F1, Shannon F1), desimea de plantare (80/40 cm - 31.250 plante/ha (mt.), 80/30 cm - 41.700 plante/ha). Toate variantele experimentale au fost mulcite cu folie neagră de polietilenă și s-a aplicat fertirigarea prin picurare. Cel mai mare procent de legare a fost înregistrat la varianta experimentală Menhir F1 31.250 plante/ha. Dinamica recoltărilor a avut cele mai mari valori la variantele experimentale reprezentate de Cronos F1 41.700 plante/ha. Cea mai mare proporție de fructe de calitate Extra a obținut-o varianta Shannon F1 41.700 plante/ha (85.90 % fructe de calitatea Extra). Influența combinată dintre densitatea de plantare și materialul biologic folosit arată că cele mai mari producții se întâlnesc la varianta experimentală Cronos F1 cu densitatea de 41.700 plante/ha (20.46 kg/m^2).*

MATERIAL AND METHODS

The experimental field was founded in 2007 in the vegetable growing sector at the Faculty of Horticulture Cluj-Napoca, Romania. The experiment was conceived as a bifactorial one. The experimental factors where: **biological material used** (Cronos F1 tomato hybrid (control), Menhir F1 tomato hybrid, Shannon F1 tomato hybrid), **plant density** (80/40 cm - 31.250 plants/ha (control), 80/30 cm - 41.700 plants/ha)

From the combination of the two factors resulted 6 experimental variants placed in 3 repetitions.

The experiment was founded in 3.04.2007, when the transplants where planted. Before the plantation the drip irrigation system was mounted and the soil was mulched with a black plastic film.

Concerning the environmental conditions, the experiment was placed in a modern plastic tunnel double covered with Visquen UV 5 plastic film. The length of the plastic tunnel was 32 m, and 8 m wide. The surface of an experimental variant was established at 4.80 m^2. The plastic tunnel was equipped with a fertirigation system, artificial fog system and an automatically opening and closure system for the windows.

In the pedoclimatic conditions of the Transilvanian Tableland the early yield was established between 15.06.2007 – 28.06.2007.

The experiment was dismounted in 3.09.2007.

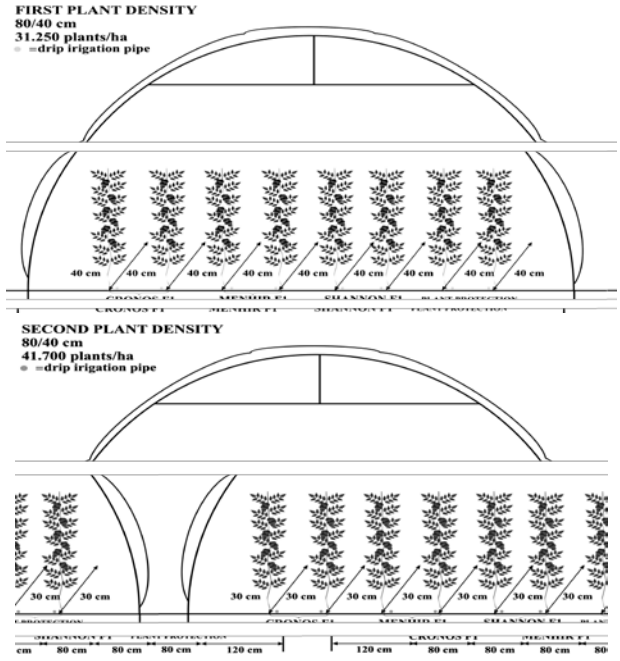

Fig.1. **Plant densities used in the experiment**

RESULTS AND DISCUSSIONS

The medium height of the tomato plants is larger an all experimental variants cultivated under the density of 41.700 plants/ha, where the self shading effect is more pregnant. Blossom and fruit link between clusters 1-3 is higher for the experimental variant Menhir F1 31.250 plants/ha (90.79 % fruit link). The same experimental variant had the highest fruit link between clusters 4-8 (54.84 % fruit link) and a medium fruit link/plant of 71.30 %. (Table 1)

The highest yield dynamic was observed at the Cronos F1 41.700 plants/ha experimental variant with a value of 3.24 kg/m^2 in June; 11.7 kg/m^2 in July and 6.53 kg/m^2 in August for the experimental variant Shannon F1 80/40. The highest total yield was recorded at the Cronos F1 80/30 experimental variant, with a value of 20.5 kg/m^2. (Fig. 1)

Overall, all the experimental variants planted at the larger plant density recorded higher total yields. (Fig. 1)

Table 1

Blossom and fruit link for the cultivated tomatoes (Cluj-Napoca, Romania 2007)

Experimental variant	Medium height of plants (cm)	Medium no. of leaves	Medium no. of clusters	Fruit link between (clusters 1-3) (%)	Fruit link between (clusters 4-8) (%)	Total fruit link (%)
V1	177.77	22.55	6.11	88.64	50.50	68.45
V2	180.55	23.66	6.22	85.08	43.46	64.10
V3	217.77	26.10	7.22	**90.79**	**54.84**	**71.30**
V4	221.11	25.77	6.88	90.00	51.00	68.43
V5	239.99	28.55	7.33	82.35	48.88	63.29
V6	245.55	28.11	7.10	77.92	40.28	56.45

V1 = Cronos F1 31.250 plants/ha (control)
V2 = Cronos F1 41.700 plants/ha
V3 = Menhir F1 31.250 plants/ha
V4 = Menhir F1 41.700 plants/ha
V5 = Shannon F1 31.250 plants/ha
V6 = Shannon F1 41.700 plants/ha

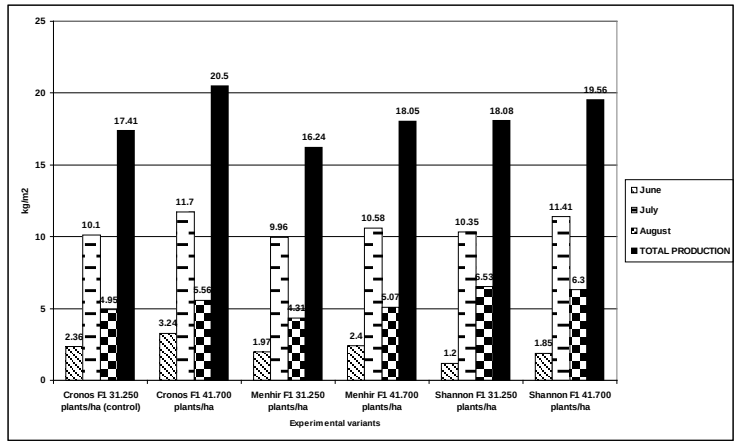

Fig.1 - Yield dynamic for the cultivated tomato plants (Cluj-Napoca, Romania 2007)

The highest percent of extra quality fruits from the total yield was obtained at the Shannon F1 41.700 plants/ha experimental variant (85.90 %). The same experimental variant had the highest percent of extra quality fruits + first quality fruits (98.90 %). (Fig.2)

Even if the highest total yield was obtained at the Cronos F1 41.700 plants/ha experimental variant (20.5 kg/m^2), the qualitative variant seems to be Shannon F1 41.700 plants/ha with a total yield of 19.23 kg/m^2. (Table 2 and Fig. 2)

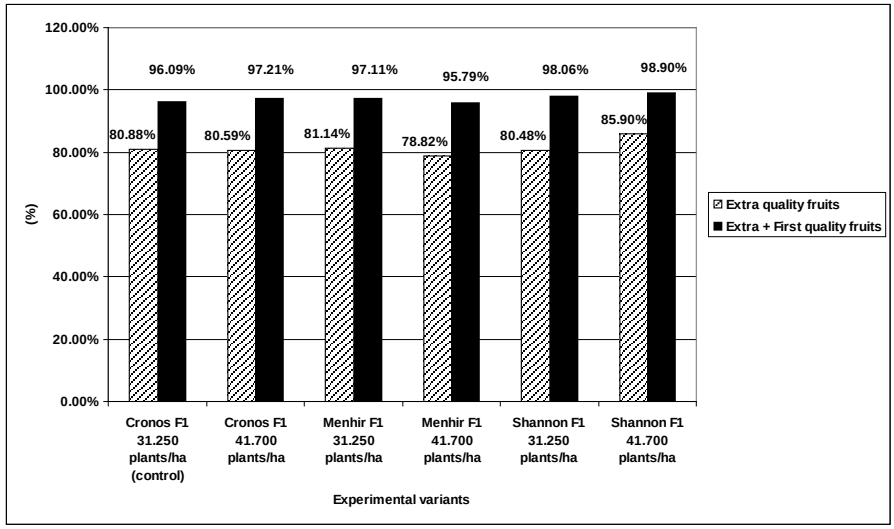

Fig.2 - Quality of the tomato yield obtained in a modern plastic tunnel (Cluj-Napoca, Romania 2007)

Table 2

The combined influence between plant density and used cultivars upon the total medium yield of tomato plants (Cluj-Napoca, Romania 2007)

Plant density + Used cultivar	Total medium yield (kg/m^2)	Relative total yield in comparation with the control	Difference (±kg/m^2) compared with the control	Relative total yield in comparation with the average	Difference (±kg/m^2) compared with the average
V1	17.42	100.00	0.00 $^{-}$	95.39	-0.84 $^{-}$
V2	**20.46**	117.45	3.04 **	112.04	2.20 *
V3	16.28	93.45	-1.14 $^{-}$	89.15	-1.98 ^{0}
V4	18.09	103.84	0.67 $^{-}$	99.06	-0.17 $^{-}$
V5	18.09	103.84	0.67 $^{-}$	99.06	-0.17 $^{-}$
V6	19.23	110.39	1.81 *	105.31	0.97 $^{-}$
Average	18.26			100.00	0.00

DL (p 5 %)	1.67
DL (p 1%)	2.53
DL (p 0.1 %)	4.06

V1 = Cronos F1 31.250 plants/ha (control)
V2 = Cronos F1 41.700 plants/ha
V3 = Menhir F1 31.250 plants/ha
V4 = Menhir F1 41.700 plants/ha
V5 = Shannon F1 31.250 plants/ha
V6 = Shannon F1 41.700 plants/ha

The combined influence between plant density and used cultivars reveal a distinct positive significance for the experimental variant Cronos F1 41.700 plants/ha (V2) compared with the experimental control, and a significant positive difference for the V6 experimental variant (Shannon F1 41.700 plants/ha) compared with the average of the experiment. (Table 2)

The increase of production was 17.45 % at V2 experimental variant, compared with the experimental control, and 12.04 % compared with the average of the experiment. (Table 2)

The V2 experimental variant compared with the average of the experiment has a significant positive difference.

The lowest total yield was obtained at the V3 experimental variant (16.28 kg/m^2) (Menhir F1 31.250 plants/ha)

CONCLUSIONS

1. All the experimental variants planted at the larger plant density 41.700 plants/ha recorded higher medium heights of plants, where the self shading effect is more pregnant.

2. The highest values for fruit link where obtained at the experimental variant Menhir F1 31.250 plants/ha, conducting to the idea that this plant density assures a better fruit link.

3. Overall, all experimental variants plated at the density 41.700 plants/ha obtained the highest percent of Extra quality fruits and highest total yields, with the recommendation for adopting this plant density, mulching of the soil with black plastic film and drip fertirigation.

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THE INFLUENCE OF USING SUPERABSORBENTS ON SWEET PEPPER AND TOMATOES SEEDLING GROWING TECHNOLOGY

INFLUENȚA UTILIZĂRII SUPERABSORBANȚILOR ÎN PRODUCEREA RĂSADURILOR DE ARDEI GRAS ŞI TOMATE

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Abstract. *The experiences were accomplished within peppers and tomatoes seedlings growing process by using different substrates with peat, perlite, sand, decomposed manure and superabsorbent. The aim of the paper is establishing the opportunity of obtaining high quality seedlings on different types of substrates improved with superabsorbent polymers. Best results were obtained for both vegetable species (pepper and tomatoes) grown on a substrate containing peat and superabsorbent.*

Rezumat. *Experienţele au fost realizate în procesul de producere a răsadurilor de ardei şi cele de tomate, folosind diferite amestecuri nutritive formate din turbă blondă, perlit, nisip, mraniţă şi superabsorbant. Scopul lucrării este acela de a stabili oportunitatea obţinerii unor răsaduri de calitate superioară pe diferite tipuri de substraturi îmbunătăţite prin adăugarea polimerilor superabsorbanţi. Cele mai bune rezultate au fost obţinute folosind un substrat format din turbă şi superabsorbant atât pentru ardei, cât şi pentru tomate.*

Research was accomplished in didactic and experimental area of Vegetable Growing department. The present research consisted in testing some growing substrates for sweet pepper and tomatoes transplants production.

MATERIAL AND METHOD

Sweet pepper (hybrid *Blondy F1*) and tomatoes (*Unirea*) represented biological material taken for present study. For both species, sowing in "speedling" system at the beginning of March produced the transplants.

It has been accomplished different nutritive mixtures formed of blonde peat, perlite, sand, decomposed manure and superabsorbent, resulting five experimental variants for tomatoes and four for sweet pepper as following:

Sweet pepper: V_1 (witness): peat; V_2: peat (75 %) and perlite (25 %); V_3: peat (75 %) and sand (25 %); V_4: peat and superabsorbent; V_5: peat (60 %), decomposed manure (40%) and superabsorbent.

Tomatoes: V_1 (witness): peat; V_2: peat (75 %) and sand (25 %); V_3: peat and superabsorbent; V_4: peat (75 %), decomposed manure (25 %) and superabsorbent.

During transplants production period were made certain observations, determination and measurements on plants (specific for every settled objective) as following: seeds germination speed, the dynamic and percent of plantlets appearance for every variant, determination on plants development expressed through plantlets height and leaves width and length, observations on transplants development uniformity after seeds germination.

Care operations applied to the transplants were similar for all variants.

RESULTS AND DISCUSSIONS

Plots of sweet pepper and tomatoes seeds were taken for present study. For sweet pepper, the plot was divided in five groups (five experimental variants) each of them with 40 seeds; for tomatoes, the plot was divided in four experimental variants each of them having 70 seeds.

During the study of seeds germination process at pepper and tomatoes it has been noticed that it began after eight days from sowing at sweet pepper (an average of 10%) and four days at tomatoes (an average of 11,8%). Another significant aspect: at sweet pepper hybrid (in the first eight days) germination and plantlets appearance happened in 30-40% percents (at V_4 and V_5 – with superabsorbent), but at V_3 (in the same period of time) plantlets appearance percent was of 7,5 %.

Representing graphically the germination percent of sweet pepper and tomatoes seeds (fig. 1 and fig. 2) it can be noticed that germination speed at sweet pepper (eight days) and tomatoes (five days) registered higher values at some variants.

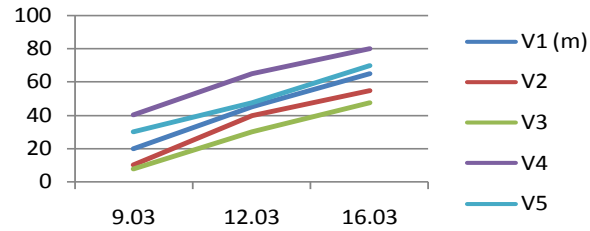

Fig. 1. Germination dynamic at sweet pepper seeds in different substrates:
V_1 (witness) peat; **V_2**: peat and perlite; **V_3**: peat and sand;
V_4: peat and superabsorbent; **V_5**: peat, decomposed manure and superabsorbent.

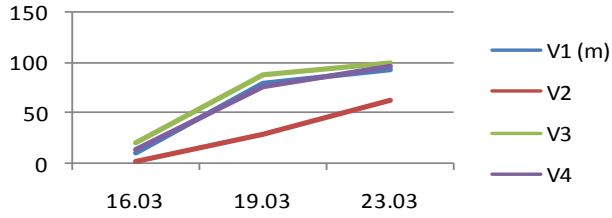

Fig. 2. Germination dynamic at tomatoes seeds in different substrates:
V_1 (witness) peat; **V_2**: peat and sand; **V_3**: peat and superabsorbent;
V_4: peat, decomposed manure and superabsorbent.

For sweet pepper - 40 % at V_4 on a combination of peat and superabsorbent, followed by V_5 and V_1 (witness) with over 20 %. Smaller values of germination speed registered at V_2 and V_3; the substrates of these variants had in composition (as additional elements) perlite and sand. For tomatoes, superabsorbents influence was pointed out by high seeds germination percent for V_3 (20 % in the first four days and 100 % after approximately one week) and V_4 (14,28 % and 97,14 % after 12 days). Variant V_3 had in composition sand and registered lowest values (2,85 % in the first days and 62,85 % at the end of determination).

In order to emphasize the influence of nutritive substrate (and especially of those with superabsorbent) on some transplants characteristics various observations and measurement were accomplished (height, leaves width and length). It has been also noted from 1 to 5(4) for growing and development uniformity for each variant taken for study (1 – low growing and development uniformity, 5(4) – high growing and development uniformity).

Determination accomplished during sweet pepper and tomatoes transplant production demonstrated that the transplant grown in all nutritive mixtures framed in normal limits regarding the quality. Nevertheless some differences appeared. Sweet pepper transplants produced in medium with superabsorbent registered higher values regarding leave size (height, width and length) and uniformity (table 1, figure 1). Therefore, the best values were obtained at V_4 (peat and superabsorbent) and the worst values at V_3.

The benefits of superabsorbents use in nutritive mixtures destined to transplants production are underlined in tomatoes case, the most vigorous plants being obtained at V_3 (table 2, figure 2).

Finally it can be concluded that transplants produced in nutritive substrates with superabsorbent presented a superior quality and a high vigour expressed through height. It can also be noticed that transplants obtained in substrates with superabsorbent had a higher growing and development capacity and a good capacity of extracting water and nutritive elements which are very necessary to a normal growing.

CONCLUSIONS

From the experiences with different nutritive substrates for transplants production the following conclusions can be drawn:

1. Nutritive substrates with superabsorbents assured better germination conditions comparing with substrates with sand and perlite that assured a germination percent of more than 70 %.

2. Nutritive substrates with superabsorbents assured better transplants growing and development conditions. The transplants obtained on these substrates had a superior quality and they were capable of assuring very good yields. The plants had a high vigour expressed through height associated with a high number of leaves coloured in a

characteristic manner, very healthy and with a 4-5 mm thickness at the plant base. The roots - expressed through their weight and length - were well developed and capable of extracting the water and mineral elements necessary for transplants development.

3. Nutritive substrates with superabsorbents assured better roots strike and resistance to drought by reducing the percent of broken roots and assuring the necessary of water immediately after planting.

4. The variants with sand and perlite could not assure good conditions for transplants production because those substrates were very settled, colder and they had a lower capacity of retaining water.

Fig. 1. The influence of nutritive substrates on development of sweet pepper transplants

Fig. 2. The influence of nutritive substrates on development of tomatoes transplants

Table 1

The influence of nutritive substrates on sweet pepper transplants growing and development

Variant	Date															
	16.03.07				19.03.07				23.03.07				26.03.07			
	H	Leaf size		Uniformity	H	Leaf size		Uniformity	H	Leaf size		Uniformity	H	Leaf size		Uniformity
		L	l			L	l			L	l			L	l	
V_1 (w)	39.8	33.5	12.6	3	41.4	35.9	13.2	3	42.7	37.1	13.7	3	43.5	38.3	14.2	3
V_2	34.3	27.5	10.4	2	36.3	30.5	11.4	2	38.1	32.7	12.2	2	41.4	35.9	13.3	2
V_3	32.4	32.1	12.2	1	34.7	33.4	12.3	1	36.3	35.1	13.1	1	40.3	34.2	13.2	1
V_4	42.7	34.4	13.1	5	44.2	35.7	13.6	5	47.2	37.2	14.1	5	49.1	38.2	14.5	5
V_5	38.9	33.9	12.9	4	41.6	34.6	13.0	4	43.3	36.8	13.6	4	46.2	37.9	14.1	4

Table 2

The influence of nutritive substrates on tomatoes transplants growing and development

Variant	Date															
	23.03.07				26.03.07				02.04.07				06.04.07			
	H	Leaf size		Uniformity	H	Leaf size		Uniformity	H	Leaf size		Uniformity	H	Leaf size		Uniformity
		L	l			L	l			L	l			L	l	
V_1 (w)	29.3	12.4	3.2	2	31.4	14.3	5.4	2	42.5	27.5	8.5	2	43.2	29.1	9.1	2
V_2	24.2	10.2	3.1	1	29.6	14.1	5.1	1	37.5	27.5	7	1	39.3	28.4	8.4	1
V_3	31.2	13.7	4.2	4	34.9	17.1	6.4	4	42.5	25	8.5	4	44.2	30.3	9.5	4
V_4	30.4	13.1	3.9	3	32.2	15.6	5.9	3	40	30	8.5	3	43.8	29.9	9.5	3

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PRELIMINARY STUDIES REGARDING THE IMPROVEMENT OF ECOLOGICAL VEGETABLE GROWING TECHNOLOGY BY USING MULCH AND SUPERABSORBENTS

STUDII PRELIMINARE PRIVIND ÎMBUNĂTĂȚIREA TEHNOLOGIEI DE CULTIVARE A LEGUMELOR ECOLOGICE ÎN SPAȚII PROTEJATE PRIN FOLOSIREA MULCIULUI ŞI A SUPERABSORBANȚILOR

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Abstract. *The aim of the present paper is to achieve a study regarding the classification and implementation of modern methods for vegetables grown within ecological agriculture system using superabsorbents polymers and different mulches. By applying these materials water will be saved and it will be accomplished an improvement of hydric and thermic conditions in soil. Therefore, the plants will have a propitious growing environment for obtaining early yields.*

Rezumat. *Lucrarea îşi propune realizarea unui studiu privind clasificarea şi implementarea unor metode moderne de cultivare a plantelor legumicole, în spaţii protejate, în cadrul sistemului de agricultură ecologică, folosind polimeri superabsorbanţi şi diferite tipuri mulci. Prin aplicarea acestor materiale se realizează o îmbunătăţire a regimului hidric şi termic în sol precum şi o economie de apă, asigurându-se condiţii normale pentru creşterea şi dezvoltarea plantelor şi obţinerea de producţii timpurii.*

A present tendency for worldwide agriculture, especially horticulture, is the development of new technologies that aim to increase yields, to utilize natural resources in the most efficient manner without using chemical fertilizers and controling pests and diseases with pesticides.

The balance less stable of the environment can be improved by applying some technical measures that influence natural conditions to the plants and yields benefit (Ciofu Ruxandra, 2003).

It is recognized water importance for physiological and biochemical processes; therefore, plants growing and development could happen in normal limits only in the presence of water. Unlike other agricultural plants, vegetables are succulent. In these circumstances, vegetables have larger demands for water.

A fundamental principle of biological vegetable growing statue that pesticides are forbidden. Therefore, it is necessary to find alternative methods that weeds control cannot be accomplished by using herbicides.

MATERIAL AND METHOD

Considering the aspects above, the present paper aim to achieve a study regarding two promising alternative methods: *mulching* and *superabsorbents.*

The information presented are a synthesis of a large documentation accomplished between 2005 – 2007.

RESULTS AND DISCUSSIONS

Mulching represents a technical method used for horticultural crops (especially for vegetables) through which the soil surface is covered with different materials with the view of assuring more propitious growing and development conditions for cultivated plants.

Alongside reconsideration of low inputs growing methods (as examples could be mentioned organic, biological, ecological growing methods which have as an aim the sustainability and durability of agricultural exploitation systems) mulching became important, being an alternative to soil thermical and hydric stress reduction and to decrease of some biological factors of major risk (pests and diseases attack and appearance of weeds).

Considering these aspects together with the necessity of using protection techniques and methods for vegetable crops it has been underlined the opportunity and importance of mulching usage with more and more efficient materials.

Research accomplished in mulching area divide the materials in two major groups: organics (straw, peat, compost, vegetal leavings, sawdust, wood chips, paper and others) and anorganics (gravel, broken stones, sand, transparent/coloured (especially, the black ones)/photodegradable plastics, unwoven polyesters, mineral oils reziduum and emulsions and others). Recently, on mulching area entered the organic and partially synthetic materials (agrotextiles) (**Munteanu**, 2003).

Practice and experiences underlined over time the influence of mulching on environment (humidity, soil air and temperature and its physical, mechanic, chemical, microbiological characteristics). Mulching assures the environment sustainability. The techniques use has to be adapted according to mulch type and quality, otherwise the eventual mistakes can cancel mulch positive effect.

Mulching effects become more important in the circumstances of sustainable agriculture systems promotion where the maintenance of soil productive potential represents an imperative objective and weeds control cannot be accomplished by using herbicides.

Some of the mulching possible disadvantages are as following: making an impediment for oxygen and water (plastic mulch stops the transfer of water and oxygen into the soil), appearance of a humidity excess (the mulch with a fine texture – grinding peat, freshly small mown grass and sawdust cand retain a large quantity of water), appearance of burns (black mulch warms too much during the

day; as a result, the plants are suffering, especially the succulent ones); it is necessary to reinstall or remove the mulch (depending on mulch type).

Superabsorbants – water management methods – are substances devoid of toxicity which acts like a "supersponge" absorbing and maintaining large volumes of water and aqueous solutions. Superabsorbents can release the liquid depending on environment neccesities.

From chemical perspective, superabsorbents are included in polymers group.

The use of polymers (with distinct chemical structures and properties) in order to improve soil physical properties has been known since '50.

The most used polymers and copolymers are the ones made from acrylates and acrylamide.

The history of superabsorbents polymers began in the 60's when the group of agricultural research „Union Carbide" developed a hydrogel that absorbed water more than 40 times its weight. At the beginning of 80's superabsorbents polymers ("superslurpers", "slush powder") began to be used in personal hygiene industry too. Worldwide production from middle 80's was estimated at 12.000 tones (2/3 was produced in Japan), at middle 90's the production increased to almost 230.000 tones and in 2003 the demand reached 1,05 millions tones, the main consumer countries being United States of America, Japan and European Union. In the next years it is been anticipating an exponential increase of the demand for superabsorbents due to their physical and chemical properties, favourable effects and many domains in which can be used.

Obtaining biodegradable hydrogel was intensively studied due to their special properties and aplications in various domains: food industry, agriculture, medicine, pharmacy etc.

Superabsorbents, due to their capacity of retaining and releasing water whenever plants need it and their capacity of increasing volume and transforming in gel particles, have a large use as additives for water retainment and degraded soil amelioration. Superabsorbent material can be used with distinctive results for sowing and transplanting, garden design, turf lands stabilization or salty soils amelioration.

Superabsorbent materials are available in different forms: granule, powder or fibers.

Superabsorbents may be considered a chemical "irrigation" system that assures to the plants a reserve of humidity available for a longer period of time.

The mechanism of volume increase and water attraction is based on osmotic pressure principle.

There are some basis methods for superabsorbents use:

a. For **sowing** superabsorbents are mixed with water and other supplementary elements that favor and stimulate germination:
   - use by mixing non hydrated superabsorbents cristals with growing medium;

- the dissipation and light incorporation of non hydrated superabsorbent on a surface to be sowed;
- the use of superabsorbent as a gel by its incorporation into the soil.

b. For plants **transplantation** superabsorbents can be used as following:
   - superabsorbents can be uniformly introduced into the vegetation nest where the plant will be transplanted;
   - superabsorbents can be mixed with the nutritive substrate that will cover plants roots;
   - plants roots can be introduced into the hydrogel prepared before planting the plant.

Over the time many researchers and farmers tried to explain the success of using superabsorbent materials and they formulated the following characteristics (Wofford, 1989):

*superabsorbents have the capacity of easily and rapidly storing water in significant quantities (200,300 to 500 times their weight);

*superabsorbents present *stopper effect*: the crystals have the capacity of partially closing capillary vessels, impeding water losses through evaporation;

*superabsorbents materials retain nutritive substances for a longer period of time;

*superabsorbents are very important in reducing stress; during drought times the roots consume large amounts of water; it has been shown that a small number of superabsorbent crystals around the roots can diminish hydric stress.

CONCLUSIONS

The facts presented above point out the importance of some materials less used in agriculture/horticulture for growing technologies improvement. This will have the following effects: quantitative and qualitative increase of yields, rational use of resources, environment preservation and its protection toward chemical agents that can pollute. Therefore, these technologies opt for a sustainable (durable) development of agriculture and especially horticulture.

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STUDIES CONCERNING THE INTRODUCTION IN ECOLOGIC CULTURE OF SOME VEGETABLE SPECIES FROM WORLD ASSORTMENT, LESS KNOWN IN OUR COUNTRY

STUDII PRIVIND INTRODUCEREA ÎN CULTURA ECOLOGICĂ A UNOR SPECII DE LEGUME DIN SORTIMENTUL MONDIAL, MAI PUȚIN CUNOSCUTE LA NOI ÎN ȚARĂ

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Abstract: *The large amount of species, cultivated as vegetables, offers the possibility of selection from a large spectrum, able to adapt to the conditions from different agro-pedo-climatic areas. This represent an important step for the ecologic vegetable gardening, offering the possibility to diversify the production with vegetables that are more rustically and more adapted to some stress conditions, thus avoiding the intervention of the producer. At VRDS Bacau different experimentations were accomplished regarding the cultivation in tunnels, in the restrictive conditions of biologic agriculture of species of long squash - Lagenaria siceraria, chrysanthemum for salad – Crysanthemum garland, spiny cucumber (Kivano, metulon) – Cucumis metuliferus, bitter cucumber – Momordica charantia; in open field cultivation the following species were studied: physalis (păpălău) – Physalis peruvianum and Helianthus tuberosus.*

Rezumat: *Multitudinea speciilor cultivate în lume, ca legume, oferă posibilitatea alegerii unui spectru foarte larg, capabil să se adapteze condițiilor din diferite zone eco-pedo-climatice. Aceasta constituie un demers foarte important pentru legumicultura ecologică căreia i se oferă posibilitatea să-şi diversifice producții cu legume mai rustice sau mai bine adaptate unor condiții de stres, fapt ce nu mai necesită intervenții din partea producătorului. La SCDL Bacau s-au experimentat, în condițiile restricțiilor impuse de agricultura ecologică, in cultura de solar speciile dovlecelul lung – Lagenaria siceraria, crizantema de salată – Crysanthemum garland, castravetele țepos (Kivano, metulon) – Cucumis metuliferus, castravetele amar – Momordica charantia; in cultura de camp s-au studiat speciile physalis (păpălău) – Physalis peruvianum si topinambur – Helianthus tuberosus. Studiile s-au referit in special la adaptabilitatea lor in conditiile experimentale de la SCDL Bacau, caracteristicile fructelor si productiile obtinute*.

Key words: diversify, ecologic, vegetables, rustically

The diversity of species, its maintaining and promotion is one of the fundamental principles of ecologic agriculture. Vegetable gardening is maybe the agricultural branch in which the diversity at global level has no limits, the classical example being offered by China where more than 1400 botanical families are consumed as vegetable.

To the nutritive and tasty qualities are added also a great plasticity of some species that can easily adapt to the diversity of pedo-climatic conditions and that also

have resistance to the pests and diseases. The multitude of species cultivated in the world, as vegetables, offers the possibility of choosing from a large spectrum able to adapt to different eco-pedo-climatic areas. This constitute a very important step for ecological vegetable gardening by offering the possibility to diversify its production with vegetables that are more rustically and well adapt to stress condition, which doesn't require interventions from the producers.

Knowing the problems involved in ecological production of vegetables from our geographic area at VRDS Bacau, we aimed toward different experimentation for the introduction in cultivation system of new species less known, designed for diversify production phased all over the vegetation period.

MATERIAL AND METHODS

At VRDS Bacau six species of vegetables less known in our country were experimented in the restrictive conditions imposed by ecologic agriculture (Table 1)

Table 1.

Vegetable species less known, studied at VRDS Bacau

Nr. variant	Specie		Origin
	Romanian name	Botanical name	
1	Bottle gourd	*Lagenaria siceraria*	Italy - Sicily
2	Chrysanthemum for salads	*Chrysanthemum garland*	China
3	Spiny cucumber, Kivano	*Cucumis metuliferus*	New Zeeland
4	Bitter cucumber	*Momordica charantia*	China
5	Phyalis	*Physalis peruvianum*	SUA Seed Savers
6	Ierusalem Artichoke	*Helianthus tuberosus*	Germany

Through the experimental protocol, the crops were accomplished in open field and protected areas:

- in plastic house, the species:
  * Bottle gourd (*Lagenaria siceraria)*;
  * Chrysanthemum for salads (*Crysanthemum garland;*
  * Spiny cucumber, Kivano (*Cucumis metuliferus*);
  *Bitter cucumber – *Momordica charantia;*
- in open field, the species:
  * physalis – *Physalis peruvianum*
  * topinambur – *Helianthus tuberosus*.

The studies focused especially toward theirs adaptability in the experimental conditions from VRDS Bacau, the characteristics of fruits and the obtaining productions in order to establish, based on the obtain results the possibility of obtaining efficient productions. The technology applied was specific for each specie, the cultivation was accomplished after the norms and principles of ecologic agriculture: without chemical amendments, insecto-fungicids and respecting the crop protection in the established asolament. For the characterization of the studied biologic material, phonological observation, quantitative determinations and biometrical measurements were accomplished.

RESULTS AND DISCUSSIONS

The presentation of each species, of requirements toward the environmental factors and the characteristics of cultivation shows real possibility of their introduction in vegetable ecological culture.

In the present paper, we aimed toward the presentation of three from the six species experimented, because the results are a synthesis for four years of ecological cultivation, the other three being cultivated for only 1-2 years.

1. ***Lagenaria siceraria*** **(Mol) Standl – Bottle gourd**

Names in different languages: English - Bottle gourd; French - Courge pélerine, Calebasse; German - Lagenaria; Italian - Lagenaria.

Origin and area cultivation. Bottle gourd is original from Equatorial Africa, from which spread in the entire world in temperate and tropical area. It is cultivated in China and in the South-East of Asia, in India, Tropical Africa and in the centre and South of America, as well as in the Mediterranean area, Italy, Sicily and South of France.

Biological particularities of plants - Bottle gourd is an annual, herby, monoic, crawler or voluble specie, with large leaves, five lobed with large, white male flowers, with a long peduncle. The female flowers are smaller and have a short peduncle. The fruits can have different forms, the edible form being often cylindrical-elongated.

Agro-pedo-climatic exigencies – The agro-climatic requests of this specie are very near with the one of cucumber reason for which these species can be cultivated in the south area in open field through seedling or direct sowing. The crops in open field must be established in the second half of May. Very good crops can be done in plastic houses – planting after April 15, at ground or palisade. The crops at ground allow larger densities, this type of crop being favorable for the obtaining of edible shoots. In "supported" system the densities are smaller, the plants have a luxuriant grow, occupies a larger surface, but the cylindrical fruits grow straight with a good commercial aspect.

Aptitudes in Biologic Agriculture: In the condition of our country, the bottle gourd is less affected by the specific diseases of Cucurbitaceae, thus can be easily adopted in biologic agriculture.

Attention! • Avoid compact, argyle soils that are exposed to sloppy;

• The densities in crops must be under the ones from conventional agriculture with 10-15%, thus obtaining a more airy crop less exposed to pest and diseases attack.

2. *Helianthus tuberosus* L. - Ierusalem Artichoke

Names in different languages: Enghlish - Ierusalem Artichoke; French - Artichaut du Canada, Topinambour; German - Knollen sonenblume, Juden Kartoffel; Italian - Tartufo bianco, Girasole artichoco.

Origin and area cultivation – The specie is original from North America, and was brought in Europe in the XVII-lea century (in our country in XVIII century). Initially, was brought as feed for animals, as a precedent for fodder potato. It is cultivated rarely in the temperate area, now a days there are preoccupations for the breeding of species and the cultivation techniques in order to extend its area of cultivation.

Biological particularities of plants. It is a perennial plant through its annual tubers (stems). The cane are strong, vigorous, slightly branched at the base, with a high of 1,50-2,00 m. The flowers are grouped in yellow capitols, smaller than sunflowers which look like. The flowers opens late (in August - September) thus they don't have time to produce seeds, in our area the multiplication being made exclusively vegetative. From the point of view of shape and color of tubers different botanical varieties can be distinguished. All the forms are edible, the distinguished between them from the point of view of their utilization in gastronomy, is given by the shape of tubers more or less regulate that allows a good cleaning of it. It is a very vigorous specie with an invasion tendency in its environment were it becomes a weed very difficult to control.

Agro-pedo-climatic exigencies – The Ierusalem Artichoke is very rustic plants, without highly elevated request for soil, and is very well adapted to temperate climate conditions. It exploits well all type of soil, even the poorest one. It is better to avoid the soils that are very humid. It resist very well to frozen during the winter, even when they are prolonged, as well it supports well excessive drought.

Aptitudes in Biologic Agriculture – It is a species highly favorable to biologic agriculture from our area being able to accomplish very good productions without any kind of special intervention.

Attention! The main causes that limit the extension of these species in cultivation system are:

- Very long vegetation period;
- It is hard to clean the tubers due to their irregularities.

The breeding and identification of some genotypes with uniform tubers, rounds or ovals, with smooth surface, easy to be cleaned, give a large perspective to these species especially in biologic agriculture, both as food and feed for biologic animals breed. The specie itself is less exigent to the soil fertility but it must be kept in mind that through large production (tubers and stems) is a "consumptive" plant. This is the reason way, after this crop, a very good agro-mineral fertilization must be done, and less exigence species must cultivated.

3. ***Physalis peruviana* L. -** Ground cherry

Names in different languages: English - Ground cherry; French - Coqueret du Peru; German - Juden Kirsche; Italian - Alchechengi giallo

Family: *Solanaceae*

The fruits of ground cherry can be consumed fresh, mixed with other vegetable and fruits, or in gems, stewed fruit or pickling.

The fruits, together with their scroll skin, dried per plant, become very ornamental and are utilized in floral arrangements.

Origin and area cultivation – The specie is original in Peruvian Ands. was extended in cultivation especially in The United States, South of America, India, China, Africa and Tropical Asia.

In Europe, is cultivated in the amateur gardens; in our country the plant find very good conditions of cultivation during the summer period.



Biological particularities of plants – Originally it is perennial specie, nut in the temperate area behave as an annual one.

The plant is hermaphrodite, herbaceous and can reach till 1,5 m height (in our conditions 50-70 cm). The port us similar with a very branched bush, sometime crawling.

The fruit is a spherical berry, with a diameter of 2-5 cm, covered with a membranous cover colored in green. At maturity it dries and this skin became beige or carroty yellow.

The fruit is yellow, shinny orange-yellow, juicy sometime aromatic and contains numerous small seeds. The fact that is surrounded by this membranous skin allows the maintaining of fruits for more than 3-4 months.

The seeds are small, one gram contain almost 1000 seeds that maintain their germinal capacity for 6-8 years.

Agro-pedo-climatic exigencies are similar with tomatoes and pepper. The plant cultivation does not require special conditions.

Aptitudes in Biologic Agriculture

Cultivated through seedlings this specie is very well adapted to the restrictions imposed by the biologic agriculture, our observations in the field showed that there are no pests and diseases that can economical affect the production.

**Attention! ***At harvesting a special attention must be paid because as soon as the fruits maturate must be harvested immediately.

* **Their place in crop rotation**

- Very good precursory - leguminous, cucurbitacee.
- Good precursory for – bulbous, root plants.
- Time until relapse: 4-5 years.

The synthetic description of the three species studied in our present paper and the preliminary production results obtained at VRDS Bacau in ecological cultivation system are presented in Table 2.

Table 2.

The description of species and the experimental results obtained at VRDS Bacau

N crt	Name	Origin	Edible organ	Obtained productions		
				UM	Cant	Observations
Species cultivates in open field - annual						
1	*Physalis peruvianum*	Peru	Fruit	Gr/m^2	30	Sweet vegetable can be consumed fresh or cooked.
Species cultivate in open field - perennial						
2	Ierusalem Artichoke (*Helianthus tuberosus)*	Canada	Tubers	t/ha	15 - 20	Vegetable dietetic. Is utilized in industry for the extraction of inuline.
Species cultivated in plastic houses.						
4	Bottle gourd (*Lagenaria siceraria*)	Asia, China, India	Fruits, growing apexes	Buc/m^2 Buc/m^2	2-3 7-8	Fruits can be consumed until they reach to a dimension of 40-60 cm.

CONCLUSIONS

In the first years of experimentation from VRDS Bacau very good results were obtained, all the cultivated species responded favorable to the cultivation conditions:

- Ierusalem Artichoke – perennial plant – a plantation 1000 m^2, was accomplished and it represents a source of seedling material. The production is sold at a price that is superior than the price of potatoes, and can be utilized in industry for the extraction of inuline (substitute of sugar at diabetics). Specie without pests and pathogen agents.

- Bottle gourd – Rustically species, very productive, both apex and the fruit at large dimension can be utilized. Specie without pests and pathogen agents can be cultivated in exterior during summer.

For all the other species, the experimentation must be continue in order to characterize them and to decide if they are recommended to be cultivated in the assortment of vegetables cultivated ecologically in our country.

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THE INFLUENCE OF ORGANIC FERTILIZATION ON ECOLOGICAL TOMATOES FROM POLYTUNNELS IN A THREE YEARS STATIONARY EXPERIMENTAL PLOT

INFLUENȚA FERTILIZĂRII ORGANICE LA O CULTURĂ ECOLOGICĂ DE TOMATE ÎN SOLAR, ÎNTR-UN STAȚIONAR EXPERIMENTAL DE TREI ANI

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Abstract. *Research was carried out in an experimental stationary of tomatoes crop cultivated in polytunnels at Spataresti-Falticeni, during 2003-2005 periods. Results showed that by using different types organic fertilizers it can be obtained significant yield positive differences, at early and total yields. The highest yields were obtained by applying a quantity of 40 t/ha mature compost.*

Rezumat. *Cercetările au fost realizate într-un staționar experimental de tomate cultivate în solarii, la Spătăreşti-Fălticeni, în perioada 2003-2005. Rezultatele au demonstrat că prin folosirea diferitelor tipuri de îngrăşământ organic, se obțin sporuri de producție, atât la cultura timpurie, cât şi la cea totală, indiferent de cultivarul de tomate folosit. Cele mai mari producții au fost obținute în variantele fertilizate cu compost matur, în cantitate de 40 t/ha.*

The aim of the experience was to determine the influence of the interaction of the organic manure type x dose about the total yield of tomatoes, in polytunnels, from conversion period and organic exploitation

MATERIAL AND THE METHOD

The experience was organized by three factors (3A x 3B x 2C), in a device of subdivided plots with 18 variants, in three repetitions. The A factor with three level is represented type of variety (A1-Belle F1, A2-Bakony F1, A3-Arletta F1). The B factor is represented by organic manure (B_1 - organic manure from extensive farms, B_2 - compost, B_3 - semi fermented manure horned cattle). The third factor with two level represented dose of manure (C_1 - 30 t/ha, C_2 - 40 t/ha).

The experimental surface was of 9 sm, accordingly 2,47 plants/sm. The number of the total experiment was of 54. The experimental variants have been planted in individual polytunnels of 262 sm, respectively 270 sm each. The planting had been accomplished in 2003 on 21 April, in 2004 on 17 April and in 2005 on 18 April. For establishment has been used seedling produced in pots from plastic of 340 cm^3, with age of 50-56 days. The seed and the seedlings were treatise only with admitted products (CEE Regl. 2092/1991). For the crop establishment had been used

the crop scheme of 90 cm x 45 cm, resulting a density of 24691 plants. The seedlings were produced in their own farm in a polytunnel from policarbonat.

The yield was recorded in dynamics from June to September. The early production was considered for North-East region, to be that production which is achieved up to 31 July (**Stan**, 1985).

The experimentally dates were processed through the analysis of variance (**Săulescu**, 1967), the signification of the differences being estimated through the limit differences, through the comparison of the studied factors or the combinations of them (**Jităreanu**, 1994).

RESULTS AND DISCUSSIONS

1) The influence of the interaction of the organic manure type x dose about the total production in the case of Belle variety (table 1) shows as following:

a) the highest production in the first year of conversion was obtained in the case of the variant fertilized with 40 t/ha of compost;

b) insured statistical efficiencies of 99,9 % about the production are obtained in the year 2004, through comparing the variants : b_2c_2 cu b_1c_1, b_3c_2 cu b_1c_1, b_1c_2 cu b_1c_1 and b_2c_2 cu b_2c_1;

c) the best production in 2005 was obtained through fertilization with compost x 40 t/ha (66,8 t/ha). Very significant positive differences are obtained through comparing the variants : b_3c_2 cu b_3c_1 (4,4 t/ha), b_2c_2 cu b_2c_1 (4,3 t/ha), b_3c_2 cu b_1c_1 (4,0 t/ha), b_3c_2 cu b_2c_1 (3,8 t/ha), b_1c_2 cu b_1c_1 (3,3 t/ha), b_3c_1 cu b_1c_2 (3,7 t/ha) si b_2c_1 cu b_1c_2(3,1 t/ha);

d) the highest total production in period of experimentation has been obtained in the same variant, the difference of the b_1c_1 variant being of 4,6 t/ha, insured statistical 99,9 %.

2) The results of production in the case of the Bakony cultivar (table 2), through the interaction of the factors manure x dose, show as following:

a) in 2004, the best yield was obtained by the variant fertilized with 40 t/ha of compost. Insured statistical efficiencies of 99,9 % are obtained through comparing the variants : b_3c_2 cu b_1c_1 (3,6 t/ha), b_2c_2 cu b_1c_2 (3,0 t/ha) and b_2c_1 cu b_1c_1 (2,8 t/ha). From this dates, we can notice that the dose of manure influenced major the production.

b) the total yield in the case of Bakony hybrid rised from 61,4 t/ha (b_1c_1) to 63,4 t/ha (b_2c_2). Insured statistical efficiencies of 99 % are obtained through comparing the variants: b_3c_2 cu b_1c_1 (2,0 t/ha), b_2c_2 cu b_1c_2 (1,5 t/ha) and b_3c_2 cu b_1c_2 (1,5 t/ha);

c) in the first year of certification, the production rised from 61,2 t/ha (b_1c_1) to 65,9 t/ha (b_2c_2). Very significant positive differences are obtained through comparing the variants : b_3c_2 cu b_1c_1 (3,4 t/ha), b_2c_2 cu b_2c_1 (3,1 t/ha), b_3c_2 cu b_3c_1 (2,9 t/ha), b_1c_2 cu b_1c_1 (2,4 t/ha), b_2c_2 cu b_1c_2 (2,3 t/ha), b_3c_2 cu b_2c_1 (1,8 t/ha) and b_2c_1 cu b_1c_1(1,6 t/ha). From the dates presented we can notice that the major factor that influenced the harvest is the amount of manure used.

Table1

Tomatoes production results, when using Belle cultivar, in ecological system

Factors	Experimental year											
	2003			2004			2005			2003-2005		
	Yield (t/ha)	Difference (t/ha)	Significance	Yield (t/ha)	Difference (t/ha)	Significance	Yield (t/ha)	Difference (t/ha)	Significance	Yield (t/ha)	Difference (t/ha)	Significance
$b_1c_2 - b_1c_1$	63,1-59,6	3,5	***	63,5-60,6	2,9	***	65,6-62,3	3,3	***	64,0-60,8	3,2	***
$b_2c_1 - b_1c_1$	61,4-59,6	1,8	**	62,4-60,6	1,8	**	62,5-62,3	0,2		62,1-60,8	1,3	**
$b_2c_2 - b_1c_1$	64,3-59,6	4,7	***	65,0-60,6	4,4	***	66,8-62,3	4,5	***	65,4-60,8	4,6	***
$b_3c_1 - b_1c_1$	60,2-59,6	0,6		62,5-60,6	1,9	**	61,9-62,3	-0,4		61,5-60,8	0,7	
$b_3c_2 - b_1c_1$	62,3-59,6	2,7	***	63,7-60,6	3,1	***	66,3-62,3	4,0	***	64,1-60,8	3,3	***
$b_2c_1 - b_1c_2$	61,4-63,1	-1,7	oo	62,4-63,5	-1,1	o	62,5-65,6	-3,1	ooo	62,1-64,0	-1,9	ooo
$b_2c_2 - b_1c_2$	64,3-63,1	1,2	*	65,0-63,5	1,5	**	66,8-65,6	1,2	**	65,4-64,0	1,4	**
$b_3c_1 - b_1c_2$	60,2-63,1	-2,9	ooo	62,5-63,5	-1,0		61,9-65,6	-3,7	ooo	61,5-64,0	-2,5	ooo
$b_3c_2 - b_1c_2$	62,3-63,1	-0,8		63,7-63,5	0,2		66,3-65,6	0,7		64,1-64,0	0,1	
$b_2c_2 - b_2c_1$	64,3-61,4	2,9	***	65,0-62,4	2,6	***	66,8-62,5	4,3	***	65,4-62,1	3,3	***
$b_3c_1 - b_2c_1$	60,2-61,4	-1,2	o	62,5-62,4	0,1		61,9-62,5	-0,6		61,5-62,1	-0,6	
$b_3c_2 - b_2c_1$	62,3-61,4	0,9		63,7-62,4	1,3	*	66,3-62,5	3,8	***	64,1-62,1	2,0	***
$b_3c_1 - b_2c_2$	60,2-64,3	-4,1	ooo	62,5-65,0	-2,5	ooo	61,9-66,8	-4,9	ooo	61,5-65,4	-3,9	ooo
$b_3c_2 - b_2c_2$	62,3-64,3	-2,0	oo	63,7-65,0	-1,3	o	66,3-66,8	-0,5		64,1-65,4	-1,3	oo
$b_3c_2 - b_3c_1$	62,3-60,2	2,1	**	63,7-62,5	1,2	*	66,3-61,9	4,4	***	64,1-61,5	2,6	***
	DL 5% = 1,2 t/ha DL 1% = 1,6 t/ha DL 0,1% = 2,3 t/ha			DL 5% = 1,1 t/ha DL 1% = 1,5 t/ha DL 0,1% = 2,1 t/ha			DL 5% = 0,8 t/ha DL 1% = 1,1 t/ha DL 0,1% = 1,5 t/ha			DL 5% = 0,8 t/ha DL 1% = 1,1 t/ha DL 0,1% = 1,5 t/ha		

Table2

Tomatoes production results, when using Bakony cultivar, in ecological system

Factors	Experimental year											
	2003			2004			2005			2003-2005		
	Yield (t/ha)	Difference (t/ha)	Significance	Yield (t/ha)	Difference (t/ha)	Significance	Yield (t/ha)	Difference (t/ha)	Significance	Yield (t/ha)	Difference (t/ha)	Significance
$b_1c_2 – b_1c_1$	60,5-58,7	1,8	**	61,9-61,4	0,5		63,6-61,2	2,4	***	62,0-60,4	1,6	***
$b_2c_1 – b_1c_1$	61,5-58,7	2,8	***	62,4-61,4	1,0		62,8-61,2	1,6	***	62,2-60,4	1,8	***
$b_2c_2 – b_1c_1$	63,5-58,7	4,8	***	63,4-61,4	2,0	**	65,9-61,2	4,7	***	64,3-60,4	3,9	***
$b_3c_1 – b_1c_1$	60,6-58,7	1,9	**	62,4-61,4	1,0		61,7-61,2	0,5		61,6-60,4	1,2	**
$b_3c_2 – b_1c_1$	62,3-58,7	3,6	***	63,4-61,4	2,0	**	64,6-61,2	3,4	***	63,4-60,4	3,0	***
$b_2c_1 – b_1c_2$	61,5-60,5	1,0		62,4-61,9	0,5		62,8-63,6	-0,8		62,2-62,0	0,2	
$b_2c_2 – b_1c_2$	63,5-60,5	3,0	***	63,4-61,9	1,5	**	65,9-63,6	2,3	***	64,3-62,0	2,3	***
$b_3c_1 – b_1c_2$	60,6-60,5	0,1		62,4-61,9	0,5		61,7-63,6	-1,9	ooo	61,6-62,0	-0,4	
$b_3c_2 – b_1c_2$	62,3-60,5	1,8	**	63,4-61,9	1,5	**	64,6-63,6	1,0	*	63,4-62,0	1,4	**
$b_2c_2 – b_2c_1$	63,5-61,5	2,0	**	63,4-62,4	1,0		65,9-62,8	3,1	***	64,3-62,2	2,1	***
$b_3c_1 – b_2c_1$	60,6-61,5	-0,9		62,4-62,4	0,0		61,7-62,8	-1,1	oo	61,6-62,2	-0,6	
$b_3c_2 – b_2c_1$	62,3-61,5	0,8		63,4-62,4	1,0		64,6-62,8	1,8	***	63,4-62,2	1,2	**
$b_3c_1 – b_2c_2$	60,6-63,5	-2,9	ooo	62,4-63,4	-1,0		61,7-65,9	-4,2	ooo	61,6-64,3	-2,7	ooo
$b_3c_2 – b_2c_2$	62,3-63,5	-1,2	o	63,4-63,4	0,0		64,6-65,9	-1,3	oo	63,4-64,3	-0,9	o
$b_3c_2 – b_3c_1$	62,3-60,6	1,7	**	63,4-62,4	1,0		64,6-61,7	2,9	***	63,4-61,6	1,8	***

DL 5% = 1,2 t/ha
DL 1% = 1,6 t/ha
DL 0,1% = 2,3 t/ha

DL 5% = 1,1 t/ha
DL 1% = 1,5 t/ha
DL 0,1% = 2,1 t/ha

DL 5% = 0,8 t/ha
DL 1% = 1,1 t/ha
DL 0,1% = 1,5 t/ha

DL 5% = 0,8 t/ha
DL 1% = 1,1 t/ha
DL 0,1% = 1,5 t/ha

Table3

Tomatoes production results, when using Arletta cultivar, in ecological system

Factors	Experimental year											
	2003			2004			2005			2003-2005		
	Yield (t/ha)	Difference (t/ha)	Significance	Yield (t/ha)	Difference (t/ha)	Significance	Yield (t/ha)	Difference (t/ha)	Significance	Yield (t/ha)	Difference (t/ha)	Significance
$b_1c_2 - b_1c_1$	60,3-57,5	2,8	***	61,1-58,4	2,7	***	61,0-60,3	0,7		60,8-58,7	2,1	***
$b_2c_1 - b_1c_1$	57,1-57,5	-0,4		58,3-58,4	-0,1		61,8-60,3	1,5	***	59,1-58,7	0,4	
$b_2c_2 - b_1c_1$	59,3-57,5	1,8	**	61,1-58,4	2,7	***	62,4-60,3	2,1	***	60,9-58,7	2,2	***
$b_3c_1 - b_1c_1$	56,8-57,5	-0,7		58,4-58,4	0,0		61,7-60,3	1,4	**	59,0-58,7	0,3	
$b_3c_2 - b_1c_1$	59,4-57,5	1,9	**	60,1-58,4	1,7	**	63,1-60,3	2,8	***	60,9-58,7	2,2	***
$b_2c_1 - b_1c_2$	57,1-60,3	-3,2	ooo	58,3-61,1	-2,8	ooo	61,8-61,0	0,8	*	59,1-60,8	-1,7	ooo
$b_2c_2 - b_1c_2$	59,3-60,3	-1,0		61,1-61,1	0,0		62,4-61,0	1,4	**	60,9-60,8	0,1	
$b_3c_1 - b_1c_2$	56,8-60,3	-3,5	ooo	58,4-61,1	-2,7	ooo	61,7-61,0	0,7		59,0-60,8	-1,8	ooo
$b_3c_2 - b_1c_2$	59,4-60,3	-0,9		60,1-61,1	-1,0		63,1-61,0	2,1	***	60,9-60,8	0,1	
$b_2c_2 - b_2c_1$	59,3-57,1	2,2	**	61,1-58,3	2,8	***	62,4-61,8	0,6		60,9-59,1	1,8	***
$b_3c_1 - b_2c_1$	56,8-57,1	-0,3		58,4-58,3	0,1		61,7-61,8	-0,1		59,0-59,1	-0,1	
$b_3c_2 - b_2c_1$	59,4-57,1	2,3	***	60,1-58,3	1,8	**	63,1-61,8	1,3	**	60,9-59,1	1,8	***
$b_3c_1 - b_2c_2$	56,8-59,3	-2,5	ooo	58,4-61,1	-2,7	ooo	61,7-62,4	-0,7		59,0-60,9	-1,9	ooo
$b_3c_2 - b_2c_2$	59,4-59,3	0,1		60,1-61,1	-1,0		63,1-62,4	0,7		60,9-60,9	0,0	
$b_3c_2 - b_3c_1$	59,4-56,8	2,6	***	60,1-58,4	1,7	**	63,1-61,7	1,4	**	60,9-59,0	1,9	***

DL 5% = 1,2 t/ha
DL 1% = 1,6 t/ha
DL 0,1% = 2,3 t/ha

DL 5% = 1,1 t/ha
DL 1% = 1,5 t/ha
DL 0,1% = 2,1 t/ha

DL 5% = 0,8 t/ha
DL 1% = 1,1 t/ha
DL 0,1% = 1,5 t/ha

DL 5% = 0,8 t/ha
DL 1% = 1,1 t/ha
DL 0,1% = 1,5 t/ha

d) for total production, insured statistical efficiencies of 99% are obtained through comparing the variants : b_3c_2 cu b_1c_1 (3,0 t/ha), b_2c_2 cu b_1c_2 (2,3 t/ha), b_2c_2 cu b_2c_1 (2,1 t/ha), b_2c_1 cu b_1c_1 (1,8 t/ha), b_3c_2 cu b_3c_1 (1,8 t/ha) and b_1c_2 cu b_1c_1(1,6 t/ha).

3) The influence of the interaction of organic manure x dose in the case of Arletta hybrid (table 3) demonstrates that the highest production in 2003 was obtained through the fertilization with manure from extensive farms x 40 t/ha (61,3 t/ha). Very significant differences are obtain through comparing the variants : b_2c_1 cu b_1c_2 (3,2 t/ha), b_3c_2 cu b_3c_1 (2,6 t/ha), b_3c_1 cu b_2c_2 (2,5 t/ha) and b_3c_2 cu b_2c_1 (2,3 t/ha). From the dates presented, we can notice that the factors of compost and semifermented manure assures harvests very significant against manure from extensive farms , through utilization the same amounts.

For the total production in 2005, the best results are obtained in the variant b_2c_2 (63,1 t/ha). Other very significant positive differences are obtained through comparing the variants: b_2c_2 cu b_1c_1 (2,1 t/ha), b_3c_2 cu b_1c_2 (2,1 t/ha) and b_2c_1 cu b_1c_1 (1,5 t/ha). The results presented for the period 2003-2005 show as the best results of production in the experimental period are obtained in the variants fertilized with compost and semi fermented manure in amount of 40 t/ha, differences from 1,9 t/ha up to 2,5 t/ha, against the other experimental variants.

CONCLUSIONS

(1) The highest Belles` total production in period of experimentation has been obtained in the variant fertilized with 40 t/ha compost; the difference of the b_1c_1 variant being of 4,6 t/ha, insured statistical 99,9 %.

(2) For total production on Bakony F1 variety , insured statistical efficiencies of 99% are obtained through comparing the variants : b_3c_2 cu b_1c_1 (3,0 t/ha), b_2c_2 cu b_1c_2 (2,3 t/ha), b_2c_2 cu b_2c_1 (2,1 t/ha), b_2c_1 cu b_1c_1 (1,8 t/ha), b_3c_2 cu b_3c_1 (1,8 t/ha) and b_1c_2 cu b_1c_1(1,6 t/ha).

(3) The results presented for the period 2003-2005 show as the best results of production in the experimental period at Arletta F1 hybrid are obtained in the variants fertilized with 40 t/ha compost and semi fermented manure, differences from 1,9 t/ha up to 2,5 t/ha, against the other experimental variants.

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MORPHOLOGICAL AND PHYSICAL CHARACTERISTICS OF SOIL FROM POLYTUNELS, AFTER FIVE YEARS OF ORGANIC FERTILIZATION OF SPĂTĂRĂŞTI (SUCEAVA COUNTY)

CARACTERIZARE MORFOLOGICĂ, FIZICĂ ŞI CHIMICĂ A SOLULUI DIN SOLARI, DUPĂ CINCI ANI DE FERTILIZARE ORGANICĂ LA SPĂTĂRĂŞTI (JUDEŢUL SUCEAVA)

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Abstract. *The paper presents the organic farming influence on the some morphological and physical soil properties, in polytunnels cultivated with vegetable crops. To know this influence is important in order to take optimum decision on the sustainable exploitation of the soil resources.*

Rezumat. *În lucrare sunt prezentate modificările unor însuşiri morfologice şi fizice ale solului din solarii, în condiţiile practicării tehnologiilor ecologice de cultivare a plantelor legumicole. Cunoaşterea acestor modificări este utilă în vederea stabilirii măsurilor tehnologice de exploatare durabilă a resuselor de sol din sere şi solarii.*

INTRODUCTION

The main criteria for the location of the greenhouses are the existence of heating and water sources. The location of greenhouse near the market in odder to diminish the transport costs is another main criterion. Due to the compulsory location imposed by the above conditions, many greenhouses were placed on soils considered with a low capability but then through the application of land improvement works satisfactory results have obtained (Canarache ,1995).The high soil moisture, high values of temperature during the year favor the activity of microorganisms in the organic mater decaying. After this process result high quantities of CO_2. The absence of air currents which assure the change of soil air lead to the necessity of soil air porosity value higher than 10% (v/v) values of which represents the minimum limit of air content for field soils. The use of a high quantity of organic fertilizers (barnyard manure, compost etc.) in the greenhouses has some beneficial effects on soil such as an additional supply of NH_4 -N, greater availability of phosphorous and micronutrients due to the complication, increased moisture retention, improved soil structure, increased pH, buffer capacity and soil organic matter, etc. The main objectives of this paper concern to the identification of the changing of physical and morphological soil properties under influence of organic farming influence on.

MATERIAL AND METHODS

The Spatareşti *polytunels* has a surface of 1114 $m^{2.}$ A subsurface drainage was made in the polytunnels construction as a measure of intercepting the possible infiltration which occurs during irrigation.

Soil profiles were made outside (control variant), and five profiles in the polytunnels. These profiles were morphologically described according to the Methodology of soil survey elaborated by the Research Institute for Soil Science and Agrochemistry, Bucharest (Florea 1987).

After morphological description, undisturbed samples were collected down to, the depth of 90 cm. The collected soil samples were analyzed in the laboratory, in three replicates independent each of horizons. In the laboratory, the bulk density and water content were determined. The humidity of the field soil samples had values between minimum moisture content for watering and field capacity and the corrections for the obtained bulk density values were not made.

RESULTS AND DISCUSSION

The *polytunnels* are located on the slight slope land with 390 m altitude**;** **N** 47˚25´357**,** E 26˚18´676 (determined by GPS)
.The parent material are loam deposits. The soil is slight drained. The clima is characterised by, the medium values of rain and temperature of 646 mm and respectively 8.0 ºC, the moisture regime being periodic percolative.

The morphological control soil profile description (fig.1) indicated that the soil Luvosol (LV) albic (ab), mezostagnic (st), melanic (Xme): by Romanian Soil Taxonomy (Florea, 2003) or *Stagnic Albic Luvosol* by World Reference Base for Soil Resources, (WRB-SR 1998) or *Typic Glossaqualfs* by USDA Soil Taxonomy (199). The soil has a medium loam texture in the upper part of the profile (A and E Horizons) and fine texture in the argic B horizon.

After five years of ecological exploitation and large quantity of compost and sawdust application (fig. 2) morphological and physical properties are changed and soil became Antrosol (AT) hortic (ho) argic (ar) mezostagnic (st) melanic (Xme)): by Romanian Soil Taxonomy (Florea, 2003) or *Hortic Anthrosol* (WRB-SR 1998) or Plagganthrepts by USDA Soil Taxonomy (1999). Some morphological *Hortic Anthrosols* properties are presented in figure 2.

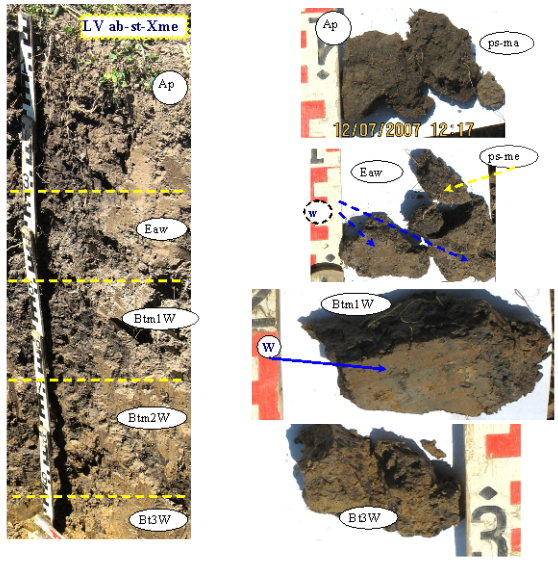

Fig. 1 - **L**uvosol (**LV**) **al**bic (**ab**), mezostagnic (**st**), **me**lanic (X**me**)

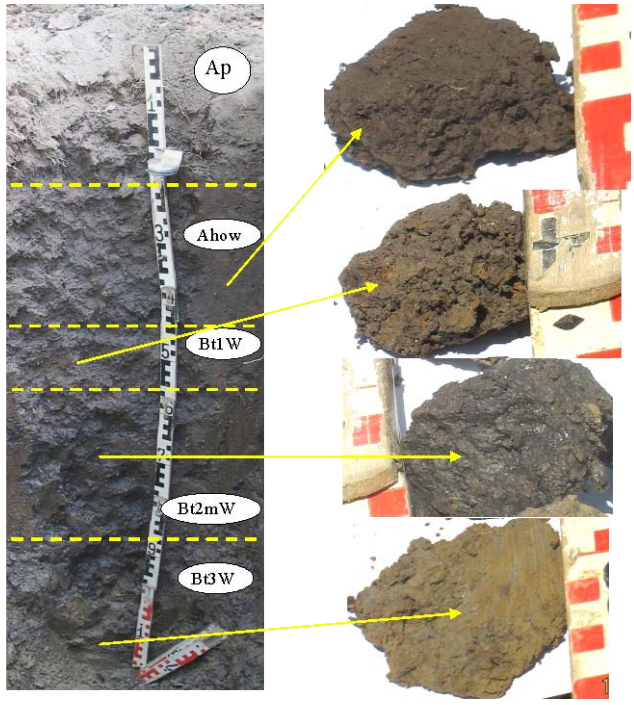

Fig. 2 - Antrosol (**AT**) hortic (**ho**) argic(**ar**) mezostagnic (**st**) melanic (**Xme**)

The values of bulk density are between 1,41 and 1,56g/cm^3 (fig. 3). The smallest values are registered in the upper part of control soil profile. The high amplitude of bulk density has been determination the large heterogeneity of the soil structure, intense macro fauna activity and plants roots distribution.

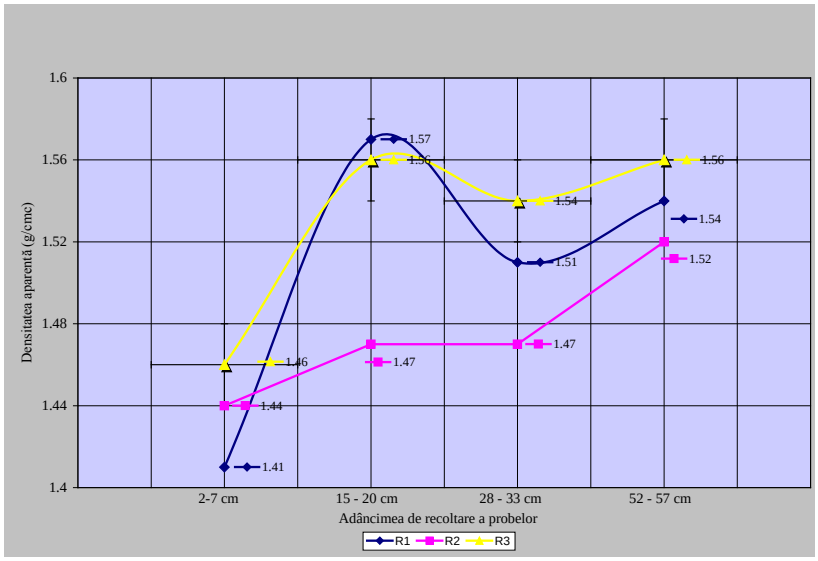

Fig. 3. Graphic representation of apparent density values for witness variant

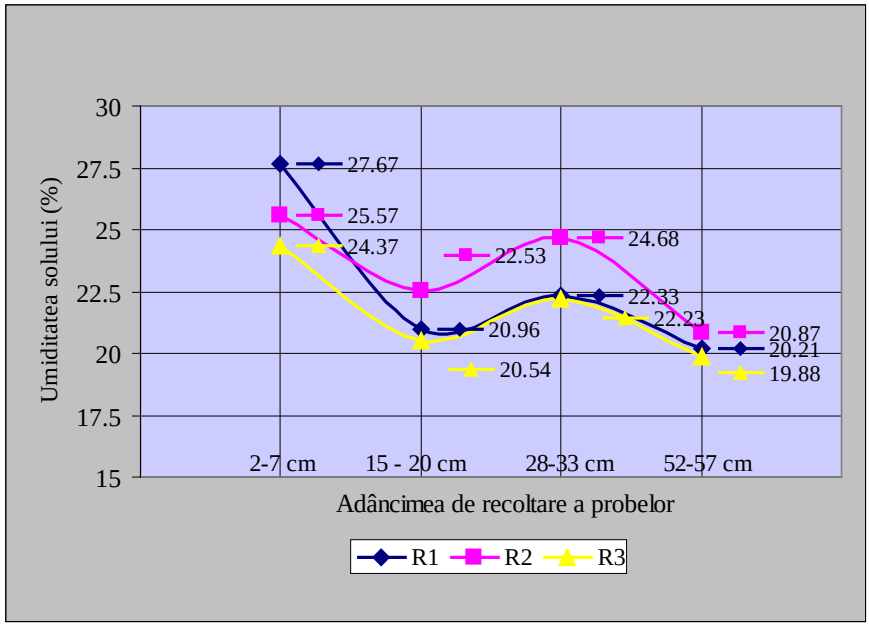

Fig. 4. Graphic representation of soil humidity for witness variant

In the A horizon (2-7cm), samples with lowest bulk density values have the highest water content (fig. 4). The highest water retention has the organic mater.

The variation of the soil profile apparent density from polytunnels is the result of technological works that have been made on the studied area. The administration of large doses of annual organic fertilizers (compost and sawdust) associated with repeated land works determined a decrease of apparent density values in the superior part of the soil profile from the polytunnels (fig. 5).

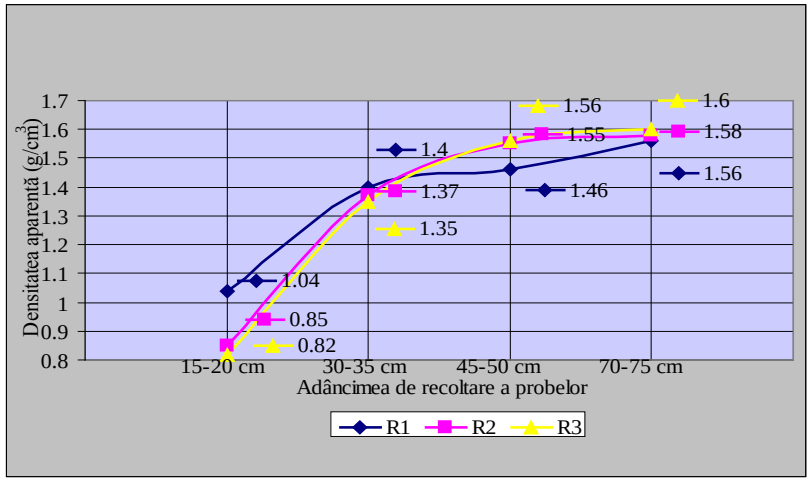

Fig. 5. Graphic representation of apparent density values from polytunnel 3

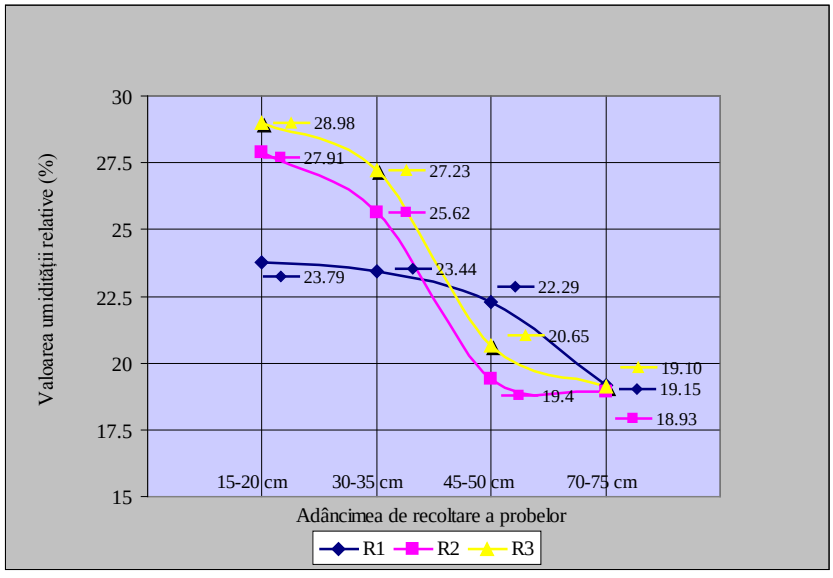

Fig. 6. Graphic representation of humidity values in polytunnel

Non uniformity of organic matter distribution in processed Ap horizon is also underlined by a greater amount of water registered at soil samples with a lower apparent density. The intensity of lumbricids activity is reflected by smaller values of apparent density in the middle part of soil profile.

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RATIONAL USE OF SOIL FERTILIZATION IN SUPERINTENSIVE SYSTEM OF APPLE TREES

UTILIZAREA RAȚIONALĂ A FERTILITĂȚII SOLULUI ÎN SISTEMUL SUPERINTENSIV DE CULTURĂ A MĂRULUI

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Abstract. *The investigations were made in the orchard of Ltd "Codru-ST", „Rassvet" sector founded in 2000 with benchgraftings of Golden Reinders and Gala Must, grafted on M9 rootstock. There were studied the types of soil of the above mentioned sector, then it was calculated the productivity potential of the investigated soil and the real productivity obtained during the period of 2005-2007. It was established that the productivity potential of the land on which is located the apple tree superintensive plantation varies from 22 to 33 t/ha, according to the type of soil. In order to increase the yield to 35-40 t/ha of qualitative fruits, there were made some supplementary fertilizations with mineral material under the planted yield according to the level of soil supply. The average yield of fruit during the period of 2005-2007 was 25,81-39,37 t/ha for Golden Reinder's and 30,45-46,15 t/ha for Gala Must.*

Rezumat. *Investigațiile au fost efectuate în livada SRL „Codru-ST" sectorul „Rassvet" fondată în anul 2000 cu altoiri la masă soiurile Golden Reinders şi Gala Must altoite pe portaltoiul M9. S-au studiat tipurile de sol pe sectorul menționat, s-a calculat potențialul de productivitate a soiurilor investigate şi productivitatea reală obținută în perioada anilor 2005-2007. S-a stabilit ca potențialul de productivitate a terenului pe care este amplasată plantația superintensivă de măr variază de la 22 până la 33 t/ha în funcție de tipul de sol. Pentru majorarea recoltei la 35-40 t/ha de fructe calitative s-a efectuat fertilizări suplimentare cu îngrăşăminte minerale sub recolta planificată în funcție de nivelul de aprovizionare a solului. Recolta medie de fructe pe parcursul anilor 2005-2007 la soiul Golden Reinders a constituit 25,81-39,37 t/ha, iar la soiul Gala Must 30,45-46,15 t/ha.*

The mineral fertilization is less important to modern fruit growing. The fertility degree of the soil should periodical tested (every 1-3 years) by soil sampling and by a calculation of the nutritive balance and apply additional lime or other nutrients as needed (1,3,4).

Terminal growth and general vigor of individual trees should be observed closely. Where growth the past year was short, increase the amount of fertilizer slightly. If growth was excessive, reduce the rate. Fertilizer rates can be fine-tuned even further by sampling leaves for tissue analyses (2).

MATERIAL AND METHOD

The studies made in 2005-2007 in the superintensive apple tree orchard of the Ltd. "Codru-ST", "Rassvet" sector planted in 2000 year with bench graftings of Golden Reinders and Gala Must varieties grafted on rootstock M 9. The distance of plantation is 4,0 x 1,0 m. The experiments included variants with different productivity potential of the soils as: diluvial

calcareous chernozem, weakly eroded calcareous chernozem and moderately eroded calcareous chernozem.

There were studied the types of soil of the above mentioned sector and then it was calculated the productivity potential of the investigated soil and the real productivity obtained during the period of 2005-2007.

The soil is seeded with grass at distances between the rows and the field is herbicided on the strips between the apple trees on the raw with a width of 1,2 m, the irrigation is through dripping.

The number of repetitions for each yield is 4. The number of apple trees in each repetition is 8. The place of repetitions is in blocks and of the evidence apple trees in each repetition is at randomize. Apple trees are lead after the structured axle system with the horizontalization of branches and shoots by their fixation with the help of support elements.

RESULTS AND DISCUSSIONS

It was established the content of humus (%) and N, P, K (ml/100 g of soil) in soil of 0-50 cm, 50-100 cm and 0-100 cm.

As a result it was calculated the potential productivity of the soil under the study and the supply with humidity for irrigation through dripping at a level not less than 75-80 % from the field capacity to retain water into the soil.

The diluvial calcareous chernozem which according of the actual classification, is considered relatively optimum assured with humus and have potential of productivity of 33,0 t/ha qualitative fruits (table 1).

Table 1

Content of humus and NPK in the soill, 2005-2006 years

Type of soil	Layer thickness, cm	Humus, t/ha	NO_3, kg/ha	P_2O_5, Kg/ha	K_2O, kg/ha	Potential of productivity, t/ha
Diluvial calcareous chernozem	0-50	233,8	131,6	196,0	1890,0	33,0
	50-100	124,4	61,6	108,7	942,5	
	Sum	358,2	203,2	304,7	2832,5	
Weakly eroded calcareous chernozem	0-50	198,5	110,8	178,7	1787,0	28,0
	50-100	80,5	36,5	53,3	587,0	
	Sum	278,5	147,3	232,0	2374,0	
Moderately eroded calcareous chernozem	0-50	192,3	66,2	132,3	1102,1	22,0
	50-100	65,4	16,0	42,1	535,0	
	Sum	257,7	82,2	174,4	1637,1	

The weakly eroded calcareous chernozem is weakly assured with humus and NPK hat a potential of productivity of 28,0 t/ha and in the moderately eroded calcareous chernozem with a low level of supply with humus and NPK, have the potential of productivity of 22,0 t/ha

The calculation of manure doses under the planned yield in 2005-2007 of 35-40 t/ha, was made by the formula (2)

$$D=R * C_{tf} * K_s * K_r - F * K_i, \text{ where:}$$

D – the manure dose of a certain element (N, P, K), kg/ha;

R – planned harvest, t/ha;

C_{tf} – the consumption of certain element to from a tone of fruits;
K_s – index of dose correction of certain element according to the assurance level of the soil (table 2);
K_r– coefficient of return in the soil of the nutritive element (N, P, K) with leaves and other parts that go into the soil;
F – quantity of NPK manures introduced in the last years
$K_{î}$ – coefficient of action of the certain elements in the next years (table 3).

Table 2

Correction coefficient of manures doses according to the level of soil assurance

Supply level	N	P_2O_5	K_2O
Low	1,3	2,2	1,8
Moderate	1,1	1,9	1,4
Relativly optimum	1,0	1,4	1,0
High	0,9	0,9	0,8

Table 3

The coefficient of use of nutritive element from the manures introduced in the previous years

Year of action	Chemical fertilizers		
	N	P_2O_5	K_2O
First	0,20	0,15	0,20
Second	0,10	0,10	0,15
Third	0,05	0,05	0,10

The result of manures application in calculated doses under the planned yield with a try in production (table 4), where it results that on the diluvial calcareous chernozem, assured relatively with humus and NPK, the average apple yield on 2005-2007 constitutes 39,37 t/ha Golden Reinders variety and 46,18 t/ha for Gala Must variety.

On weakly eroded calcareous chernozem, moderately assured with humus and NPK, the apple yield is about 17 % lower than that of the relatively optimum assured soil and is 34,59 t/ha for Golden Reinders variety and 38,46 t/ha for Gala Must variety.

Table 4

The fruit yield according to the soil proprieties, t/ha

Type of soil	Variety	2005	2006	2007	Average
Diluvial calcareous chernozem	Golden Reinders	42,80	41,01	31,27	39,37
	Gala Must	48,92	50,95	40,08	46,15
Weakly eroded calcareous chernozem	Golden Reinders	36,22	36,70	30,85	34,59
	Gala Must	40,70	43,50	31,20	38,46
Moderately eroded calcareous chernozem	Golden Reinders	28,45	27,27	21,72	25,81
	Gala Must	31,90	33,14	26,31	30,45

On moderately eroded calcareous chernozem, with a low level of supply with humus and NPK, the fruit yield is about 35 % smaller than that on of the relatively optimum assured and constitute 25,81 t/ha for Golden Reinders variety and 30,45 t/ha

for Gala Must variety.

The fruit quality for all the varieties under the study was mentioned at a high level due to the fruit manual thinning calculated on 1 cm^2 of the transversal section of the truck – 0,8 kg. The difference appeared in the qualitative categories by 75-80 % with a diameter of 70 – 75 mm extra on the first type of soil, 55 – 60 % on the second type of soil and 50 % on the third type of soil.

The most productive type of soil vas diluvial calcareous chernozem where the average production et the Golden Reinders variety constitute 39,37 t/ha and 46,15 t/ha for Gala Must variety. On weakly eroded calcareous chernozem the average production constitute respectively 34,59 and 38,46 t/ha, but on moderately eroded calcareous chernozem this indices is respectively 25,81 t/ha and 30,45 t/ha.

CONCLUSIONS

For the superintensive apple tree orchards, the most favorable soils are those with a deep non eroded profile, supplied at a relative optimum level with humus and NPK, where the average yield on many years reaches 40-46 t/ha with about 75-80 % of extra quality.

Favorable soil is the weakly eroded soil with a moderate level of supply with humus and NPK where the yield reaches to 35-38 t/ha with about 60 % extra qualitative fruits.

Less favorable are the moderately eroded soils with a low level of supply with humus and NPK where the yield reaches 25-30 t/ha and only 50 % high quality fruits.

The calculation of fertilizer doses under the planed yield according to the consumption of NPK per 1 tone of fruits, the assurance level of the soil with humus and similar forms to NPK, the recovery of these elements into the soil with the fallen leaves and other parts, the use of utilized fertilizers in recent years (1-4) contribute to the fertilizer consumption reduction per 1 tone of fruits with about 25-30% than the traditional recommendations that are not referring to each lot sector.

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"CRISTIRIN" – A NEW SWEET CHERRY SELECTION OF PERSPEVTIVE FOR SUPER INTENSIVE CULTURE

"CRISTIRIN" – O NOUĂ SELECȚIE DE CIREŞ DE PERSPECTIVĂ PENTRU LIVEZILE SUPERINTENSIVE

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Abstract: *"Cristirin" sweet cherry selection was found in Iaşi county spontaneous flora. Fruit size is rather big, the average is 7.4 – 8.3 g, comparing with the fruits of control variety Ramon Oliva, which are 4.1 – 4.6 g. Fruit shape is flat-round, the small diameter is 22.6 mm and the big diameter is 25.8 mm. Trees are 1.8 – 2.0 m height and the distances recommended for planting are 4 m between rows and 1.5 m between trees on the row. First production occurs after 3 – 4 years from planting, in year 6 there could be obtained a production of 3-4 kg/tree. Fruits rippening starts with the first dacade of June, 5 – 6 days after Ramon Oliva variety.*

Rezumat. *Selecția de cireş Cristirin a fost depistată în flora spontană din județul Iași. Fructul este mare având în medie 7,4 -8,3 g în comparație cu fructele soiului Ramon Oliva care au fost de 4,1-4,6 g. Forma fructului este uşor turtită, diametrul mic fiind de 22,6 mm iar diametrul mare de 25,8 mm. Pomii ating înălțimea de 1,8-2,0 m distanța de plantare fiind de 4m între rânduri şi 1,5 m între pomi pe rând. Intrarea pe rod a pomilor are loc în anii 3-4 de la plantare, în anul VI obținându-se obținându-se o producție de 3-4 kg/pom. Determinările efectuate privind autofertilitatea au arătat ca selectia este autosterilă Maturarea fructelor are loc în prima decadă a lunii iunie, ea producându-se la cca 5-6 zile după soiul Ramon Oliva*

Key words: cherry tree, assortment, selection, tree low vigour.

Sweet cherry is a fruit growing specie of a great economic importance due to fruits nourishing, technological and commercial features, which in Iasi region find the best culture conditions.

Romanian breeding programme for sweet cherry assortment has as main objectives: a more diversified varieties conveyer, for a larger period of fresh consumption, self-fertility, fruit quality, reduced tree vigour. The present paper subscribes to this current that wants the promotion of sweet cherry selection with reduced vigour, suitable for super intensive culture.

MATERIAL AND METHODS

'Cristirin' selection comes from spontaneous flora nearby Popricani, Iasi County.

In spring 2000 the selection was whip grafted on Oblacinska sour cherry root sucker, and in 2002 budding was used on mahaleb rootstock. Trees had a sloping growth in the nursery and supporting was needed.

The trees obtained in the nursery were planted in the spring of 2004 setting a trial culture with different planting distances (1, 2, 3 and 4 m between treed on the row and 4 m between rows); another group of 30 trees were planted at 25 - 30 cm, bush shape leaded (fig. 1; 2).

Trees crown shape was irregular palmetto, obtained only by pruning and training, without arching the branches.

Climatic factors during 2005 – 2007 were generally favourable for sweet cherry varieties growing and fructification, totalizing, on average, 178 days of active vegetation.

In temperate-continental climate, sweet cherry needs annual precipitation of 500 – 700 mm, from which at least 250 – 300 mm to be uniformly distributed during vegetation period as useful rains (more than 10 mm).

In the last years we witness a decreasing of precipitation quantity (2005 – 2007), the annual average is 565.3 mm and 384.3 mm during the vegetation period. The extended drought and the lack of precipitation in 2007 determined an early blossoming, an intensified physiological fruit falling and earlier ripening of the fruits, with 10 – 15 day, comparing with years with normal climatic conditions.

During the period of experiments there had been done observations and determinations regarding trees growing vigour, the development of fructification organs phonological phases, fruit's physical-chemical features and production.

Fig. 1. Trees planted at 3 m on the row

Fig. 2. Trees planted at 25 - 30 cm on the row

RESULTS AND DISCUSSIONS

The determinations that were made regarding self-fertility showed that the selection is self-sterile, Boambe de Cotnari being a very good pollinator.

Trees started to give first productions years 3 – 4 after planting and after 6 – 7 years there were obtained 3 - 4 kg fruits/ tree.

The selection has an early blossoming period and it lasts 7 – 12 days. (fig. 4; 6).

Tree has reduced vigour, 1.8 – 2.0 m high, annual branches is 20 – 30 cm up to 60 – 80 cm, the fructification is rather on spurs and less on long branches.

Regarding the planting distances there were used, it showed that 1 m between trees on the row is too small and 2 m leave big distances between trees, this is way we consider that 1.5 m is the optimum.

4 m distance between rows is too big, so there could be used distances of 2 – 2.5 m for mechanization whereof there will be used the viticulture machinery. By an optimum spatial use there could be obtained a density of 2500 – 3300 trees/hectare.

Fruit is big size, the average 7.4 – 8.3 g, comparing with fruits of *Ramon Oliva* variety which were 4.1 – 4.6g. Fruit shape is spherical, heart shaped, size index is more than23 mm (D = 25.8 mm; d = 22.6 mm and H = 21/26 mm). Peduncle is medium length and thick (36.4 mm), yellow-green colour.

The stone is medium size, the percent of stone is 6.35 – 6.5 of fruit weight. Fruit pulp is hardy, good flavour and represents 91.75 – 92.38 % of fruits total weight. In rainy years cracking fruits percents is 40 – 50 and shows *Monillinia* attack.

The ripening starts in the second decade of June, 5 – 6 days after *Ramon Oliva* variety (fig. 3).

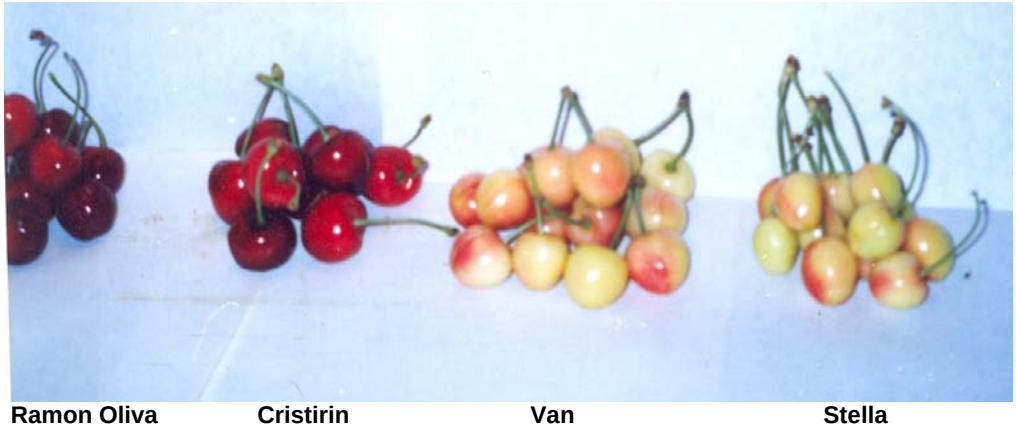

Fig. 3. Ripening period at 'Cristirin' selection, compared with other sweet cherry varieties

Unusual climatic conditions of year 2007, characterized by the lack of precipitations associated with high temperatures determined an almost simultaneous ripening of Ramon Oliva, Van, Stella varieties and 'Cristirin' selection, the first variety being a little early.

From technological point of view the selection presents some important particularities due to the early ripening, fruits are not affected by *Rhagoletis cerasi* attack and trees small size make the pruning and harvesting easier (fig. 7).

Fig. 4. Branch with flowers in detail

Fig. 5. Branch with fruits in detail

Fig. 6. Blossoming period - 'Cristirin'

Fig. 7. Aspect during the vegetation period

CONCLUSIONS

1. The fruits of 'Cristirin" selection are big size, hardy, with early ripening and the plants are not affected by *Rhagoletis cerasi* attack.

2. Trees reduced vigour allows the establishment of super intensive plantations that could give big and constant productions per surface unit. Also, trees reduced high determines an increased work efficiency, significantly reducing production costs.

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ORCHARD PRODUCTIVITY IN FONCTION OF FRUIT THINNING

PRODUCTIVITATEA LIVEZILOR DE MĂR ÎN FUNCȚIE DE RĂRIREA FRUCTELOR

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Abstract. *This study evaluates the effects of fruitlet thinning for controlling the quality of fruits of two apple varieties (King Jonagold and Champion) grafted on M 9 rootstock and planted a distance of 3,5 x 1,2 m (2380 tree/ha). Data present include the effects of different thinning methods on fruit size, quantity of fruit and their quality.*

Rezumat. *Cercetările au fost efectuate în livada superintensivă de măr a societății „Alfa-Nistru". Materialul biologic a fost reprezentat prin soiurile King Jonagold şi Cempion altoite pe portaltoiul M9. Densitatea la care sunt plantați pomii luați în studiu este de 2380 pomi/ha (3,5 x 1,2 m). Datele prezintă efectul diferitelor metode de răzire asupra mărimii fructelor, cantității şi calității producției.*

Key words: *apple trees, fruitlet thinning, fruit quality, yield.*

INTRODUCTION

Fruitlet thinning is one of the most efficient and widely used methods of obtaining high quality apples. The intensity of thinning of the reproductive organs must ensure one reserve of flowers for prevent possibly damage cause of spring frost, rain, wind etc.

The fruitlet thinning is effective for enlarge the capacity of utilization of fruitlet what remaining in the crown (*1,3*).

The hand fruitlet thinning must to be effect in about 40 days after the blossoming of first flowers. After fruitlet thinning the distance between the fruitlet must to be 10-15 cm for the varieties with small fruits and 15-20 cm for the varieties with big fruits.

During the hand fruitlet thinning is necessary to eliminate the fruitlet attacked of the diseases and pests (*4,1,2*).

MATERIAL AND METHOD

The experiment of fruitlet thinning was found in apple intensive orchard of A.S. „Alfa-Nistru". The research were performed on apple trees of the cultivars King

Jonagold and Champion grafted on M 9 and planted at a distance of 3,5 x 1,2 m (2380 tree/ha). Each treatment was tested on 8 trees in 3 repetitions.

Trees were chosen from along the rows and were similar in terms of blossoming, fruiting and growth intensity.

The quality of fruit was evaluated as previously described in regulations (CE) NR. 85/2004.

The method of hand fruitlet thinning as follows:

V1 – control – no thinning;

V2 – elimination of 65-75% buts burst;

V3 – suppressing of 100% fruits from 65-75% buts burst;

V4 – fruitlet thinning after the fall of the petals, let 1-2 fruits in each inflorescence;

V5 – fruitlet thinning after the physiological fall of the fruits, let 1-2 fruits in each inflorescence.

RESULTS AND DISCUSSIONS

At the start of the experiment within the fruitlet thinning there was significant difference in the quality and quality of the fruits comparing to the control (tab. 1).

Table 1

The fruit production in dependence of the variety and of the method of fruitlet thinning

The rootstock M9, the distance of the planting, 3,5x1,2m, the shape of the crown, spindle slender

S. A. "Alfa-Nistru", in medium of the years 2005-2007

The method of thinning	The variety King Jonagold		The variety Champion	
	The fruit production (t/ha)	The medium weight of the fruit (g)	The fruit production (t/ha)	The medium weight of the fruit (g)
V_1 (c)	35,1	155	32,1	140
V_2	25,9	200	26,6	181
V_3	30,9	197	29,0	180
V_4	29,5	198	26,3	184
V_5	27,8	193	28,2	170

Thus, if in control variant of varieties King Jonagold and Champion the yield during the period of research was 35,1 t/ha and 32,1 t/ha, then in the variants with hand fruitlet thinning the yield decrease to 25,9-30,9 t/ha for the variety King Jonagold and to 26,3-29,0 t/ha for the variety Champion.

The maximal medium yield (years 2005-2007) was realized in the variant where was suppressing 100% of the fruits from 65-75% buts burst. In that variant

the yield on an average was 30,9 t/ha for the variety King Jonagold and 29,0 t/ha for the variety Champion, that exceed the yield in rest other variant with fruitlet thinning.

Table 2

The quality of fruits in dependence of the variety and the method of fruitlet thinning

The rootstock M9, the distance of the planting, 3,5x1,2m, the shape of the crown, spindle slender

S.A. "Alfa-Nistru", 2007

The method of thinning	The variety King Jonagold				The variety Champion			
	Super	I	II	Fruits for industry	Super	I	II	Fruits for industry
V_1 (c)	58,0	27,7	10,0	4,3	52,5	27,3	13,4	6,8
V_2	67,1	22,0	7,4	3,5	55,2	31,5	8,2	5,1
V_3	70,5	18,4	7,3	3,8	62,1	24,4	8,8	4,7
V_4	73,5	16,4	6,3	3,8	64,6	22,9	8,0	4,5
V_5	72,8	16,0	7,2	4,0	62,1	25,7	7,2	5,0
DL $_{0,05\%}$	0,44	1,07	0,58	0,31	1,26	0,68	0,74	0,35

Also, the quality of the fruits was strong influenced of hand fruitlet thinning. The fruit of the variety King Jonagold was more qualitative in all variant comparing to the control variant (tab.2).

At the variety King Jonagold the quantity of the category super increased more till 73,7% in the variant where the fruitlet thinning was effected after the fall of the petals.

The fruits quantity of the category I is inferior (16,0-22,0%)than at the variety Champion.

At the variety Champion the category super of fruit is also more increase (64,6%) in the variant 4.

As a rule hand fruitlet thinning decrease total fruit production but that agricultural work simultaneous increase significant the quality of the fruits.

CONCLUSIONS

Thinning of apple fruitlet is an important technology method for the improvement of fruit quality and for the impulsion of sufficient flower buds formation to prevent biennial bearing.

The cultivars King Jonagold and Champion due to a strong thinning effect from the variant 4 were realized higher quality of the fruits (73,5-64,6%).

Duet o high labor cost, hand thinning is neither economical nor practical.

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ANATOMICALLY INVESTIGATIONS OF GRAFT UNION IN SOME COMPATIBLE AND INCOMPATIBLE PEARS GRAFTS

INVESTIGAȚII ANATOMICE ASUPRA PUNCTULUI DE ALTOIRE LA UNELE COMBINAȚII COMPATIBILE ŞI INCOMPATIBILE DE PĂR ALTOITE PE GUTUI

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Abstract: *Light microscopy was used to study the graft union formation of five compatible (Curé) and incompatible (Triumf, Trivale, Contesa de Paris, Williams) three years old pear cultivars grafted on quince (Cydonia oblonga). Observations of graft unions showed necrotic points at the xylem in the cutting zone of the incompatible combinations graft union. The cambium connection between rootstock and scion in compatible graft combination after three years was completed. On the other hand, in incompatible combinations was observed that most part of the callus did not differentiate and cambium occurred partly. In addition, vascular differentiation did was not completely and necrotic layers increased during the periods after grafting. The visual observations were observed in the graft union zone between different cultivar. The poor performance of Trivale and Contesa de Paris cultivars may be caused by partial blockage at the graft union, or reduction in movement of water and nutrient materials, or both. Ultimately, malfunctioning of the graft union adversely affect assimilate translocation.*

Rezumat: *S-au efectuat observații microscopice asupra secțiunilor realizate prin punctul de altoire a cinci soiuri de păr aflate în anul al treilea de vegetație (Triumf, Trivale, Contesa de Paris, Williams şi Curé) cu grade de compatibilitate diferite cu gutuiul (Cydonia oblonga). Observațiile efectuate au arătat prezența unor puncte necrotice la nivelul xilemului în cazul combinațiilor incompatibile. Conexiunile cambiale dintre altoi şi portaltoii în cazul soiului Curé s-au realizat complet, pe când în cazul combinațiilor incompatibile cea mai mare parte a calusului nu s-a diferențiat în țesut cambial. De asemenea, s-a constatat faptul că diferențierea țesutului vascular a fost perturbată observându-se raze necrotice care se accentuează în timp la combinațiile incompatibile. S-au constatat diferențe privind procesul de regenerare a simbionților la diferite soiuri. Simptomele cele mai accentuate s-au observat în cazul soiurilor Trivale şi Contesa de Paris, la care anomaliile pot cauza reducerea circulației sevei prin punctul de altoire, generând în scurt timp simptome certe de incompatibilitate.*

Plant grafting is a widely used means of plant propagation and growth control that is of considerable importance in the adaptation of interesting cultivars

in appropriate areas. The grafted partners can belong to the same species or genus, but usually components that are more genetically divergent are used. In these cases the stock and scion do not always constitute a successful graft and show their disagreement in the form.

The development of graft union is a process of forming a functional unit through the interaction of organs, tissues or cells from the same or different plants (Shanfa, 2000). A number of detailed studies have been made about graft union formation with woody and herbaceous plants (Hartman et al. 1997).

The anatomical changes that occur during graft union formation are in the approximate order of occurrence, following grafting in many plants. These include the death of layers of cells at the graft interface, cohesion of scion and rootstock, generation of callus and establishment of vascular continuity and a new stem centre (Miller, Barnett 1993). According to Moore (1984), the development of a compatible graft includes three events: cohesion of rootstock and scion, proliferation of callus cells at the graft interface, and vascular differentiation across the graft interface.

The mechanism, in which incompatibility is expressed, is not clear and several hypotheses have been advanced in an attempt to explain incompatibility. In many cases incompatibility is manifested by the breaking of the trees at the point of the union particularly when they have been growing for some years (apricot on Prunus grafts, pear on quince grafts).

The objective of this study was to investigate the structural development of graft union formation in some Pyrus combinations at early stages of incompatibility.

MATERIAL AND METHODS

The trial was performed at the Faculty of Horticulture in the experimental field from S.D.E. „V. Adamachi"-Iasi.

Research material was represented by *Pyrus* genous varieties, which are not compatible with *Cydonia oblonga*. The determinations were made on trees in the third growing season .

The trial was set up on a lot in the spring of 2004 when rootstocks of *Cydonia oblonga* were planted at 90×20 cm. In August these rootstock were budded the incompatible varieties Triumf, Trivale, Williams and Comptesse de Paris. Curé pear variety was used as witness because it has a good compatibility with quince. Morfo-anatomical studies were made concerning the rootstock-scion combinations with different compatibility degrees.

For histo-anatomical observations vegetal material was fixed in ethylic alcohol 70% for proprieties and form of the cell walls conservation. With semi-automatic microtome, sections were made through vegetal material, which were conserved in Javel water 40 minutes for excluding the cell content. Preparations were washed with acetic water, and colored first with methylene blue for 10 minutes, washed with

distilled water, colored once again with red ruthenium, washed with alcohol 90^0 for moving away the coloring matter and fixed in Canada balsam.

The observations were made with Motic microscope using 10 ocular and 4 objective and captures were made using the Motic camera.

RESULTS AND DISCUSSIONS

First period after grafting is characterized by intensification of metabolic processes and by growing and specialization of tissues. Quick knitting and vascularisation at the graft point indicate the compatibility of the two partners. If they are incompatible, between the two surfaces a stratum of cambium and felogenous, and later a suber appears, which later cicatrizes, isolating the two grafting partners.

Between these two extreme cases there are numerous situations where, initially the knitting takes place, but, in time the grafted tree presents low compatibility symptoms like: presence of parenchyma tissues at the graft point, the deformation of vascular tissues, the interruption of the wood and bark, and forming of the wood bridges.

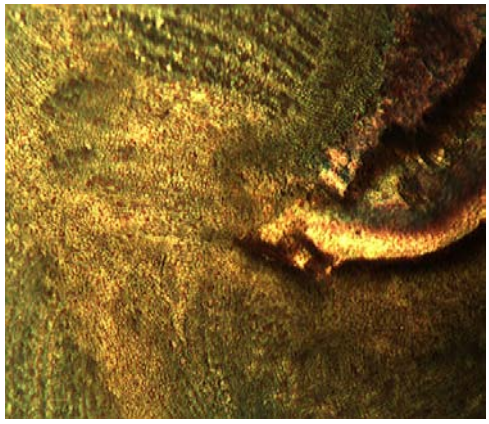

Fig. 1. Comtesse de Paris - necrotic point

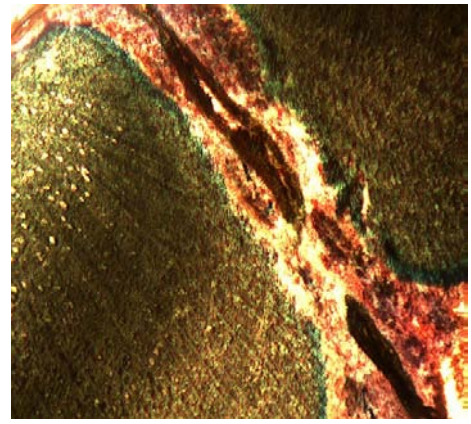

Fig.2. Comtesse de Paris – presence of *non-differentiated parenchyma at union line*

The observations made at the Comptesse de Paris variety (fig.1 and 2) the lignified tissues of the scion and rootstock were separated in many places by a parenchyma tissue. Between rootstock and scion a parenchymatic compact stratum was formed and bark stratum of the two partners were separated by a dark color tissues. The vascular tissue differentiation was destroyed, and we observed necrotic rays which may cause the reducing the circulation of the sap through the graft point and generate in the short time certain symptoms of incompatibility.

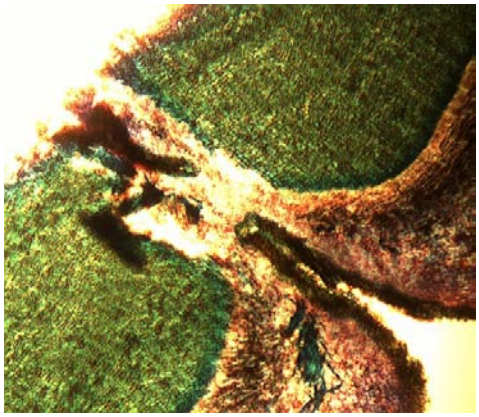

Fig. 3. Trivale - bark stratum penetrating the vascular tissues

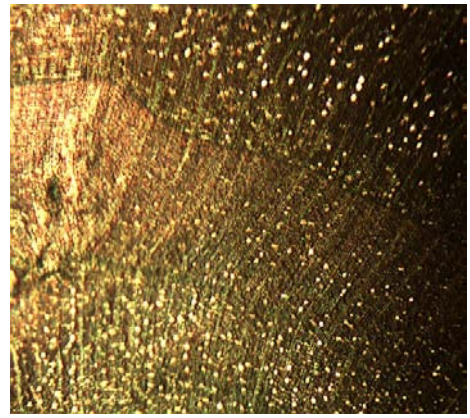

Fig. 4. Trivale – deformation of the vascular tissues

Regarding Trivale variety (fig. 3 and 4) we observed the inclusion of cortical tissues between the cambial tissues. The bark stratum comes to the cambial tissues of the scion and rootstock.

The cambium generated a little tissue which reconstituted the conducting vessels continuity, so that water and mineral substances could arrive into the scion and start his growth. The bark arrived in cambial zone, and was cought between scion`s and rootstock`s xylem and because of that, the knitting become fragile.

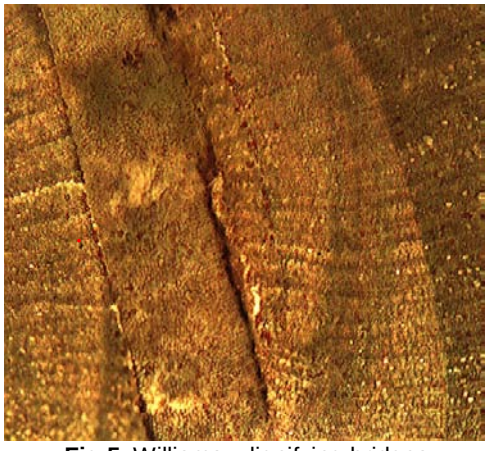

Fig.5. Williams – lignifying bridges

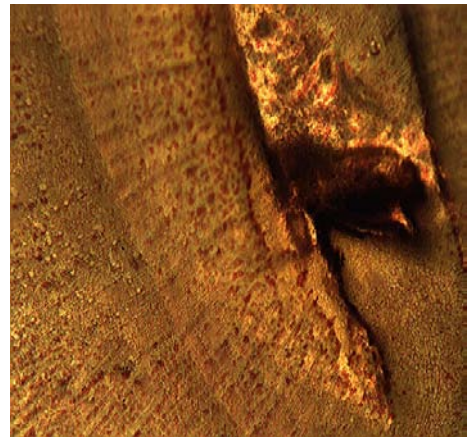

Fig.6. Williams – necrotic point

Graft incompatibility was pit into evidence at the Williams variety (fig. 5, 6) by presence of some necrotic points in grafted area which determined interruption of sap circulation between rootstock and scion. Between the two surfaces a cambium and felogenous and later, a suberus stratum formed. The

damaged surfaces were healed and the two partners were isolated which proved that knitting and vascularization didn't take place.

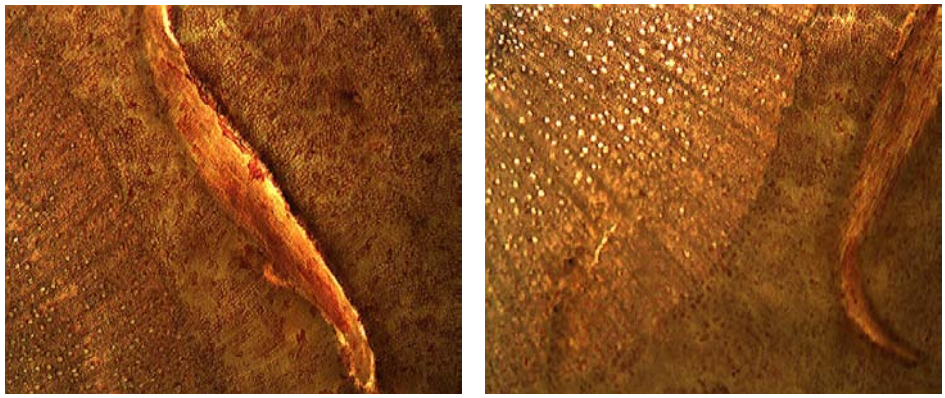

Fig.7. Triumf – wood vessels discontinuity

Sections made at Triumf variety at the graft point (fig. 7 and 8), made in evidence the presence of some necrotic points which determined the interruption of vessels continuity, lignified tissues of the scion and rootstock being separated in many places by the dark suber tissues.

Because a direct contact between cambial tissues of the two partners was not established, the absence of supply with sap, conducted to necrosis of both scion and rootstock tissues.

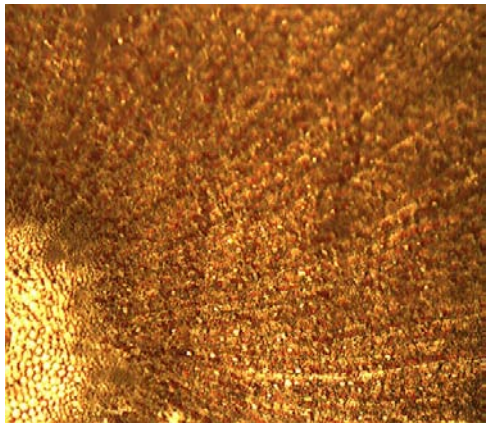

Fig.9. Curé-*central cylinder and vessels*

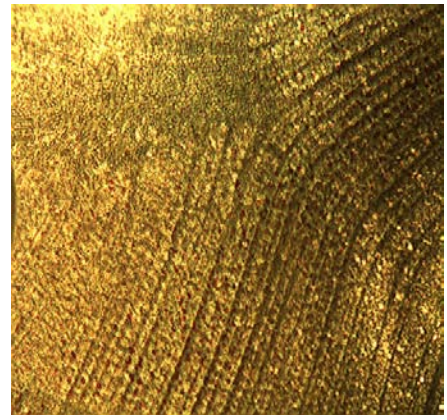

Fig.10. Curé- *distortions of the vessels*

Regarding the Curé variety, whose grafting succeed, we observed a continuity of the rootstock and scion cambial tissue. By the meristematic tissue activity result the new conductible tissues (xylem and floem), assuring both

supply with water and mineral substances of the scion and the transport of assimilates to the rootstock.

However, in this case we can observe some deviations of the wood conducting vessels, which may generate difficulties in sap circulation through the graft point and the installation in future of some incompatibility symptoms.

On the other way these deviations, resulted after partners union, may have a normal functionality, which lead to a satisfying development of planting material obtained.

CONCLUSIONS

After the morfo-anatomical observations made at pear varieties grafted on quince, we identified:

1. Incompatibility phenomenon was evident at the varieties: Comptesse de Paris by the presence of the undifferentiated parenchyma on the graft union area and Trivale variety by the invaginated bark stratum.

2. In the case of Williams *and* Triumf varieties, the phenomenon of incompatibility was less visible, of these varieties meeting discontinuity of the wood vessels and bark and forming of the ligneous bridges.

3. Regarding the witness variety, Curé, although we observed some deviations of the conductible tissues, grafting is considered a success because of continuity of the cambial tissues between rootstock and scion.

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MORPHOLOGICAL, BIOLOGICAL AND AGRONOMICAL EVALUATION OF SOME NATIVE SOUR CHERRY GENOTYPES, *EX SITU* COLLECTED INTO ROMANIAN NATIONAL GERMPLASM

EVALUAREA UNOR CARACTERISTICI MORFOLOGICE, BIOLOGICE ŞI AGRONOMICE LA UNELE SOIURI AUTOHTONE DE VIŞIN, COLECTATE *EX SITU* ÎN FONDUL NAȚIONAL DE GERMOPLASMĂ

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Key words: Romania, *Prunus cerasus*, evaluation, native germplasm.

Abstract. *Romanian territory is located in the extended area limits of the geographic genetic center for cherry which grows wild or weedy in a high genetic diversity, all over the country. In the past, sour cherry has been propagated to a large extend by seeds or suckers, resulting a wide range of variability. Subsequently, by selection and clonally propagation of valuable individuals within seedling population from different growing areas, many local cultivars were framed. Additionally, as a result of breeding programs stared more than 50 years ago, 18 new varieties were released. Some of them are preserved in cherries collections which include 174 sour cherry (from which 54 are autochthonous biotypes, breeder's lines, old and new cultivars) accessions held in duplicate in two different locations (Pitesti and Iasi). To give new opportunities for conservation of cherry biodiversity and sustainable use of genetic resources, 54 native genotypes have been evaluated for some morphological and biological characteristics as well as agronomic traits like fruit use, plant use, status of sample, date of full blooming, harvest maturity, fruit shape, fruit size, fruit skin color, juice color, flesh juiciness, tree vigor, according to the numerical scale of IBPGR descriptors.*

Rezumat. *Geografic, teritoriul României se află în cadrul limitelor extinse ale centrului genetic de formare a speciilor cireş şi vişin, acestea crescând în flora spontană sau semicultivată pe tot cuprinsul ţării. În trecut, vişinul a fost înmulţit şi diseminat pe scară largă, generativ prin sâmburi sau vegetativ prin drajoni, ceea ce a condus la o mare dispersie teritorială şi o largă variabilitate genetică. Ulterior, selecţia şi propagarea clonală a unor genotipuri valoroase din cadrul unor populaţii de pomi pe rădăcini proprii din diferite zone de cultură, a condus la formarea a numeroase soiuri locale. Relativ recent, ca rezultat al unui activ program de ameliorare început cu 50 de ani în urmă, au fost omologate sau înregistrate 18 soiuri noi. Unele dintre ele sunt conservate în colecţia naţională care cuprinde 174 de genotipuri (din care 54 sunt biotipuri*

autohtone, selecţii rezultate din programul de ameliorare, soiuri vechi şi creaţii contemporane) şi sunt menţinute în duplicat la Piteşti şi Iaşi. Pentru a oferi noi oportunităţi acţiunii de conservare a biodiversităţii şi folosirii durabile a resurselor genetice la vişin, 54 de genotipuri autohtone au fost evaluate folosind o scală numerică, conform metodologiei prezentate în descriptorii IPBGR, în ceea ce priveşte unele caracteristici morfologice, biologice şi agronomice, cum ar fi utilizarea fructului, a plantei, statutul probei, perioada de maximă înflorire, epoca de maturare a fructului, forma, mărimea, culoarea pieliţei fructului, culoarea şi suculenţa pulpei, vigoarea pomului.

Sour cherry, one of the most important fruit tree species, owing to his economical and feeding value given by the nutritive fruit quality, meets in Romania good natural environmental conditions to express his agro-biological potential. Moreover, as a matter of fact, it is believed that some of the cherries have a secondary center of genetic origin in the Black Sea surroundings (Kaska et al., 1998), including a significant part of the Romanian territory.

The weedy or naturalized sour cherry types, grows abundantly all over the country in a high genetic diversity, in different fruit tree mixed populations up to 1600 m a.s.l.. So, tart cherry is a traditional crop in Romania, spread extensively for commercial purpose or in home gardens, for domestic consumption.

In the past, the richness in genetic diversity, give the possibility to generations of fruit growers to select valuable individuals from weedy populations, on the basis of fruit quality. Propagation was made vegetative (by suckers) and clonally (by grafting) and most of this so called „local varieties" have name derived from their local origin (Bizighesti, Baneasa, Bucovina, Drobeta, Locale de Bistrita, Timpurii de Marculesti, Timpurii de Pitesti, Timpurii de Osoi, Topoloveni, Leordeni, De Botosani, Topologu Tulcea, Crisana, Vrancean, Satmarean, etc.).

Collecting of the new varieties was an activity made as a hobby by rich landowners, enthusiast fruit growers, monks in the abbey orchards, or disperses in different nurseries and research centers.

MATERIAL AND METHODS

Romanian cherry genetic resources have started to be methodically collected since 1967. At present there are a total of 174 sour cherry accessions held in duplicate at the Research Institute for Fruit Growing, Pitesti – Maracineni and Fruit Research Station, Iasi.

Five sour cherry trees per genotype grafted onto Mahaleb seedlings are planted in each location.

Collections contain foreign or indigenous cultivars, selections, clones, local varieties and landraces. All accessions are evaluated for morphological and biological characteristics as well as agronomic traits according to the numerical scale of IBPGR descriptors. The main tasks are to estimate commercial value and to detect the possible useful sources of valuable genes for breeding program.

At this time, the target is to systematize collected data from the two institutions like fruit use, plant use, harvest maturity, blooming time, fruit skin color, fruit shape,

fruit size, juice color, fruit taste, fruit cracking susceptibility, susceptibility to diseases, check and re-examine in order to update or adjust.

In this circumstances, to give new opportunities for conservation of cherry biodiversity and sustainable use of local genetic resources, greater attention has been paid to characterize and preliminary evaluate 54 *ex situ* collected wild genotypes and indigenous varieties. (Budan, 2005; Budan et al., 2006.a)

Descriptors Used to Evaluate *Ex Situ* Collected Native Cherry Genotypes

Fruit use: 1. Scion cultivar – dessert including distilling; 2. Scion cultivar – processing including distilling; 3. Dual or multipurpose use; 4. No use
Plant use: 1.Clonal rootstock; 2. Clonal interstock; 3. Seedling rootstock; 4. Ornamental / pollinator; 5. Dual or multipurpose use; 6. Botanical (wild) species; 7. Other; 8. Timber; 9. No use
Status of sample: 1. Wild; 2. Weedy; 3. Primitive cultivar / Landrace; 4.Breeders line; 5. Advanced cultivar; 6. Unknown; 7. Other.
Virus disease status: 1. Virus disease free from quarantine pest and disease; 2.Virus disease present; 3. Not tested; 4. Free from Sharka.
Blooming period: 1. Extremely early; 3. Early; 5. Mid-season; 7. Late; 8. Very late; 9. Extremely late.
Harvest maturity: 1. Extremely early; 3. Early (Ludwigs Fruhe, Meteor korai) ; 5. Mid-season (Heimanns Rubinweichsel, Erdi Botermo); 7. Late (Schattenmorelle, Ujfehertoi furtos); 8. Very late (Marasca types); 9. Extremely late (later than Marasca types).
Fruit shape:1. Kidney-shaped; 2. Flat round; 3. Round; 4. Elongate; 5. Cordate.
Fruit size: 1.Extremely small; 3. Small; 5. Medium; 7. Large; 9. Extremely large.
Fruit skin colour: 1. Yellow; 3. Vermilion on yellow ground; 4. Light red (Montmorency, Favorit); 5. Red (Erdi botermo, Ujfehertoi furtos); 7.Dark red (Schattenmorelle); 9. Black
Juice colour: 1. Colourless (Montmorency); 3. Pink (Favorit); 5. Red (Schattenmorelle); 7.Purple (Meteor korai); 8. Brown red; 9. Black red (Marasca, Zahoracka)
Juiciness: 3. Dray**;** 5.Intermediate**;** 7. Juicy.
Tree vigor: 3. Weak (Kelleris 14); 5. Medium (Schattenmorelle); 7. Strong; 9. Extremely strong (Koroser).

RESULTS AND DISCUSSIONS

As a first benefit of characterization and evaluation of at the time available germplasm fond, between 1950 – 2005, was facilitation of the knowledgeable use of different genitors in more than 300 cross combinations from which over 8,000 seedlings were obtained and 10 new varieties as Bucovina, Nana, Dropia, Satmarean, Tarina, Timpurii de Cluj, Ilva, Pitic, Rival, Amada were released, (Budan et al., 2006.b)

Certainly, in the breeding work have been used in the overwhelming scale foreign varieties but also, often, Crisana or Mocanesti a indigenous old cultivars and some advanced new breed Romanian cultivars as Satmarean, Dropia, Timpurii de Cluj, Rival, Tarina.

Advanced selection made between multitude indigenous local biotypes, with large fruit, red fruit and juice color, high juiciness, early harvest maturity, prevalent sour cherry taste and flavor, grown by amateurs for domestic purposes, especially for traditional delicious sweets, jam or alcoholic drinks making, give the possibility for releasing and registering of an other 7 new varieties, recognized at the national level, as Timpurii de Pitesti, Timpurii de Osoi, Crisana 2, Mocanesti 16, Vrancean, Scuturator and De Botosani

Evaluation made over several years shows the great diversity of some morphological, biological and agronomical traits as blooming period, period of harvest maturity, fruit shape, size and skin color, juiciness and juice color, tree vigor.

Obtained results, as level of numerical scale for descriptors evaluation, range from 3 (Marculesti 33/20, Mari timpurii, Timpurii de Cluj, Timpurii de Marculesti cvs.) to 9 (Pitic cv.) for "blooming period", from 3 (Mari timpurii clones, Tarina, Timpurii de Marculesti, Timpurii de Osoi, Timpurii de Pitesti cvs.) to 9 (Pitic cv.) for "harvest maturity", from flat round to elongate for "fruit shape", from 3 (Drobeta, Marculesti 33/13, Marculesti 33/21, Marculesti 4 vie, Pitic, Timpurii de Marculesti cvs.) to 9 (Crisana clones, Leordeni, Locale de Bistrita, Tg. Jiu 401, Tg. Jiu 505 cvs.) for "fruit size", from red to dark red for "fruit skin color", from pink to black red for "juice color", from 3 (Dropia cv.) to 8 (Timpurii de Pitesti, Timpurii de Marculesti, Marculesti 33/20 cvs.) for "juiciness" and from 1 (Pitic cv.) to 7 (Leordeni, Locale de Bistrita, Tg. Jiu 401, Tg. Jiu 505 cvs.). (Table 1)

Collected data offer new possibilities to select valuable genotypes useful by their characteristics for breeding program and also to register other interesting local landraces with fruit of quite importance to domestic market.

Unfortunately, the lack of coordination and limited financial support means that only limited results have been achieved in recent years.

At present, germplasm is preserved only by the research institution's efforts, no other governmental or non-governmental organizations being involved, excepting, from time to time, some insignificant financial supported short term research projects.

Also, for weedy sour cherry trees, very common in some Romanian geographic area, there is no funding project for identification, evaluation, collection and *ex situ* conservation of these natural biodiversity, endangering and dramatically decreasing for the future the disposable native genetic resources.

So, to avoid further losses, development of a national strategy and governmental and/or international financial support for cooperation projects regarding the enhancement of germplasm by exploration and selection of natural and semi-natural ecotypes and agro- types, followed by *ex situ* preservation of the most valuable native genotypes is required.

Table 1.

Evaluation of some native sour cherry genotypes from the Romanian national germplasm

Genotype	Fruit use	Plant use	Collection site *	Status of sample	Virus disease status	Blooming period	Harvest maturity	Fruit shape	Fruit size	Fruit skin color	Juice color	Juiciness	Tree vigor
0	1	2	3	4	5	6	7	8	9	10	11	12	13
Băneasa 4/2	3	5	I	4	3	5	5	4	5	5	3	5	6
Băneasa 6/26	3	5	I	4	3	5	5	4	5	5	3	5	5
Băneasa 44/7	3	5	P;I	7	3	5	5	3	5	5	5	6	6
Băneasa 6/26	3	5	I	4	3	5	5	4	5	5	3	5	5
Bizigheşti	3	5	P;I	3	3	5	5	2	5	5	5	5	5
Brezniţa	3	5	P;I	3	3	5	5	2	5	5	5	5	5
Bucovina	3	5	P	4	3	5	5	2	5	5	5	6	5
Crişana 11/6	3	5	I	4	3	7	7	2	9	7	8	5	5
Crişana 15/10	3	5	P	4	3	7	7	2	9	7	8	5	5
Crişana 15/20	3	5	I	4	3	7	7	2	9	7	8	5	5
Crişana 2	3	5	P	3	3	7	7	2	9	7	8	5	5
Crişana Cluj	3	5	P	4	3	7	7	2	9	7	8	5	5
Crişana Nazarcea	3	5	I	4	3	7	7	2	9	7	8	5	5
De Botoşani	3	5	I	5	3	6	7	2	9	7	5	5	5
Drobeta	3	5	P;I	5	3	5	5	2	3	5	5	5	5
Dropia	3	5	P	5	3	5	5	2	5	7	9	3	5
Focsani 3	3	5	PI	4	3	5	5	4	7	5	5	5	5
HV 12/105	3	5	P	4	3	5	5	2	5	5	5	5	5
Ilva	3	5	P;I	5	3	5	7	2	5	7	9	5	5
Leordeni	3	5	P	3	3	7	5	2	9	5	3	6	7
Locale de Bistriţa	3	5	P;I	3	3	7	7	2	9	5	5	5	7
Mărculeşti 33/20	3	5	I	4	3	3	4	2	7	5	3	8	6
Mari timpurii	1	5	P	5	3	3	3	3	8	5	3	7	6
Mari timpurii cl.11	1	5	P	4	3	5	3	2	7	5	3	7	5
Mari timpurii cl.93	1	5	P	4	3	5	3	2	7	5	3	7	5
Mărculeşti 33/13	3	5	P;I	4	3	5	7	4	3	5	9	5	5
Mărculeşti 33/21	3	5	P;I	4	3	7	7	4	3	5	5	5	5
Mărculeşti 4 vie	3	5	P	4	3	7	5	2	3	5	5	5	5
Mocăneşti 104/24	3	5	I	4	3	5	5	2	5	5	5	5	5
Mocănesti 15/2	3	5	P	4	3	4	5	2	5	5	5	5	5
Mocănesti 16	3	5	P;I	4	3	5	5	2	7	5	3	5	5
Mocăneşti 10/24	3	5	I	4	3	4	5	2	5	5	3	5	5
Mocăneşti 32/20	3	5	I	4	3	4	5	2	5	5	3	5	5

0	1	2	3	4	5	6	7	8	9	10	11	12	13
Mocăneşti 6/7	3	5	I	4	3	4	5	2	5	5	3	5	5
Nana	3	5	P;I	5	3	5	5	2	5	5	5	5	5
Pitic	3	5	P,I	5	3	9	9	4	3	5	3	5	1
Rival	3	5	P	5	3	5	6	4	7	6	5	7	6
Selectie Cotea	3	5	I	3	3	4	4	3	5	5	5	6	5
Sătmărean	3	5	P	5	3	6	4	2	5	5	7	7	5
Scuturător	3	5	P,I	5	3	5	5	2	7	7	5	5	5
Suraia	3	5	P,I	3	3	6	5	2	5	5	9	5	5
Târgu Jiu 200	3	5	P,I	4	3	7	7	4	7	5	3	6	8
Târgu Jiu 401	3	5	I	4	3	7	7	2	9	5	3	6	7
Târgu Jiu 404	3	5	P,I	4	3	7	7	4	7	5	5	6	6
Târgu Jiu 505	3	5	I	4	3	7	7	2	9	5	3	6	7
Timpurii de Cluj	3	5	P	5	3	3	4	2	7	5	5	5	6
Timpurii de Mărculesti	3	5	P;I	4	3	3	3	2	3	5	5	8	5
Timpurii de Osoi	3	5	I	5	3	4	3	2	5	7	5	5	5
Timpurii de Piteşti	3	5	P,I	5	3	4	3	2	5	5	5	8	5
Topologu Tulcea	3	5	P;I	3	3	3	5	2	5	5	5	6	5
Topoloveni 6	3	5	P	3	3	6	7	2	6	5	5	6	6
Turceşti	3	5	P,I	5	5	5	7	2	5	5	5	5	5
Țarina	1	5	P,I	5	3	4	3	4	5	7	5	5	5
Vrâncean	3	5	P,I	5	3	7	7	2	5	5	5	5	3

* P - Research Institute for Fruit Growing, Pitesti-Maracineni
I - Fruit Research Station, Iasi

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INFLUENCE OF ROOTSTOCK AND BUDDING HEIGHT ON THE QUALITY OF PLANTING MATERIAL AT SOME FRUIT TREES SPECIES

INFLUENȚA PORTALTOIULUI ŞI A ÎNĂLȚIMII DE ALTOIRE ASUPRA CALITĂȚII MATERIALULUI SĂDITOR LA UNELE SPECII POMICOLE

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Abstract. *This paper is the result of some experiences organized with the aim of emphasizing the influence of the rootstock, and budding height (10, 20 and 40 cm) on the quality of planting material obtained. Apple rootstocks (MM106 and M9) and sour cherry rootstocks (Mazzard and VV1) were each budded with 2 cultivars. Observations and determinations were made on vegetative aspects of the grafted trees (bud healing, bud overwintering, scion shoots length).*

Rezumat. *Această lucrare este rezultatul unor experienţe organizate în scopul evidenţierii influenţei portaltoiului şi a înălţimii de altoire (10, 20 şi 40 cm) asupra calităţii materialului săditor obţinut. Au fost luaţi în studiu portaltoi din speciile măr (MM 160, M9) şi vişin (mahaleb şi vişin vegetativ – VV1), pe care s-au altoit câte 2 soiuri. Observaţiile şi determinările realizate au cuprins aspecte ale comportamentului vegetativ al pomilor (procent de prindere la altoire, rezistenţa peste iarnă a mugurilor altoi, lungimea lăstarilor altoi).*

The choice of rootstocks depends mostly on climatic conditions, which are different form one region to another. The lenght of vegetative period depends on temperature acumulated and precipitation and has a significant effect on the quality of maiden trees produced. The low temperature in winter may be a limiting factor in the production of high budded trees.

Higher budding can be an effective way to reduce the vigour of trees and increase the productivity. Numerous trials show that increasing budding height increases vigour control and yield efficiency of apple trees in the orchard (Quamme et al., 1998; Webster, 1993).

The objective of our research was to study the effect of rootstock and budding height on the quality parameters of apple and sour cherry planting material produced under Iasi environmental conditions.

MATERIALS AND METHODS

The trial was performed at the Faculty of Horticulture in the experimental field between 2006-2007.

Research material was represent by apple rootstocks (MM106 şi M9) and sour cherry rootstocks (*Prunus mahaleb* and V.V.1), which were planted at 90×15 cm. Apple rootstocks were budded with Florina and Auriu de Bistrița cultivars and sour cherry rootstocks were

budded with Mocăneşti and De Botoşani cultivars. Rootstock diameter was 9-11 mm, and budding height varied from 10 cm, to 20cm and 40 cm

The following spring, rootstocks were cut just above the bud and tree height (cm), length of scion shoot (cm) bud survival was measured, during and at the end of the vegetative period.

RESULTS AND DISCUSSIONS

Grafting success was measured after 15-20 days. On the average, grafting success percent was between 83,9% and 85,1% on apple and between 80,9% and 71.3 % on sour cherry and it depended of rootstock and the scion grafted.

There was no significant effect of rootstock and budding height on bud healing in the autumn. There were also no interactions between rootstocks and budding height (Tab.no.1)

Table 1

Grafting success percentage at some scions of apple and sour cherry grafted on different rootstocks at 10, 20 and 40 cm

Graft height	MM 106	M9	MM 106	M9	Mahaleb	V V 1	Mahaleb	V V 1
	Florina (%)		Auriu de Bistrița (%)		Mocăneşti (%)		De Botoşani (%)	
10 cm	85,0	85,2	84,9	85,1	80,9	76,1	73,3	75,7
20 cm	84,8	84,9	84,8	84,6	74,6	74,1	74,3	74,5
40 cm	84,5	84,5	83,9	83,8	72,5	75,9	71,3	73,1

Significant differences among rootstocks and budding height were observed when bud survival was evaluated the following spring as a following of bud over-wintering evaluation.

Irrespective of budding height, the highest percentage of live buds was found on semi-dwarfing rootstocks (up to 95% at MM.106 and *Prunus mahaleb*). When M9 and VV1 rootstocks were used, percentage of live buds was approximately 90%. (Tab.no.2)

Table 2

Average of bud over-wintering percentage at some scions of apple and sour cherry grafted on different rootstocks at 10, 20 and 40 cm

Graft height	MM 106	M9	MM 106	M9	Mahaleb	V V 1	Mahaleb	V V 1
	Florina (%)		Auriu de Bistrița (%)		Mocăneşti (%)		De Botoşani (%)	
10 cm	98,45	91,64	97,86	91,45	97,87	92,25	98,15	92,10
20 cm	97,52	90,98	97,58	90,87	96,55	90,35	97,64	90,12
40 cm	95,12	89,94	96,68	89,97	95,04	89,67	95,88	89,54

Dwarf rootstock (M9 and VV1), being more susceptible at winter frost, had more winter damaged buds when were budded at 40 cm than at 10 cm.

We can say that low temperature resistance can be influenced in a bigger way from rootstock genetically characteristics than budding height.

. Differences in growth intensity appeared at the beginning of the season. When rootstock MM106 and *Prunus mahaleb* were used scion burst buds began with 1-2 days earlier, than scions grafted on M9 and VV1 (Tab. no. 3).

Table 3

Bud opening time at some scions of apple and sour cherry grafted on different rootstocks at 10, 20 and 40 cm

Graft height	MM 106	M9	MM 106	M9	Mahaleb	V V 1	Mahaleb	V V 1
	Florina		Auriu de Bistrița		De Botoşani		Mocăneşti	
10 cm	31.03.08	26.03.08	31.03.08	27.03.08	24.03.08	23.03.08	25.03.08	24.03.08
20 cm	1.04.08	29.03.08	1.04.08	30.03.08	25.03.08	24.03.08	26.03.08	25.03.08
40 cm	1.04.08	31.03.08	2.04.08	31.03.08	25.03.08	25.03.08	26.03.08	26.03.08

Determinations made in May, June, July and September, had show differences between scions growth at both studied species.

At the sour cherry scions, shoot length was significantly bigger than at the apple scions.

Irrespective of rootstock, on the same species, no significant differences were found regarding of average length of the shoots scion. (Tab. no.4)

Table 4

Average length of shoot scions (cm) at some scions of apple and sour cherry grafted on different rootstocks at 10, 20 and 40 cm (May 2007)

Graft height	MM106		M9		Mahaleb		V V 1	
	Auriu de Bistrița	Florina	Auriu de Bistrița	Florina	De Botoşani	Mocăneşti	De Botoşani	Mocăneşti
10 cm	29,15	29,34	29,10	29,20	46,25	48,51	45,90	48,37
20 cm	28,42	28,62	28,35	28,59	43,21	47,50	43,18	47,38
40 cm	28,23	28,20	28,16	28,22	43,17	47,35	42,50	47,26

Later, the differences regarding the length of shoot scions depended in a bigger degree on grafting height (*Tab. no.5, 6).*

Table 5

Average length of shoot scions (cm) at some scions of apple and sour cherry grafted on different rootstocks at 10, 20 and 40 cm (June 2007)

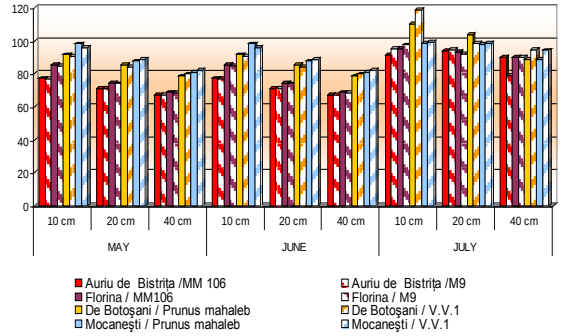
Graft height	MM106		M9		Mahaleb		V V 1	
	Auriu de Bistrița	Florina	Auriu de Bistrița	Florina	De Botoşani	Mocăneşti	De Botoşani	Mocăneşti
10 cm	77,34	85,32	76,86	84,95	91,60	98,30	90,50	95,74
20 cm	71,21	74,19	71,22	74,10	85,60	87,84	84,21	88,58
40 cm	67,38	68,74	67,34	68,30	78,54	81,03	80,01	82,41

Table 6

Average length of shoot scions (cm) at some scions of apple and sour cherry grafted on different rootstocks at 10, 20 and 40 cm (July 2007)

Graft height	MM106		M9		Mahaleb		V V 1	
	Auriu de Bistrița	Florina	Auriu de Bistrița	Florina	De Botoşani	Mocăneşti	De Botoşani	Mocăneşti
10 cm	91,23	95,17	95,38	97,45	110,12	118,56	98,45	99,01
20 cm	93,86	94,65	93,22	92,13	103,84	98,54	98,05	98,67
40 cm	90,22	78,80	90,15	89,97	88,85	94,60	88,63	94,21

Fig. 1 Average length of shoot scions (cm) at some scions of apple and sour cherry grafted on different rootstocks at 10cm, 20cm and 40cm (May, June and July 2007)



During the growing season, a suppressing of growth scions shoot in length was recorded, in direct correlation with increasing budding height

On the same species, the scion length reduction tendency increased, all the more as rootstock is dwarfing.

The measurements made in September did not show significant differences regarding total length of the grafted trees irrespective of budding height, on both species (*Tab. no. 7).*

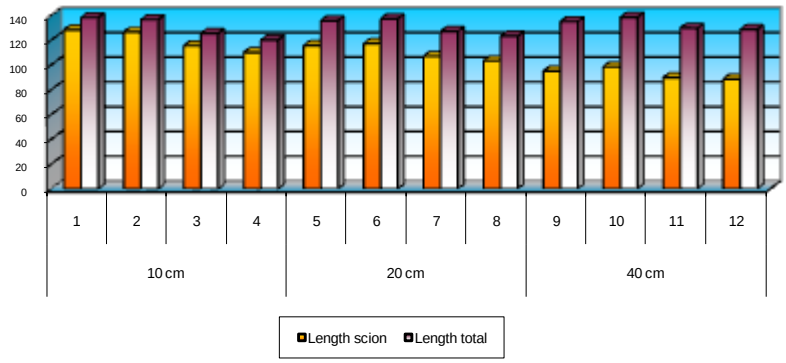
Table 7

Average length of shoot scions and total tree length (cm) at some scions of apple and sour cherry grafted on different rootstocks at 10, 20 and 40 cm (September 2007)

H. graft (cm)	Lenght (cm)	MM106		M9		Mahaleb		V. V. 1	
		Auriu de Bistrița	Florina	Auriu de Bistrița	Florina	De Botoşani	Mocăneşti	De Botoşani	Mocăneşti
10	scion	128,23	126,54	115,42	110,10	138,80	139,35	132,86	134,52
	grafted tree	138,23	136,54	125,42	120,10	148,80	149,35	142,86	144,52
20	scion	115,65	117,25	106,96	103,34	125,73	120,47	126,34	121,32

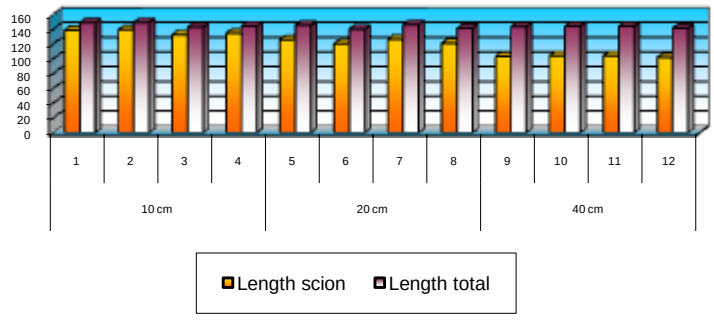
	grafted tree	135,65	137,25	126,96	123,34	145,73	140,47	146,34	141,32
40	scion	94,98	98,45	89,73	88,58	103,36	104,25	104,12	101,74
	grafted tree	134,98	138,45	129,73	128,58	143,36	144,25	144,12	141,74

Fig. 2 Average length of shoot scions and total tree length (cm) at some apple scions grafted on different rootstocks at 10 cm, 20 cm and 40 cm (September 2007)



1. Auriu de Bstrița/ MM106
2.Florina/ MM106
3. Auriu de Bstrița/ M 9
4. Florina/ M9
5. Auriu de Bstrița/ MM106
6. Florina/ MM106
7. Auriu de Bstrița/ M 9
8. Florina/ M9
9. Auriu de Bstrița/ MM106
10. Florina/ MM106
11. Auriu de Bstrița/ M 9
12. Florina/ M9

Fig. 3 Average length of shoot scions and total tree length (cm) at some sour cherry scion grafted on different rootstocks at 10 cm, 20 cm and 40 cm (September 2007)



1. De Botoşani/ Mahaleb
2. Mocăneşti/ Mahaleb
3. De Botoşani/ V.V.1
4. Mocăneşti/ V.V.1
5. De Botoşani/ Mahaleb
6. Mocăneşti/ Mahaleb
7. De Botoşani/ V.V.1
8. Mocăneşti/ V.V.1
9. De Botoşani/ Mahaleb
10. Mocăneşti/ Mahaleb
11. De Botoşani/ V.V.
12. Mocăneşti/ V.V.1

On the average the length of the scion shoot was between 88,58 cm and 128,23 cm at apple, and 101,74 cm and 138,8 cm at sour cherry.

At both apple and sour cherry, we observed a diminishing of scion shoot growing rhythm, as the budding height was increased so we can say that modifications in budding height and rootstock influence on the scion are directly correlated.

CONCLUSIONS

1. Grafting success percentage was good, a small decrease in the case of budding height being noticed.
2. Budding height influenced significantly live buds percentage, bigger damages being observed when budding height was increased to 40cm.
3. Scions bud over-wintering was better when rootstocks MM106 and *Prunus mahaleb* were used.
4. Budding height did not influence significantly the time of scions bud opening
5. During the growing season we observed a indirect correlation between scion shoot growing rhythm and budding height, these results are to be verified over the next year.

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SOME COMPATIBILITY ASPECTS OF PEAR VARIETIES ENGRAFTED ON DIFERENT ROOTSTOCKS

UNELE COMPATIBILITĂȚI LA SOIURI DE PĂR ALTOITE PE DIFERIȚI PORTALTOI

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Abstract. *Our experiments followed some aspects like: the enzymatic activity of the catalasas and peroxidasas; nitrogen and assimilating pigments contents at the scion and rootstock level with the purpose of establishing a correlation between those specific biochemical parameters and their influences upon the compatibility between scions and rootstocks at some pear varieties engrafted on Cydonia oblonga and Pirus sativa rootstocks. The results highlighted a correlation between enzymatic activity and engrafting affinity. Also, the nitrogen and assimilating pigments contents can be taken into consideration for establishing the level of compatibility on graft combinations.*

Rezumat. *Experimentele noastre au vizat unele aspecte precum: activitatea enzimatica a catalazei si peroxidazei; cantitateade azot total si pigmenti asimilatori la altoi si portaltoi in vederea stabilirii unor corelatii intre acesti parametri biochimici si influetnta lor asupra compatibilitatii dintre altoi si portaltoi la unele soiuri de par altoite pe Cydonia oblonga si păr franc (Pirus sativa). Rezultatele obtinute au evidentiat existenta unei corelatii intre activitatea enzimatica si compatibilitatea la altoire. De asemenea, continutul de azot total si pigmnenti asimilatori pot fi luati in calcul la stabilirea gradului de compatibilitate la altoire.*

MATERIAL AND METHODS

For our researches we used two varieties of pear (Contesa de Paris and Triumf) which were engrafted on a known rootstock as incompatible – *Cydonia oblonga* BN 70 and on a compatible rootstock – *Pirus sativa* as a control

At the same time in order to avoid the occurred modifications by the engrafting process, we made the engrafting on the franc rootstocks themselves.

Here we present the results of biochemical analyses that we performed regarding catalasas and peroxidasas activities which were achieved through the idiometric method; the determination of the total nitrogen content through the Kjeldahl method; as well as the determination of the quantity of assimilating pigments using the UV-VIS method.

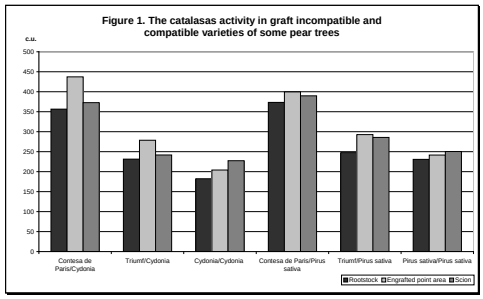
RESULTS AND DISSCUSIONS

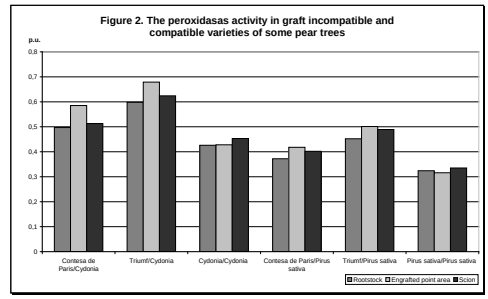
The catalasas and peroxidasas are enzymes which suffer quite high fluctuations along the cell differentiating and re-differentiating process, after which a series of toxic products are generated type of peroxides, which are

neutralized by these two enzymes. The engrafting process, in itself, represents a major artificial intervention, followed by modifications in the anatomy, physiology and biochemistry of the fruit trees. Due to the physiological stress, induced by the engrafting process, the fruit trees undergo a series of transformation on the cellular and molecular level meant to reestablish the functional balance of its cells, tissues and organs.

Analyzing the data presented in the figures 1 and 2 we can remark the fact that the activity of the catalasas and peroxidasas was bigger at the same engrafted varieties on incompatibles rootstocks (Contesa de Paris/*Cydonia oblonga* BN70, Triumf/*Cydonia oblonga* BN70) when compared to the compatible rootstocks (Contesa de Paris/*Pirus sativa*, Triumf/*Pirus sativa*).

It is interesting the fact that although the engrafted varieties on compatible rootstocks have a catalasas and peroxidasas activity much below the level of the engrafted varieties on incompatible rootstocks, these, yet present an enzymatic activity however bigger compared to the rootstocks on engrafted themselves (*Cydonia oblonga* BN70/*Cydonia oblonga* BN70, *Pirus sativa*/*Pirus sativa*).





Therefore, following the performed analysis we can assert the following thing: a bigger difference of the respiratory enzymes activity (catalasas, peroxidasas) in the engrafted varieties on a rootstock, when compared to the one of the rootstock engrafted on itself, indicate a smaller degree of variety affinity for the rootstock.

Another truth which imposes itself, due to the results of the achieved experiences is the one according to which, although the variety is compatible with the rootstock (Contesa de Paris/*Pirus sativa*, Triumf/*Pirus sativa*), however it presents some differences if compared to the rootstock engrafted on itself (*Cydonia oblonga* BN70/*Cydonia oblonga* BN70, *Pirus sativa*/*Pirus sativa*). So, we can not discuss about a total (100%) affinity between scion and rootstock.

Regarding the activity of the catalasas and peroxidasas around the engrafting point, no significant differences were noticed with an interpretative role in the studied matter.

Knowing the biological importance of the nitrogen in plants, we attempted to see which is the dynamics of this element in the case of the varieties engrafted on a compatible and incompatible rootstocks.

As shown in figure 3 in the varieties incompatible with the rootstocks (Contesa de Paris/*Cydonia oblonga* BN70, Triumf/*Cydonia oblonga* BN70) the nitrogen quantity is clearly bigger in scion (2 cm above the engrafting point) however, in the case of the compatible varieties (Contesa de Paris/*Pirus sativa*, Triumf/*Pirus sativa*), and of the rootstocks engrafted on themselves (*Cydonia oblonga* BN70/*Cydonia oblonga* BN70, *Pirus sativa*/*Pirus sativa*), the situation is exactly opposite. The nitrogen quantity is bigger in rootstock than in scion. It is well known the fact that the nitrogen enters the plants through roots, wherefrom, together with the raw sap it is transported to the aerial organs and leaves, where it is used in the synthesis of various organic compounds, which then migrate by the elaborated sap, to the inferior organs and the plant roots.

The retention of the nitrogen (included in organic combinations) above the engrafting point, in case of the varieties incompatible with the rootstock, make us believe that on this level there are barriers of an anatomo-morphological order, hindering the migration of the organic compounds through the elaborated sap to the roots. Therefore, the rootstock and its roots will suffer a chronic lack of active physiological substances generating the lowering of the rootstock vigor, and finally its death.

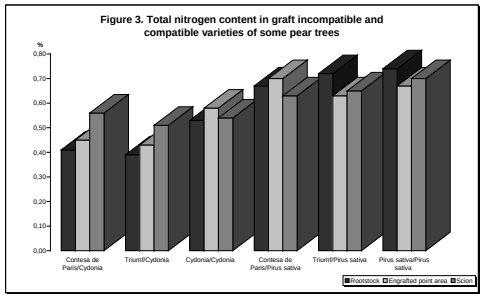


Figure 3. Total nitrogen content in graft incompatible and compatible varieties of some pear trees

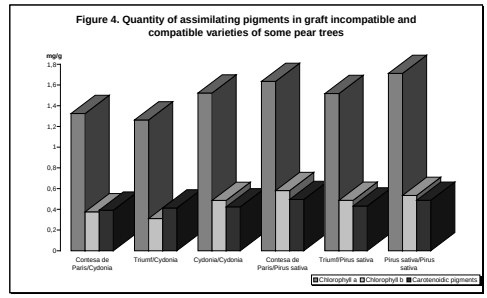


Figure 4. Quantity of assimilating pigments in graft incompatible and compatible varieties of some pear trees

Naturally, a bigger quantity of assimilating pigments existent in the tree leaves (especially in the young ones, during their first year of vegetation) can support a higher intensity of the photosynthesis generating the energy and the substratum necessary to the plants growing and their development.

Following the analysis of our results (figure 4) we notice that in the varieties incompatible with the rootstock (Contesa de Paris/*Cydonia oblonga* BN70, Triumf/*Cydonia oblonga* BN70), the quantity of assimilating pigments is significantly lower (about 20%) than in the varieties compatible with the rootstocks (*Cydonia oblonga* BN70/*Cydonia oblonga* BN70, *Pirus sativa*/*Pirus sativa*).

G.V. Shishcanu (1973), in the speciality literature mentions that due to some deficiencies in nitrogen, phosphorus, potassium in some apple varieties, the photosynthesis intensity was reduced up to 10,8% – 28,6% during the day, compared to the varieties which had a balanced mineral nutrition.

Therefore we conclude one more time that in case of the varieties incompatible with the rootstock, due to a heavier circulation of the elaborated sap

on the level of the engrafting point, the nutrients get to the roots in insufficient quantities, generating their functional disequilibrium reflected upon the absorption capacity of the mineral elements necessary to the photosynthetic apparatus.

CONCLUSIONS

- The high level of the respiratory enzymes activity (catalasas, peroxidasas), in the area of the engrafting point at the varieties incompatible with the rootstock shows the existence of physiological stress at this level.

- The retention of the nitrogen above the engrafting point, in case of the varieties incompatible with rootstock, indicate the existence of a barrier of an anatomo-physiological order on this level, hindering the migration of the organic compounds through the elaborated sap to the roots.

- The reduced quantity of assimilating pigments at the varieties incompatible with the rootstock is determined by the installing of a functional disequilibrium of the roots affecting the process of the tree mineral nutrition, due to hardening of the organic and inorganic compounds migration at the level of the engrafting point.

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NEW PEACH AND NECTARIN CULTIVARS OBTAINED AT RESEARCH STATION FOR FRUIT GROWING CONSTANTA

SOIURI NOI DE PIERSIC ŞI NECTARIN OBȚINUTE LA STAȚIUNEA DE CERCETARE-DEZVOLTARE PENTRU POMICULTURĂ CONSTANȚA

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Abstract. *In order to improve the existing assortment, many peach and nectarine cultivars, hybrids and selections were studied in the last 30 years. Many hybridizations, self pollinations, open pollinations and selections were made annually and from those, some genotypes were obtained: MONICA-peach with flat fruit, MARINA and CREOLA-nectarine with flat fruit. This new varieties have good quality as for fresh consumption as for processing too.*

Rezumat. *În scopul de a îmbunătăți actualul sortiment de piersic şi nectarin, multe soiuri au fost studiate, au fost selectați genitori şi s-au efectuat anual numeroase combinații hibride, autopolenizări, libere polenizări şi selecții-în ultimii 30 ani. În 2007 la S.C.D.P. Constanța au fost omologate trei soiuri noi: MONICA-piersic cu fructul plat, MARINA şi CREOLA-nectarin cu fructul plat. Aceste soiuri îmbunătățesc actualul sortiment, având fructe de calitate superioară pretabile atât la consumul direct, cât şi la procesare.*

In order to improve the existent assortment, many peach, clingstone, nectarine and brugnone cultivars, selections and hybrids were studied. The breeder-team has been done an intense activity in order to enrich the germplasm fund and to obtain new cultivars.

MATERIAL AND METHOD

At Valu lui Traian there is The Peach National Collection, who contents 855 genotypes. Annualy, the breeders selected the best genitors and made hibridations, self pollinations and clonal selections, in order to obtain new cultivars.

The biological material was observed from the phenological point of view. There were made biometric measurements on fruits, physicochemical analyses, appreciations on productivity; fruit-bearing date. The selected and valuable genetic material obtained was used to organize competition crops in Constanta and in different other regions of our country. The fruits have a good teste and flavor and a very attractive appearance. They are very good as well for fresh consumption, as for industrial processing.

RESULTS AND DISCUSSIONS

Most of the selected genotypes have medium and late flowering (Table 1).

The flowering intensity is between 4 and 5. The ripening time is from June (Cora and Delta), to September (NJC 85 Sel. L.P.). Yield is between 23.0 kg/tree (Creola) and 45 kg/tree, (Catherine sel.1), or between 19 t/ha and 37.5 t/ha. The selected genotypes have: spherical fruit (Raluca, Cora, NJC 105 sel AP, NJC 85 sel. L.P. and Catherine sel.1); ovoidal fruit (Delta, Romamer 2, Sel. V.T. BR7P2) and

Table 1.

Phenological stages and average yield of some genotypes of peach, nectarine, brugnone and clingstone (multiannual data)

Research Station for Fruit Growing Constanta

Genotype	Group	Beginning of flowering	Flowering intensity	End of flowe-ring	Ripening time	Yield	
						kg/tree	t/ha*
FLORIN	peach with flat fruit	03.04-25.04	4	12.04-06.05	08.07-25.07	25.0	21.0
RALUCA	peach	30.03-13.04	4	27.04-03.05	10.07-19.07	31.0	26.0
FILIP	peach with flat fruit	23.03-22.04	5	05.04-03.05	15.07-03.08	37.0	31.0
MONICA	peach with flat fruit	01.04-22.04	5	07.04-29.04	24.07-07.08	35.0	29.0
CORA	nectarine	25.03-11.04	5	04.04-18.04	23.06-29.06	25.0	21.0
DELTA	nectarine	24.03-11.04	5	05.04-19.04	26.06-05.07	27.0	22.5
ROMAMER 2	nectarine	25.03-13.04	5	03.04-19.04	30.06-14.07	35.0	29.0
CREOLA	nectarine with flat fruit	29.03-20.04	4	17.04-30.04	07.07-25.07	23.0	19.0
MARINA	nectarine with flat fruit	28.03-23.04	5	13.04-28.04	01.07-20.07	30.0	25.0
Sel. V.T. BR7P2	brugnone	01.04-19.04	5	03.04-02.05	17.07-25.07	32.0	27.0
NJC 105 Sel. A.P.	clingstone	29.03-18.04	5	07.04-29.04	19.07-05.08	30.0	25.0
CATHERINE Sel.1	clingstone	28.03-12.04	5	15.04-03.05	20.07-27.08	45.0	37.5
NJC 85 Sel. L.P.	clingstone	30.03-20.04	5	10.04-06.05	01.08-03.09	29.0	24.0

*The orchard density is : 833 trees/ha

Table 2

Quality test of some genotypes of peach, nectarine, brugnone and clingstone (multianual data)
Research Station for Fruit Growing Constanta

Genotype	Fruit mean weight (g)	Dry matter (%)	Acidity* (mg%)	Fruit appearance	Flesh quality	Destination of fruits
FLORIN	120.0	11.5	0.52	Flat, yellow with 30% red	Orange, juicy	Dessert processing
RALUCA	170.0	12.3	0.38	Spherical, yellow 80% red	Yellow flesh, juicy	For fresh consumption
FILIP	95.0	14.0	0.42	Flat, red-carmine	White, juicy, sweet	Fresh consumption and can
MONICA	75.5	13.6	0.38	Flat, red-carmin	White, juicy	Fresh consumption and can
CORA	91.0	9.2	0.71	Spherical, red-dark	Yellow, juicy	Fresh consumption
DELTA	95.0	10.3	0.68	Ovoidal, red	Yellow, juicy	Fresh consumption
ROMAMER 2	101.0	9.4	075	Ovoidal, red	Yellow, juicy	Fresh consumption
CREOLA	65.0	13.5	0.88	Flat, orange-dark	Yellow-orange, juicy	Fresh consumption and processing
MARINA	80.0	13.0	094	Flat, orange	Orange juicy	Fresh consumption and processing
Sel. V.T. BR7P2	90.0	12.0	0.45	Ovoidal, orange	Yellow-orange, ferm	For can and fresh consumption
NJC 105 Sel. A.P.	120.0	12.5	0.31	Spherical, yellow+red	Yellow, ferm	For processing and consumption
CATHERINE Sel.1	220.0	14.0	0.51	Spherical, orange	Orange, ferm, flavoured	For processing and consumption
NJC 85 Sel. L.P.	125.0	10.6	0.37	Spheric-ovoidal yellow+red	Yellow, ferm	For processing and consumption

* Acidity: mg malic acid/100 g flesh-fruit

- flat fruit (Florin, Filip, Monica, Creola and Marina) (Table 2)

The color of flesh is:

- white (Filip and Monica)

- yellow (Raluca, Cora, Delta, Romamer 2, Sel. V.T. BR7P2, NJC 105 sel. AP and NJC 85 sel. L.P.)

- orange (Florin, Marina, Creola and Catherine Sel.1).

The fruit weight is between 65.0 g (Creola) and 220.0 g (Catherine Sel.1).

The dry matter is between 9.2% (Cora) and 14.0% (Filip and Catherine Sel.1).

The acidity is between 0.31% (NJC 105 sel. A.P.) and 0.94% (Marina).

CONCLUSIONS

In the last 30 years at Research Station for Fruit Growing Constanta 26 cultivars were obtained and registered.

In 2007 were registered: Monica, Marina and Creola.

We recommend these new cultivars for extending in production and for family orchards.

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„IN VITRO" MICROPROPAGATION – QUICK AND EFFICIENT METHOD FOR SOME VALOROUS *PRUNUS CERASIFERA* ECOTYPES FROM THE SOUTH ROMANIAN AREA

ÎNMULȚIREA „IN VITRO" - METODĂ RAPIDĂ ŞI EFICIENTĂ PENTRU PROPAGAREA UNOR BIOTIPURI VALOROASE DE CORCODUŞ DIN SUDUL ROMÂNIEI

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Abstract *P. cerasifera (Ehrh.) is one of over 270 species of Prunus gender (Jucovski, 1952), and over some other authors is one of over 400 species (WGHROB – OECD, 2006). This species presents interest all over the world to preserve the genetic resources and to breed, cultivars and rootstocks of a great value. In this paper we have proposed to show up the Prunus cerasifera ecotypes in the South Romanian area and the micro propagation through "in vitro" cultures to establish a work method in the laboratory, to obtain quickly and efficiently of some south Romanian ecotypes and to preserve them in the National Prunus Gene Bank at S.C.D.P. Vâlcea. The evaluation of the material was done with IPGRI descriptors in agreement with ECP/GR PRUNUS WORKING GROUP, 1996. The micro propagation was done through meristems cultures during February and March. The used media were Murashige & Skoog for the starting and multiplication phases and Lepoivre for rooting with normal concentrations of micro- and macro elements and phytohormons as: Giberelic acid (GA3) 0,5 mg/l, Benzilaminopurine(6-BAP) – 1mg/l, Indolilbutiric acid (IBA) – 0,5-1 mg/l and mixtures of vitamins as: Murashige & Skoog and Liensmair in normal concentrations.*

Rezumat *P. cerasifera (Ehrh.) este una dintre cele peste 270 de specii ale genului Prunus (Jucovski, 1952), iar după alți autori ,dintre cele 400 specii ale acestui gen (WGHROB – OECD, 2006). Această specie prezintă interes la nivel mondial pentru conservarea resurselor genetice şi pentru ameliorarea de soiuri şi portaltoi de mare valoare biologică. Prin prezenta lucrare ne-am propus să punem în evidență câteva biotipuri aparținătoare la P. cerasifera în zona de Sud a României (Oltenia, Dobrogea) şi în acelaşi timp să încercam micropropagarea acestora prin culturi „in vitro" în vederea stabilirii unei metode de lucru rapide pentru obținerea celor mai reprezentative biotipuri şi conservarea lor în Banca Națională de Gene Prunus de la SCDP Vâlcea. Evaluarea materialului s-a făcut pe baza descriptorilor IPGRI – în conformitate cu ECP/GR PRUNUS WORKING GROUP, 1996. Microînmulțirea s-a realizat prin culturi de meristeme în cursul lunilor februarie – martie. Mediile de cultură utilizate, ca medii de bază au fost :Murashige & Skoog pentru inițiere şi multiplicare; Lepoivre pentru înrădăcinare, cu concentrații normale de macroelemente si microelemente, cu adaosuri de fitohormoni ca : Acid giberelic (GA3) – 0,5 mg/l; Benzilaminopurină (6-BAP) – 1 mg/l; Acid indolilbutiric (IBA) – 0,5-1 mg/l şi vitamine Murashige & Skoog şi Liensmair în concentrații normale.*

It has passed over 106 years since Haberlandt, discovered the assumption of totipotential of the vegetative cell, an assumption confirmed and developed in the same time with the discovery and the use of the plant growth regulators especially auxins and citochinines.

P. cerasifera (Ehrh.) is one of over 270 species of *Prunus* gender (Jucovski, 1952), and over some other authors is one of over 400 species (WGHROB – OECD, 2006). This species presents interest all over the world to preserve the genetic resources and to breed, cultivars and rootstocks of a great biological value. On Romanian territory *P. cerasifera* is present from the ancient times near by: P*runus domestica, P.insititia, P. spinosa, P.avium, P. cerasus, P.persica, P.armeniaca, etc.*

P.cerasifera is considered to be formed (Sonea 1957) of more varieties and ecotypes (P. *cerasifera var. pissardi Schn*., P. *cerasifera var. bliereiana Hort*., P. *cerasifera var. moserii*, P. *cerasifera var. woodiwood*., P. *cerasifera var. turcomanii* Pop., P. *cerasifera var. orientalis* Pop.).

The favourable ecological conditions from the South Romanian area and the high interest of the fruit growers for fruits, distilled drinks and also the use as rootstocks , go to the spread of this species and to form many populations formed of several ecotypes which present different morphological and biochemical characteristics.

In Romania were done many researches over this species regarding the genetic and breading aspects, growth and fruiting processes spread in different areas, etc. *(Bordeianu, 1956; Sonea, 1957; Duțu, Parnia şi Botu, 1987; Botu, 1987; Giorgota, 2005, Botu I., Achim Ghe, Preda S., Giorgota A.)*.

In this paper we have proposed to show up some *Prunus cerasifera* ecotypes from the South Romanian area (Oltenia, Dobrogea) and in the same time to try the micro propagation through "in vitro" cultures to establish a work method to obtain quickly and efficiently of some south Romanian ecotypes and to preserve them in the National Prunus Gene Bank at S.C.D.P. Vâlcea.

MATERIAL AND METHODS

The researches were done during the period 2002-2007. The identify and the collecting of the biological material was done in the south Romanian area and included areas from Oltenia and Dobrogea regions.

The evaluation of the material was done with IPGRI descriptors in agreement with ECP/GR PRUNUS WORKING GROUP, 1996.

The micro propagation was done through meristems cultures during February and March. The used media were *Murashige & Skoog* for the starting and multiplication phases and *Lepoivre* for rooting with normal concentrations of micro- and macro elements and phytohormons as: Giberelic acid (GA3) 0,5 mg/l, Benzilaminopurine (6-BAP) – 1mg/l, Indolilbutiric acid (IBA) – 0,5-1 mg/l and mixtures of vitamins as: *Murashige & Skoog and Liensmair* in normal concentrations.

In the growth room, the little plants were maintained at an photoperiod of 16 h light and a temperature of 23-24 ° C and 8h dark and a temperature of 18-20 ° C.

The "in vivo" acclimatization was realised in perlite and than the plants were moved in vases with mixture of peat, soil and sand (1/1/1) and than were planted directly in the field.

Were identify, evaluated and propagated through classic methods a number of 120 ecotypes *of Prunus cerasifera* which were introduced in S.C.D.P. Vâlcea "Prunus collection" as clones. Of these a number of 11 were introduced in the micro propagation technology.

RESULTS AND DISCUSSIONS

In the micro propagation process were used meristems of *P. cerasifera* from the buds.The explants were formed from the meristematicã bud (the dom) and one or two small leaves.

The branch small parts had the length of 2 cm, each one with one bud, were sterilized in ethylic alcohol 70% for 1 minute, then in calcium hypochlorite 6 % for 5 minutes, followed by 3 washes with distilled, sterile water.

The entire sterilization was done after the moment when the branches were washed with water and dish drops.

THE *Prunus cerasifera* ECOTYPES IN THE MULTIPLICATION PHASE

The used media as we said were Murashige & Skoog and Lepoivre with phytohormons adding , vitamins, sucrose and a gelling agent as agar (Table nr. 1).

For the multiplication media were used vitamins as *Murashige & Skoog* and for the *Lepoivre* media was used *Linsmair* vitamin and for both media was used BAP in different concentrations 1-1,5 mg/l, GA3 1 mg/l, and for rooting was used IBA 0,5-1 mg/l. For both media were used agar (7g/l), and sucrose (20-40 g/l).

After the effected researches the results showed up that the Murashige & Skoog media is good for the starting and multiplication phases and the Lepoivre media is good for rooting phase, this media assure to obtain over 66 % rooted plants which survived till the acclimatization phase. (Table no. 2 and Fig. 1.)

Table 1.

The composition of the used culture media

Media Murashige & Skoog (MS)		***Media Lepoivre (L)***	
Substance	***The quantity for 1000 ml***	***Substance***	***The quantity for 1000 ml***
KNO3	*1900 mg*	*NH4NO3*	*400 mg*
NH4NO3	*1650 mg*	*KNO3*	*1800 mg*
MgSO4 7H2O	*370 mg*	*MgSO4 7H2O*	*360 mg*
CaCl2 2H2O	*440 mg*	*KH2PO4*	*270 mg*
KH2PO4	*170 mg*	*CaCl2 2H2O*	*1200 mg*
MnSO4 4H2O	*22,3 mg*	*MnSO4 4H2O*	*1,000 mg*
ZnSO4 7H2O	*8,6 mg*	*ZnSO4 7H2O*	*8,600 mg*
H3BO3	*6,2 mg*	*H3BO3*	*6,200 mg*
CuSO4 5H2O	*0,025 mg*	*CuSO4 5H2O*	*0,025 mg*
Na2MoO4 2H2O	*0,250 mg*	*Na2MoO4 2H2O*	*0,250 mg*
CoCl2 6H2O	*0,025 mg*	*CoCl2 6H2O*	*0,025 mg*
KI	*0,830 mg*	*KI*	*0,080 mg*
FeSO4 7H2O	*27,9 mg*	*FeSO4 7H2O*	*27,8 mg*
Na2 EDTA	*37,5 mg*	*Na2 EDTA*	*37,02 mg*

THE *Prunus cerasifera* ECOTYPES IN THE MULTIPLICATION AND ROOTING PHASES

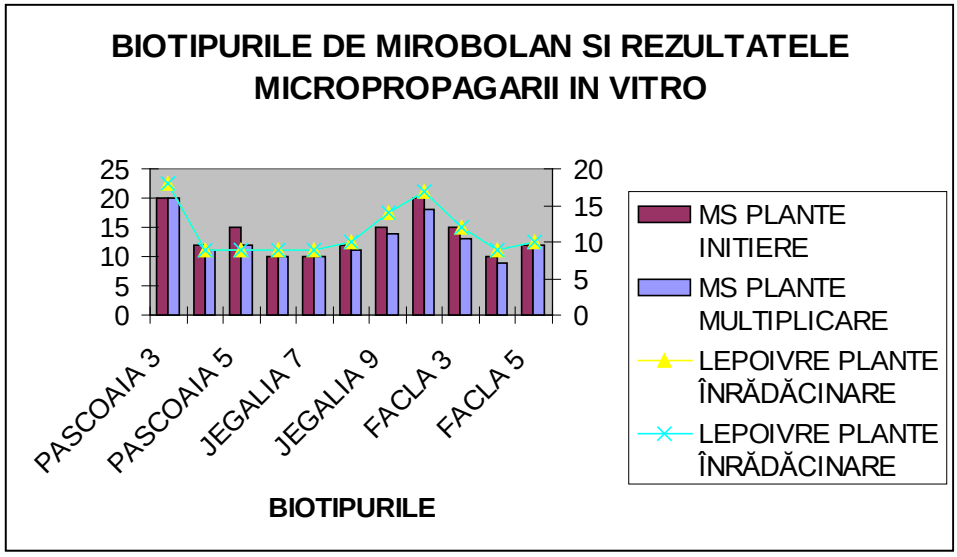

Fig. 1. The *Prunus cerasifera* ecotypes and the results of "in vitro" micro propagation

Table 2

The *Prunus cerasifera* ecotypes and the results of "in vitro" micro propagation

No	BIOTYPE	THE CULTURE MEDIA			ACLIMATIZED PLANTS
		MS STARTING PLANTS	MS MULTIPLICATION PLANTS	LEPOIVRE ROOTED PLANTS	
1	*PASCOAIA 3*	*20*	*20*	*18*	*18*
2	*PASCOAIA 4*	*12*	*11*	*9*	*9*
3	*PASCOAIA 5*	*15*	*12*	*9*	*9*
4	*JEGALIA 6*	*10*	*10*	*9*	*9*
5	*JEGALIA 7*	*10*	*10*	*9*	*9*
6	*JEGALIA 8*	*12*	*11*	*10*	*10*
7	*JEGALIA 9*	*15*	*14*	*14*	*14*
8	*JEGALIA 10*	*20*	*18*	*17*	*17*
9	*FACLA 3*	*15*	*13*	*12*	*12*
10	*FACLA 4*	*10*	*9*	*9*	*9*
11	*FACLA 5*	*12*	*12*	*10*	*10*

CONCLUSIONS

- The results obtained in the behaviour of some *Prunus cerasifera* ecotypes both in aseptic and natural conditions of life, prove the possibility of realising the ontogenesis and the propagation of *Prunus cerasifera* through tissues cultures "in vitro", very important method for the assurance of the rootstocks necessary for the propagation of the species of *Prunus* gender in our country.

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THE ROOT SYSTEM DEVELOPMENT AND REPARTITION INTO THE SOIL OF APPLE TREES IN THE FRUIT NURSERY

DEZVOLTAREA ŞI REPARTIZAREA SISTEMULUI RADICULAR ÎN SOL LA POMII DE MĂR ÎN PEPINIERA POMICOLĂ

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Abstract. *In 2006 in the enterprise „Fruit Nurseries" were made studies on the root system development and repartition into the soil of the „knip-baum" apple trees in the first and second field of the nursery. As a object of study served the varieties Golden Reinders, Jonagored and Idared, bench grafted on M 9 rootstock. As a result of the investigations made, the root system development of the apple trees grown in the second field increased with 1,44 and 3,33, unlike the length and weight of the bench grafted roots in the first field of the fruit nursery. The greatest number of roots of the apple trees in the fruit nursery was distributed in 0-20 cm layer soil.*

Rezumat*. În anul 2006 în întreprinderea „Fruit Nurseries" au fost studiate dezvoltarea şi repartizarea în sol a sistemului radicular la pomii de măr de tipul „knip-baum" în câmpul întâi şi doi al pepinierei pomicole. Ca obiect de cercetare au servit soiurile Golden Reinders, Jonagored şi Idared altoite la masă pe portaltoiul M 9. În urma investigaţiilor efectuate, dezvoltarea sistemului radicular la pomii de măr în câmpul doi s-a majorat cu 1,44 şi 3,33 ori faţă de lungimea şi masa rădăcinilor altoirilor la masă în câmpul întâi al pepinierei. Cele mai multe rădăcini la pomii de măr în pepinieră au fost repartizate în stratul 0-20 cm de sol.*

The root system in the apple tree plantations was widely studied and it mustn't be excluded the fact that an early fructification depends on apple trees development in the fruit nursery, including the roots that were insufficiently studied (3, 6).

For agrotechnical systems elaboration and implementation of working and keeping the soil in good conditions in the fruit nursery, it is necessary to know about the root quantity and repartition in vertical and horizontal position in the soil layers (1, 2).

The rootstock vigor, the biological features of the soil, the type of soil and meteorological conditions in the period of vegetation, influence on the root system extension and repartition in the soil of apple trees from the fruit nursery (4).

Production of crowned apple trees according to "knip-baum" type reduces the technological cycle for one year; the crown is formed from sylleptic shoots, whose quantity and length depend on the biological features of the soil. This

crowning accelerated development leads to some modifications in the root system that require some additional investigations in order to obtain planting material for the technology improvement meant to obtain planting material that can produce fruits in the second year after plantation in the orchard.

MATERIAL AND METHOD

The investigations were made at the firm "Fruit Nurseries" and had as study the development and repartition in the soil of the root system of apple trees in the first and second field of the fruit nursery. The first field was planted with bench graftings, in the second field the trees were crowned according to "knip-baum" type. As object of study served Golden Delicious Reinders, Jonagored and Idared varieties, bench grafted on M 9 rootstock. The distance of plantation is 90x35 cm.

Root system development and repartition were studied according to the method of monolith and profile in vertical and horizontal position at the end of 2006. The size of monoliths is 20 cm; the thickness is to 40 cm depth and 22 cm width to the middle of the distance between rows.

RESULTS AND DISCUSSIONS

Our investigations didn't have the aim to study the constructions and functions of the apple tree roots, and they were more limited and directed to the root development and repartition into the soil, according to the hereditary capacities of the soil.

According to the varieties under the study, the root system development of the apple trees bench grafted at the end of the first period of vegetation, (table 1) in the first field of the fruit nursery is more emphasized at Jonagold variety with a super average growing vigour, where it was registered a length of 43,09 m/tree than 41,35 m/tree of Idared variety and 40,76 m/tree of Golden Reinders. Roots weight is greater for Idared variety apple trees (9,79 g/tree), that have less fibre roots than Jonagored variety apple trees.

Table 1

Root system development of apple trees in the first field of the fruit nursery, depending on the variety

Variety	**Root weight,** g/tree			**Root length,** m/tree		
	diameter		*sum*	**diameter**		*sum*
	< 3 mm	*> 3 mm*		*< 3 mm*	*> 3 mm*	
Golden Reinders	7,66	0,77	8,43	40,70	0,06	40,76
Jonagored	9,00	0,73	9,73	43,01	0,08	43,09
Idared	9,07	0,72	9,79	41,29	0,07	41,36

In the second field, at the end of the period of vegetation, root system development at "knip-baum" crowned apple trees (table 2), according to the varieties under the study, increased with 1,44 and 3,33 times than the root length and weight of bench graftings in the first field of the fruit nursery.

The maximum share of these main indicators was registered at the variety Jonagored, where their value increased with about 6-10% in comparison with Golden Reinders and 8-11% with Idared.

Table 2

Root system development of apple trees in the second field of the fruit nursery, depending on the variety

Variety	**Root weight,** g/tree			**Root length,** m/tree		
	diameter		*sum*	**diameter**		*sum*
	< 3 mm	*> 3 mm*		*< 3 mm*	*> 3 mm*	
Golden Reinders	17,43	9,83	27,26	62,10	0,83	62,93
Jonagored	19,40	10,63	30,03	66,01	0,81	66,82
Idared	12,86	14,90	27,76	58,73	1,17	59,90

According to the roots type and thickness in the second field of the fruit nursery, at Golden Reinders and Jonagored varieties predominates the fibre roots mass with a diameter of less than 3 mm – 63,9-64,6%. For Idared predominates non significantly the root mass with a diameter greater than 3 mm, being 53,6%. For all the varieties under the research, the fibre roots length constitutes 98,0-98,7% of the total length.

Roots extension and repartition on soil profile according to length and weight in preponderantly determined by the genetic proprieties of M 9 rootstock, that has a relatively superficial (fasciculated) root system located in the fruit nursery, in the soil layer of 0-40 cm (2, 3).

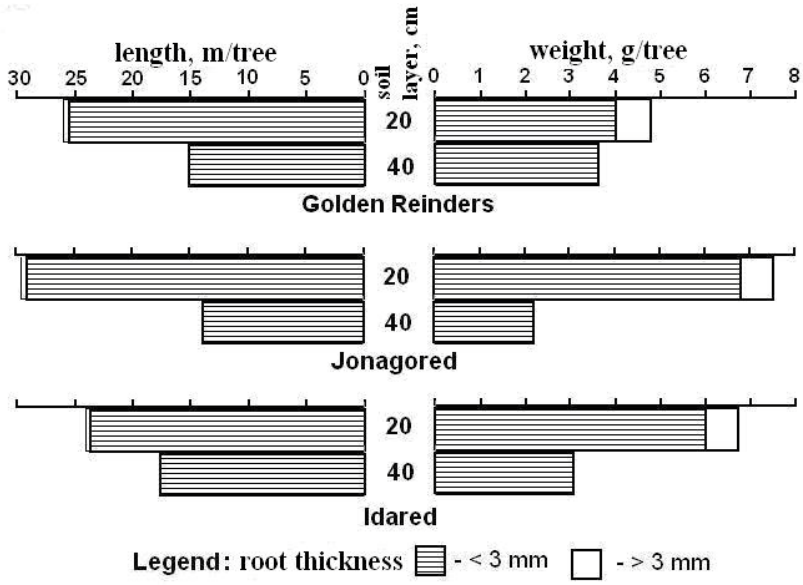

Fig. 1. Root system architectonics of apple trees in the first field of the fruit nursery, depending on variety.

Our investigations confirm that roots repartition into the soil at M 9 rootstock and apple tree, grafted on it, doesn't essentially differ according to the varieties taken into the study.

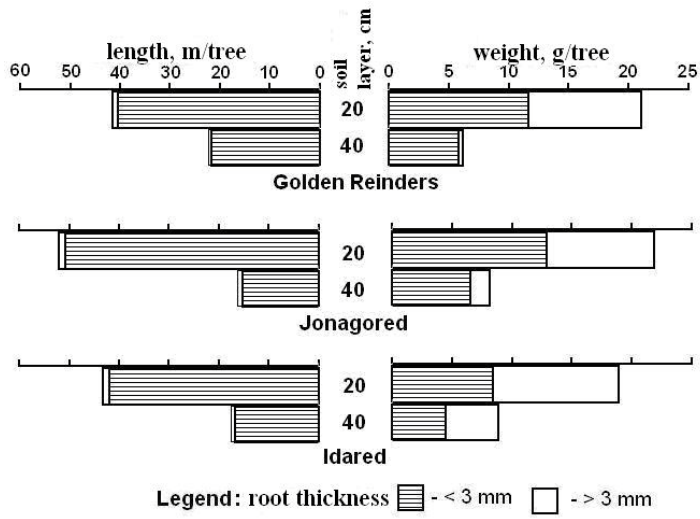

Fig. 2. Root system architectonics of apple trees in the second field of the fruit nursery, depending on variety.

At the end of vegetation period, in the first and second field of the fruit nursery (figure 1, 2), 52-75% of roots weight and total length is in 0-20 cm layer, and 25-48% in 20-40 cm layer.

CONCLUSIONS

The root system development of the apple trees grown in the second field increased with 1,44 and 3,33 unlike the length and weight of the bench grafted roots in the first field of the fruit nursery.

In the first and second field of the fruit nursery, the 52-75% of roots weight and total length is in 0-20 cm layer, and 25-48% in 20-40 cm layer.

The obtained results demonstrate that the parameters of the root system of the formed apple trees after the "knip-baum" type, register values that correspond to SM-155 (5) standard.

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RESEARCHES CONCERNING THE BEHAVIOR OF SOME PEACH TREE VARIETIES IN CONDITIONS OF THE DIDADCTIC STATION TIMISOARA

CERCETĂRI PRIVIND COMPORTAREA UNOR SOIURI DE PIERSIC ÎN CONDIȚIILE STAȚIUNII DIDACTICE TIMIŞOARA

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Abstract. *The peach tree is the most important species by its fruit qualities and biological features of trees, being considered the IIIrd fruit culture as economical importance and culture perspectives in our country. In Romania, the peach tree occupies the 6th place after the apple tree, plum tree, sweet cherry tree, apricot tree and peat tree. If during 1970-1989 this species was very cultivated, after 1990 the peach tree culture known a progressive decline. The nectarine culture amplified from 1970, thanks to the collaboration between dr. Vasile Cociu and prof. Leon Hough from the University Reurgers, New Jersey, U.S.A. researchers who made up the genetic bases of some nectarine varieties. The ample studies concerning the nectarine cultures were made by dr. Monica Murvai, dr. Antonia Ivascu, prof. Draganescu E. and others. In Timisoara, the studies concerning peach and nectarine culture was beginning in 1982-1990 period, was continuous after that and in present here is established the national collection of peach and nectarine who content 259 varieties and hybrids on the globe.*

MATERIAL AND METHOD

In this paper we have observed the behavior of some peach varieties in conditions of the Didactic Station Timisoara, concerning their productivity, the anterior studies showing up the fact that in this conditions the productions obtained are smaller, on one side because of the climatic accidents and on the other side because of the bad technology culture used in our country.

The biological material contains 12 peach varieties: Sunhaven, Springold, Jerseyland, Redglobe, Harvester, Redhaven, Shasta, Gloria, Southland, Elberta, Cresthaven and Harmony. The research goals were observing the fruit bending degree and the obtained productions during the years 2006 and 2007. The peach trees were planted in the spring of 2001 at a distance of 4 x 3 meters, obtaining 833 trees/hectare densities. The peach trees were grafted on a mirobolam, the top tree system being a “free palmet” and the type of soil is cambic cernosiom. The culture technology was the common one.

The working method was of stationary type in two steps:

<!--[if !supportLists]-->- <!--[endif]-->first step: on field, base on observing the fruit bending degree, counting the fruits and weighting them;

<!--[if !supportLists]-->- <!--[endif]-->second step: in the laboratory, based on calculating and interpretation the collected data.

In the first step we did the following observations: marking 3 trees for each variety, counting the fruits that remained on the tree after the physiological and premature falling of these, collecting the fruit samples in order to weight them, determination of the mean weight and estimating the production. The second step consisted in calculating the obtained data, the experiment being a monofactorial one and the interpretation of the data was made by the analysis variance method.

RESULTS AND DISCUSSIONS

The fruit binding degree was established after counting and calculating the fruits that were left on the tree after the physiological and premature falls, considering the fact that there were not done any chemical or mechanical procedures for the fruit rate-setting process and in that period there were not registered any climatic accidents that could have compromised the fruit production. The results obtained concerning this indicator are presented in tables 1 and 2.

Table 1

Fruit binding degree for the peach varieties in 2006

No.	Variety	No. of bind fruits after pollination - fecundation	No. of fruits after the physiological and premature falls	% of binding
1	Sunhaven	400	135	33,75
2	Springold	170	148	87,05
3	Jerseyland	138	117	84,78
4	Redglobe	368	232	63,04
5	Harvester	234	156	66,67
6	Redhaven	284	175	61,61
7	Shasta	188	174	92,55
8	Gloria	164	122	74,39
9	Southland	311	130	41,80
10	Elberta	108	90	83,33
11	Cresthaven	192	165	85,93
12	Harmony	178	105	58,98

In 2006, the highest fruit binding degree was observed for Shasta, then Springold, Cresthaven, Jerseyland and Elberta to which this parameter over passed 80%. The lowest fruit binding degree was registered for Sunhaven and Southland varieties, which was under 40%. The highest fruit binding degree in 2007 was observed for Gloria and Shasta varieties, which were the only ones that over passed 80%, while the lowest fruit binding degree was observed for Elberta and Harmony varieties which had values around 40%. Comparing the two studied years, we can observe that in 2007 the fruit binding degree was lower than the ones in 2006, so that there was no constancy between the varieties concerning this parameter, as an exception being considered Shasta variety, which had a high fruit binding degree in both years.

Table 2

Fruit binding degree for the peach varieties in 2007

No.	Variety	No. of bind fruits after pollination - fecundation	No. of fruits after the physiological and premature falls	% of binding
1	Sunhaven	207	164	79,22
2	Springold	230	154	66,95
3	Jerseyland	215	150	69,76
4	Redglobe	310	235	75,80
5	Harvester	273	180	65,93
6	Redhaven	240	177	73,75

7	Shasta	230	195	84,78
8	Gloria	125	118	94,40
9	Southland	216	152	70,37
10	Elberta	265	108	40,75
11	Cresthaven	207	164	79,22
12	Harmony	292	126	43,15

The fruit production obtained in the two studied years is presented in tables 3 and 4.

Table 3

Peach production per tree in 2006

No.	Variety	Medium production kg/tree	Relative value %	Difference to the witness	Significance
1	Sunhaven	13,1	86,81	-1,99	-
2	Springold	12,57	83,28	-2,52	0
3	Jerseyland	12,94	87,77	-2,15	-
4	Redglobe	13,89	92,07	-1,20	-
5	Harvester	15,65	103,71	0,56	-
6	Redhaven	16,79	111,27	1,7	-
7	Shasta	9,84	65,23	-5,25	000
8	Gloria	13,01	86,24	-2,08	-
9	Southland	18,5	122,60	3,41	XX
10	Elberta	15,05	100	0	Mt
11	Cresthaven	13,19	87,45	-1,89	-
12	Harmony	10,28	68,12	-4,81	000

DL5%=2,35 DL1%=3,20 DL0,1%=4,31

Table 4

Peach production per tree in 2007

No.	Variety	Medium production kg/tree	Relative value %	Difference to the witness	Significance
1	Sunhaven	18,83	98,57	-2,73	00
2	Springold	14,84	77,67	-4,27	000
3	Jerseyland	16,95	88,71	-2,16	00
4	Redglobe	17,85	93,44	-1,35	-
5	Harvester	18,78	98,29	-0,32	-
6	Redhaven	18,53	97,26	-0,53	-
7	Shasta	12,72	66,56	-6,39	000
8	Gloria	11,56	60,50	-7,55	000
9	Southland	20,34	106,45	1,23	-
10	Elberta	19,10	100	0	Mt
11	Cresthaven	14,76	77,25	-4,34	000
12	Harmony	13,78	72,21	-5,31	000

DL5%=1,64 DL1%=2,24 DL0,1%=3,01

In 2006, the highest production per tree was obtained for Southland variety of 18.5 kg, variety which had distinct significant positive difference to the witness. The lowest peach production per tree was obtained for Shasta (9.84 kg) and Harmony (10.28

kg) varieties, both of them having very significant negative differences to the witness. At the same time, Springold variety had a significant negative difference to the witness. The other varieties had values relative close to the witness that is why there were no differences to the witness.

In 2007, the highest peach production was obtained for Southland variety of 20.34 kg, production close to the one of the witness Elberta of 19.10 kg, which is why there were no significances to the witness. An interesting fact is that the other studied varieties had productions smaller than the one of the witness, which is why there were no significances (close values) or the obtained significances were very significant or distinct significant negative. The lowest peach production per tree was obtained for the varieties Gloria (11.56 kg), Shasta (12.72 kg) and Harmony (13.78 kg) varieties.

CONCLUSIONS

Because of the climatic conditions of the studied years, we can say that the peach varieties had a good behavior concerning their fruit binding degree and by this assuring a good potential production.

We can remark that in 2007 the peach productions per tree were higher comparing them to those in 2006, though the fruit binding degree of the varieties in 2006 assured otherwise.

Among the varieties we can observe constancy concerning the peach production for Southland variety, which had good productions in both years. At the same time, high productions and close to the witness were obtained for the varieties Harvester and Redhaven. On the other side, there are the varieties Shasta and Harmony, which had in both years the lowest productions among the studied varieties.

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STUDY ABOUT THE BEHAVIOUR OF SOME NEW SWEET CHERRY TREE CULTIVARS IN THE SOIL AND CLIMATE CONDITIONS BY N-E AREAS OF ROMANIA

STUDIUL COMPORTĂRII UNOR SOIURI NOI DE CIREŞ ÎN CONDIȚIILE PEDOCLIMATICE DIN N-E ȚĂRII

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Abstract. *For a new sweet cherry tree assortment with new cultivars which have all demandes and objectives, in 1990 was organised to Fruit Growing Development Station Iasi an experience with sweet cherry tree cultivars and hybrids elites. We have study five sweet cherry tree cultivars, through observations and determinations about trees vigor, the main fructification stages, self-fertility, behaviour about stress factors (frost, drought, special diseases), fruits yield and the main fruits physical and chemical features. Concerning the trees vigor, through trunk section surface, five new sweet cherry tree cultivars created at Fruit Growing Development Station Iasi, are classified in two vigor groupes: medium vigor cultivars, with trunk section surface between 376-296 cm^2 (as Cetatuia, Catalina, Maria and Marina cultivars) and small vigor cultivars, with trunk section surface with 274 cm^2 (as Golia cultivar). Concerning productivity level, all theses five cultivars have a very good productivity, remarkable though high yields by four years (Cetatuia have 14,4 tonnes/ha, Catalina with 12 tonnes/ha, Maria with 14,5 tonnes/ha and Marina with 16 tonnes/ha). The new sweet cherry cultivars have a very early maturity (Cetatuia), early maturity (Catalina), self-fertility (Maria), small vigor trees (Golia) and late maturity (Marina).*

Rezumat. *Pentru reînnoirea sortimentului de cireş cu noi soiuri care să întrunească toate cerinţele şi obiectivele urmărite, în anul 1990 s-a organizat la SCDP Iaşi o experienţă cu soiuri şi elite hibride de cireş. La cele cinci soiuri luate în studiu s-au efectuat observaţii şi determinări privind vigoarea pomilor, principalele fenofaze de fructificare, autofertilitatea, comportarea faţă de factorii limitativi ai producţiei (ger, secetă, bolile specifice cireşului), producţia de fructe şi principalele însuşiri fizico-chimice ale fructelor. După vigoarea de creştere a pomilor, exprimată prin suprafaţa secţiunii trunchiului, cele cinci soiuri noi de cireş create la SCDP Iaşi, se împart în două grupe de vigoare: soiuri de vigoare mijlocie, cu suprafaţa secţiunii trunchiului între 376-296 cm^2, (Cetăţuia, Cătălina, Maria şi Marina) şi soiuri de vigoare mică, cu suprafaţa secţiunii trunchiului 274 cm^2 , (Golia). Sub aspectul productivităţii, toate cele cinci soiuri au o capacitate productivă foarte bună, remarcându-se prin producţiile mari pe patru ani (Cetăţuia cu 14,4 t/ha, Cătălina cu 12 t/ha, Maria cu 14,5 t/ha, Golia cu 11,2 t/ha şi Marina cu 16 t/ha). Soiurile noi de cireş s-au remarcat prin extratimpurietate (Cetăţuia), timpurietate (Cătălina), autofertilitate (Maria), vigoare scăzută (Golia) şi tardivitate (Marina).*

The pedo-climatic conditions from the NE of the country are favourable for the cherry breeding except some years when some natural calamities occurred. The present and future situation of the cherry breeding as well as the results of the previous research

constituted stimulating factors to continue and deepen researches for the cherry species from this part of the country.

The goal of this study focuses on the improvement of the cherry assortment for the NE area of Romania by promoting the newly created breeds at SCDP Iaşi, the renewing of the present cherry assortment by new high quality breeds and especially the extension of the cherry season, the completion of the gaps existing in the period of consumption, the setting up of a special assortment for industrialization, and mentioning the areas where the respective breeds give the best results.

To renew the cherry assortment with new breeds that might meet all the requirements and objectives enumerated above, in 1990, they organized at SCDP Iaşi an experiment with 10 cherry breeds and hybrid elites.

MATERIAL AND METHOD

The studies were effectuated in the interval 2004 – 2007, having as research material five new cherry breeds created at SCDP Iaşi, homologated in 1999 – 2001 (Cetățuia, Cătălina, Maria, Golia and Marina), and as a blank test the breed Boambe de Cotnari clone 5, all of them grafted on mahaleb.

The comparative contest culture was placed linearly, in three groups of 3 trees at a distance of 5 x 4 m, and guided under the form of a free fan-shaped espalier without a supporting system.

During the experiment, the soil was maintained as a black land, the pests and diseases were fought against when we received warnings and the culture technology was the one specific to the cherry culture.

We made observations and measurements regarding the tree vigor (the surface of the trunk section, cm^2), the main pheno-phases of fructification, self-fertility, the behaviour towards the limitative factors of production (frost, drought, diseases specific to cherry trees), the fruit production and the principal physical-chemical features of fruits.

RESULTS AND DISCUSSIONS

The data regarding the tree vigor and the increase of the trunk surface measured in the autumn of 2007 have values close to the blank test Boambe de Cotnari cl. 5: Cetățuia with 376 cm^2, Maria with 343 cm^2, Cătălina with 299 cm^2 , Marina with 296 cm^2 and Golia with 274 cm^2 (*tab. 1*).

Analyzing the resistance of the breeds to anthracnose (*Coccomyces hiemalis Higg*.) we notice that the breed 'Golia' registered a degree of attack of 5%, the remainder of the breeds registering a degree of attack under 1% (0,12-0,72%) (*tab. 2*).

This aspect associated with the reduced degree of attack for aphides (0,07-5%), made us understand that if we apply 4-6 chemical treatments at optimum times we may insure an economic harvest volume with healthy trees throughout the year.

All the breeds under study manifested a good resistance to frost and drought thus they may be cultivated in harsher conditions than in the NE of Moldavia. It is significant that in the conditions of the winter of 2005-2006, when they registered minimum temperatures of -25° -27°C, the breeds under study did not show any damages provoked by frost.

Table 1

Dates concerning trees vigor until XVII year from plantation

Cultivar	Trunk section surface				
	cm^2		Calculated given the average		
	Annual growth of trunk	Trunk section surface 2007	%	Difference (+) (-)	Significance
Cetățuia	18	376	119,7	62	
Maria	16	343	109,2	29	
X (Average)		314	100	0	
Cătălina	12	299	95,2	- 15	
Boambe de Cotnari (as control)	11	297	94,6	- 17	
Marina	17	296	94,2	- 18	
Golia	9	274	87,3	- 40	

DL 5% = 75,3 *DL 1% = 107,1* *DL 0,1% = 155,1*

Table 2

Resistance of five cultivars at production's damages factors

Cultivar	Resistance at:							
	Anthracnose:			Aphides:			Frost	Draught
	Attendances %	Intensity %	Attack degree F x I 100	Attendances %	Intensity %	Attack degree F x I 100		
Cetățuia	4	3	0,12	24	20	4,80	good	good
Cătălina	8	9	0,72	25	20	5,00	good	good
Maria	7	5	0,35	8	6	0,48	good	good
Golia	20	25	5,00	0	0	0,00	good	good
Marina	5	3	0,15	4	2	0,08	good	good
Boambe de Cotnari (as control)	27	24	6,48	32	27	8,64	medium	good

The pheno-phases of the fructification organs are specific to the biology of each species and the date of their start and duration depend on the climatic conditions of each year.

We also made observations on the unfolding of the main pheno-phases of fructification, and we noticed differences from one year to another depending on the climatic conditions (tab. 3).

The beginning of bud swelling out and blossoming started the earliest in 2007 and the latest in 2005.

Blossoming started the earliest on April 7th for the breed Cetățuia, and the latest fro the breeds Golia and Boambe de Cotnari on April 22nd.

In 2005, the early breeds suffered partially that were caught during blossoming by a temperature of -2^{o} C, and in February 2007 from positive temperatures there occurred an abrupt going down of temperature (-20,7 C^{o}) producing huge loses for the early cherry trees (10-20%).

Table 3

Fructification stages to sweet cherry during 2004 – 2007

Fructification stages of	Cultivar:					
	Cetățuia	**Cătălina**	**Maria**	**Golia**	**Marina**	**Boambe de Cotnari(**(as control **)**
Start of swollen bud	20.03-03.04	18.03-02.04	20.03-04.04	24.03-04.04	19.03-03.04	18.03-02.04
Start of bud burst	27.03-06.04	24.03-05.04	27.03-06.04	30.03-06.04	25.03-05.04	27.03-06.04
Start of blossom	07.04-17.04	08.04-19.04	09.04-20.04	11.04-22.04	12.04-20.04	11.04-22.04
End of blosson	18.04-25.04	18.04-26.04	19.04-27.04	20.04-28.04	24.04-27.04	19.04-27.04
Maturity	20.05-30.05	06.06-10.06	12.06-18.06	15.06-18.06	03.07-08.07	18.06-03.07
Days between end blossom and maturity	32-38	46-50	53-55	52-59	72-74	61-68
Self - fertility %	1,6	2,6	48	5,9	-	-

The time of fruit maturation was spaced out for 50 days starting with May 20th for the breed Cetățuia and finishing on July 8th for the breed Marina.

The breed Maria registered self-fertility in all years (48%), the other breeds registering percentages raging between 0-5,9%.

From the group of extra-early and early breeds, Cetățuia şi Cătălina are representative, and we highlight the larger production for Cetățuia (28,7 kg/tree, 14,4 t/ha respectively) as compared to Cătălina (24,0 kg/tree, 12 t/ha respectively).

Table 4

Fruits yield registered during 2004 - 2007

CULTIVAR	Yielo (Kg/tree) in years:				Average yielo:	
	2004	**2005**	**2006**	**2007**	**Kg/tree**	**t/ha**
Cetățuia	32,5	31,0	25,5	24,6	28,7	14,4
Cătălina	28,0	27,5	22,6	18,2	24,0	12,0
Maria	30,5	32,0	28,0	25,4	28,9	14,5
Golia	27,0	25,6	20,8	15,7	22,3	11,2
Marina	37,5	35,5	29,7	25,4	32,0	16,0

The group of breeds with average maturation is represented by the fruit production of the breed Maria (28,9 kg/tree, 14,5 t/ha respectively) as compared to the breed Golia (22,3 kg/tree, 11,2 t/ha respectively).

The largest fruit production was registered for the breed Marina (32,0 kg/tree, 16,0 t/ha respectively).

The evaluation of the physical-chemical features of the fruits of the five cherry breeds created at SCDP Iași, was analysed for a period of four years (2004-2007), for the fruit samples harvested at their full maturity from the contest culture existing on the experimental field (tab. 5).

Table 5

Physical and chemical features of fruits at five new sweet cherry cultivars

Physical-chemical features of fruit	CULTIVAR				
	Cetățuia	**Cătălina**	**Maria**	**Golia**	**Marina**
Average weight (g)	5,9-6,1	6,8-7,8	7,4-8,3	7,5-8,0	7,6-8,0
Shape	Kidney shape	Heart shape oblong	Heart shape oblong	Heart shape	Heart shape
Acidity (By tasting)	Small	Small	Small	Small	Medium
Taste (By tasting)	Sweet	Sweet	Sweet	Sweet	Sweet tart
Peduncle length	Medium	Long	Medium	Long	Long
Stone size	Medium	Medium	Medium	Medium	Big
Stone size/fruit weight ratio (%)	6,5	6,5	5,9	5,2	6,9
Dry substance (%)	16,0	16,0	17,0	17,5	16,8
Skin colour	Red blackish	Red blackish	Red blackish	Red blackish	Half red half yellow
Juice colour	Purple red	Red	Red	Purple red	White yellow
Pulp colour	Red	Red	Red	Red Blackish	White yellow
Pulp firmness	Semifirm	Semifirm	Firm	Firm	Firm
Suculence	Medium	Medium	Medium	Medium	Medium

The physical-chemical tests were effectuated on account of some parameters established by the UPOV testing guide.

Fruit size. From the five cherry breeds, four breeds have big and very big fruits (6,8-8,3 g the average weight of a fruit), only Cetăţuia has average size fruits (5,9-6,1).

Fruit shape. It varies from reniform (Cetățuia) to cordiform (Golia and Maria) and cordiform elongated (Cătălina and Marina).

By tasting they appreciated the fruit acidity and taste. Most breeds have a small acidity (four breeds) and one has an average acidity.

The taste varied from sweet (Cetățuia, Cătălina, Maria, Golia) to acidulated sweet (Marina).

Stone size. As compared to the total weight of fruit stones were average (Cetățuia, Cătălina, Golia, Maria) and big (Marina).

The dry substance (%). The breeds under study had the following values: 16% early breeds (Cetățuia and Cătălina), 16,8% for the breed Marina, 17% Maria and 17,5% for the breed Golia.

Fruit colour. The red colour was dominant with shades from bright red (Maria) to dark red (Cetățuia, Cătălina and Golia). One single breed Marina had a bicolor shade (red and yellow).

Pulp colour. Most breeds had a red colour only the breed Marina had a white-yellowish pulp colour.

Pulp firmness varied from half-hard (Cetățuia and Cătălina) to hard (Maria, Golia and Marina).

The pulp succulence is average for all breeds.

CONCLUSIONS

1. According to the tree growing vigor expresses by the surface of the trunk section, the five new cherry breeds fall into two vigor groups: average vigor breeds with a surface of the trunk section between 296 - 376 cm2 (Cetățuia, Cătălina, Maria and Marina) and breeds with little vigor having a trunk section surface of 274 cm2 (Golia).
2. All the five breeds are good for intensive plantations.
3. In the climatic conditions of Iasi, the blooming of the cherry tree generally takes place in the second decade of April and has an average duration of 7-12 days and the maturation time of fruits starts at the beginning of the third decade of May for the breed Cetățuia and ends in the first decade of July for the breed Marina.
4. As for productivity, all the five breeds have a very good productive capacity standing out by their large productions for four years (Golia with 11,2 t/ha, Cătălina with 12 t/ha, Cetățuia with 14,4 t/ha, Maria with 14,5 t/ha and Marina with 16 t/ha) .
5. As for the fruit quality, all the five breeds show superior features in terms of size, colour, firmness, taste and contents of dry substance.
6. The new cherry breeds stood out for their extra-earliness (Cetățuia), earliness (Cătălina), self-fertility (Maria), little vigor (Golia) and tardiness (Marina).

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RESEARCHES REGARDING THE BEHAVIOUR OF THREE NECTARIN CULTIVARS IN DIFFERENT ORCHARD MANAGEMENT

CERCETĂRI PRIVIND COMPORTAREA A TREI SOIURI DE NECTARIN ÎN DIFERITE CONDIȚII DE AGROTEHNICĂ POMICOLĂ

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Abstract. *Research Station for Fruit Growing Constanta created many new cultivars for apricot, peach and nectarine species and for their promote in the culture there were necessary many others studies. In this way, were organized a new experiment which included three factors, these ones being: Factor A: the cultivar: Delta, Cora, Romamer 2, Factor B: planting distances: 6/2 m; 4/3.5 m; 4/3.0 m; 4/1.5 m; Factor C: the crown shape: Tatura trellis vertical axis, veronese vase, improved vase. The unroll activities were composed of: the pruning for crown shape formation; the determinations and observations regarding vegetative grows, fructification stages, fruit qualities productivity on cultivars, shape crown and planting distances. The results for seven years shows that the improved vase and vertical axis support the economic yields in correlation with very good qualities of fruit for all three cultivars.*

Rezumat. *Staţiunea de Cercetare-Dezvoltare pentru Pomicultură Constanţa a creat multe soiuri de cais, piersic, nectarin şi pentru promovarea acestora în cultură au fost necesare şi alte studii de agrotehnică pomicolă. În acest sens, a fost organizată o experienţă în care s-au studiat trei factori: factorul A – soiul: Delta, Cora, Romamer 2; factorul B – distanţe de plantare 6/2 m; 4/3,5 m; 4/3,0 m; 4/1,5 m; factorul C – forme de coroană: Tatura trellis, cordon vertical, vas veronez, vas ameliorat. Activităţile desfăşurate au constat în: tăieri pentru formarea coroanelor; observaţii şi determinări privind creşterea vegetativă, fenofazele de fructificare, calitatea fructelor, productivitatea/ soi/ formă de coroană/ distanţă de plantare. Rezultatele obţinute pe parcursul a 7 ani au arătat că se susţine economic formele de coroană: vas ameliorat şi cordon vertical pentru toate cele 3 soiuri luate în studiu.*

INTRODUCTION

In Romania, though there are very favorable soil and climatic conditions in many fruit trees growing areas, nectarines cultivation hasn't extended owing to the absence of the competition with peach cultivars and not knowing some specific details in nectarines culture technology.

At present, cultivators are very much interested in this crop, prices being an important stimulus in fruits market. In order to encourage the respective cultivators, the Research Station for Fruit Growing Constanta has offered the first technical guidance still 2003 and organized a new experimental crop especially with reference to the crop technology of early nectarine cultivars (considering the conditions in Romania).

In this paper we present the results of observations and determinations on the influence of some shapes, of the crown over the vegetative growth and three new nectarine cultivars starting fruit bearing, cultivars obtained at the Research Station Constanta.

MATERIALS AND METHODS

Cora, Delta and Romamer 2 which were studied were grafted on one year old peach trees T16. Each cultivars was produced in 4 crown shapes: Tatura trellis, Vertical belt, Verona vase and Ameliorated vase, planted distances varying from 6/2m (833 trees/ha), 4/1.5 m (1666 trees /ha), 4/3 m (833 trees/ha) and 4/3.5 m (714 trees/ha).

All data commented further on; represent an average of 5 trees in 2002-2007 periods, since the planting moment. It was considered the influence of the crown shape and soil over trees growth (indicators: trees height (H), trunk diameter, crown diameters following the directions of the trees line (D) and the perpendicular of the trees line (d) and the fructification of trees (indicators: precocious ripening, fruit production per tree and ha, fruit qualities).

RESULTS AND DISCUSSIONS

Considerations regarding the influence of crown shape over certain factors of fructifications

The observations regarding the beginning of blossoming and those on fruits maturity at harvest time are not influenced by the systems of cultivars management, these phenophases being genetically determined and under climatic conditions influence. So, in the earliest year which were 2007, the nectarine cultivars began to blossom on the end of March (between 27-30 March) and in the latest year which were 2003 the nectarine cultivars began to blossom on the first of May (between 1-3 May)(table 1).

Table 1

-The phenology evolutions for nectarine cultivars 2003-2007 period limits*

Cultivars	Beginning of the blossom	The end of the blossom	The become hard of stone	The harvest maturity
Cora	27.03…1.05	9.04…7.05	4.06-12.06	22.06-1.07
Delta	29.03…1.05	11.04…7.05	4.06-12.06	24.06-4.07
Romamer 2	30.03…3.05	13.04…7.05	4.06-13.06	28.06-4.07

*the earliest year was 2007
The latest year was 2003

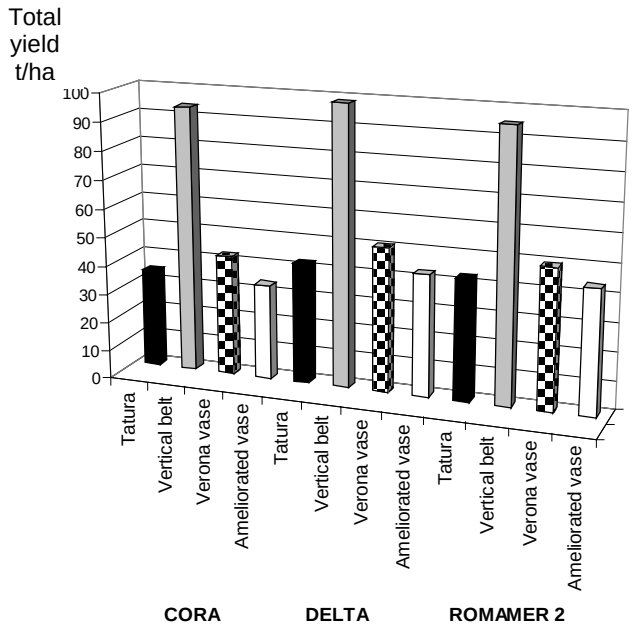
Fruit harvesting period is earlier in comparison with another nectarine cultivars from assortment that represents an important advantage in the trade with nectarines. Variation limits of harvesting period were between 22 June and 1 July for Cora 24 June-4 July for Delta and 28 June-4 July for Romamer 2. Nectarine is the species with a great productivity since second year after planting and therefore the number of trees/ha and the crown shape are more important in first years of bearing.

In the table 2 on see that the yields obtaining per tree ranged between 41.40 kg for Cora and 51.13 kg for Romamer 2 at Tatura shape; between 56.1 kg for Cora and

59.2 kg for Delta at Vertical belt; between 50.83 kg for Cora and 60.73 for Delta at Veronese vase; between 46.1 kg for Cora and 61.23 kg for Romamer 2 at ameliorated vase.

The yield quantity obtaining per tree in the first five years from planting, no showed us differences to large between cultivars or crown shape, but values regarding the yield per surface unit (hectare) where plants density interfere, being determined by the crown shape and planting distance and very much different.

So, on first place there is situated vertical belt with the yields ranged between 93.45 t/ha for Cora and 98.33 t/ha for Delta, while the smallest yield/ha.
had ameliorated vase ranged between 33.27 t/ha for Cora and 43.72 t/ha for Romamer 2 (graph 1).



Graph 1 – Total yield for different crown shape (2002-2007 period)

Nectarine cultivars run for study are with very early ripening period, small to medium fruit weight, stone with adherence of flesh, all these characters being genetic established and a little influenced by the environmental and technological conditions.

Table 2.

Yields per tree and hectare

Cultivar	Crown shape*	The yields/years								The sum of period	
		2004		2005		2006		2007			
		kg/tree	t/ha	kg/tree	t/ha	kg/tree	t/ha	kg/tree	t/ha	kg/tree	t/ha
CORA	Tatura	1.16	0.97	1.74	1.45	16.5	13.74	22.0	18.32	41.40	34.48
	Vertical belt	1.42	2.37	2.37	3.95	23.3	38.82	29.0	48.31	56.09	93.45
	Verona vase	1.41	1.17	1.92	1.60	22.5	18.74	25.0	20.85	50.83	42.36
	Ameliorated vase	1.02	0.73	2.19	1.56	19.9	14.20	23.5	16.78	46.61	33.27
DELTA	Tatura	1.34	1.12	2.52	2.10	19.8	16.49	27.0	22.49	50.66	42.20
	Vertical belt	1.45	2.41	2.97	4.96	24.6	40.98	30.0	49.98	59.02	98.33
	Verona vase	1.39	1.16	2.44	2.03	27.1	22.57	29.8	24.82	60.73	50.58
	Ameliorated vase	1.10	0.78	2.11	1.51	27.1	19.34	29.5	21.06	59.81	42.69
ROMAMER 2	Tatura	0.67	0.56	1.76	1.47	21.7	18.08	27.0	22.49	51.13	42.60
	Vertical belt	0.76	1.27	1.44	2.39	25.8	42.98	29.0	48.31	57.00	94.95
	Verona vase	0.10	0.92	3.11	2.59	25.79	21.48	29.2	24.32	59.20	49.31
	Ameliorated vase	1.15	0.82	3.36	2.40	25.32	18.08	31.4	22.42	61.23	43.72

*The number of trees/ha and crown shape is:
833 trees/ha - Tatura
1666 trees/ha - Vertical belt
833 trees/ha - Verona vase
714 trees/ha - Ameliorated vase

Fruit weight average varied for the same cultivar depending on crown shape a little, being for Cora between 72.5 g (Tatura) and 79.0 g (Vertical belt), for Delta between 84,0 g (Tatura) and 87,0 g (Verona vase), for Romamer 2 between 80.0 g (Ameliorated vase) and 84.5 (Vertical belt) (Table 3).

Table 3.

The values of main traits of fruit

Cultivar	Crown shape	Weight fruit average (g)	Weight of stone average (g)	Stone percent	Dry matter content %	Total acidity g% malic acid
CORA	Tatura	72.5	9.5	13.1	10.0	1.18
	Vertical belt	79.0	9.3	11.7	10.0	1.18
	Verona vase	74.0	9.5	12.8	10.0	1.18
	Ameliorated vase	73.0	9.8	13.4	10.0	1.18
DELTA	Tatura	84.0	12.0	14.2	11.5	0.94
	Vertical belt	85.0	12.5	14.7	11.5	0.94
	Verona vase	87.0	13.4	15.7	11.5	0.94
	Ameliorated vase	84.5	12.0	14.2	11.5	0.94
ROMAMER 2	Tatura	84.0	12.8	15.2	12.0	0.67
	Vertical belt	84.5	10.5	12.4	12.0	0.67
	Verona vase	84.0	12.0	14.2	12.0	0.67
	Ameliorated vase	80.0	11.4	14.2	12.0	0.67

Regarding on dry matter content and total acidity there are not differences than only between cultivars, crown shape have no influence.

Leaving aside the shape of the crown, the minim height of trees vas at the end of the sixth year of plantation between 2.98 (Cora) to 3.18 m (Romamer 2) for Tatura shape and maximum height between 3.30m (Cora), to 3.52 m (Romamer 2) at Vertical belt (Table 4).

Table 4.

Vegetative growth in the sixth year since planting (2007)

Cultivar	Crown shape	Trunk diameter (mm)	Tree height (m)	Crown diameter	
				On long the rows D (m)	Perpendicular on rows d(m)
CORA	Tatura	97.46	2.98	1.14	1.14
	Vertical belt	102.60	3.30	1.60	1.20
	Verona vase	89.00	3.18	1.04	1.36
	Ameliorated vase	92.80	3.02	1.18	1.18
	Tatura	91.20	3.04	0.88	1.40
	Vertical belt	82.20	3.34	1.40	1.22

DELTA	Verona vase	86.20	3.18	1.48	1.64
	Ameliorated vase	90.58	3.12	1.36	1.40
ROMAMER 2	Tatura	90.80	3.12	1.00	1.46
	Vertical belt	83.20	3.52	1.10	1.22
	Verona vase	79.80	3.16	1.30	1.32
	Ameliorated vase	82.80	3.14	1.20	1.30

The diameter of trunk – a very important indicator for plants vigor estimation – also varied considering the cultivar and crown shape. Romamer 2 cultivar has the lowest growth of the trunk thickness 79.8 mm for Verona vase shape, Delta 82.2 mm and Cora 92.80 mm – both for Vertical belt shape. The higher growth of the trunk thickness vas produced at Cora cultivar 102.60 mm for ameliorated vase shape crown following the direction of the trees line can provide information on the production volume and the correct utilization of the space among plants with effects on fruit quality now and in future.

CONCLUSIONS

The begining of flourishing and the fruit maturity at harvest time are not influenced by the system of cultivars management, these phenophases being genetically determined.

Plants growth in first four years since planting is very much controlated and directed for crown shape realizing, thus that in the sixth year since planting are interpenetrated on direction of the trees line for 1.5 m and 2.0 m distances of planting, while for 3.0 m and 3.5 m distances between trees the spaces are not entirety conquered.

Total yield realized in all years of studied period was net superior for vertical belt shape at 4/1.5 m distances of planting (between 93.45 t/ha-Cora and 98.33 t/ha Delta) thus us the investment for a superintensive orchard is very quickly recoverable.

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RESULTS OF RESEARCH ON THE PLUM ASSORTMENT FOR THE NE AREA OF MOLDAVIA (ROMANIA)

REZULTATE ALE CERCETĂRII PRIVIND SORTIMENTUL DE PRUN PENTRU ZONA DE NE A MOLDOVEI

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Abstract*. A major objectiv for breeders from Fruit Growing Developemnt Station Iasi are the choice and extend in culture on soil and climate area for the must valueble plume tree cultivars for production, with superior quality fruits, available for fresh consumption and processing, with diseases resistence or tolerance. The soil and the climate conditions (except year 2007) are very favorable for plume trees culture in Iasi area, with great and constant fruit yields. Taking to account the parameters whitch decided the cultivars and the assurance of spacing fruit maturity, productivity and fruits quality for fresh consumption and processing, it propose for Iasi area the next plume trees assortment: Stanley, Centenar, Silvia, Tuleu gras and Carpatin. By remarkable cultivars studied was breed and take to account in last ten years, at Fruit Growing Development Station Iasi influence area, 44700 trees Stanley cultivar, 33000 trees Centenar cultivar, 23500 trees Tuleu gras cultivar, 11200 trees Silvia cultivar and 1500 trees Carpatin cultivar.*

Rezumat. *Alegerea şi extinderea în cultură pe zone pedoclimatice a celor mai valoroase soiuri de prun productive, cu fructe de calitate superioară, pretabile pentru consum în stare proaspătă şi pentru prelucrări industriale, rezistente sau tolerante la boli, cu epoci diferite de maturare şi o eşalonare cât mai lungă, a recoltării fructelor, au constituit un obiectiv major pentru cercetătorii amelioratori de la SCDP Iaşi. Solul şi clima (cu excepţia anului 2007) sunt considerate favorabile culturii prunului pentru zona Iaşi, obţinându-se producţii mari şi constante de fructe. Ţinând cont de parametrii care decid valoarea soiurilor respectiv asigurarea eşalonării maturării fructelor, a productivităţii, calităţii şi pretabilităţii fructelor pentru consum în stare proaspătă şi pentru industrializare se propune pentru zona Iaşi următorul sortiment de prun: Stanley, Centenar, Silvia, Tuleu gras, Carpatin. Din soiurile care s-au remarcat în anii de studiu s-au înmulţit şi valorificat în ultimii 10 ani, în zona de influenţă a SCDP Iaşi, 44700 pomi din soiul Stanley, 33000 pomi din soiul Centenar, 23500 pomi din soiul Tuleu gras, 11200 pomi din soiul Silvia şi 1500 pomi din soiul Carpatin.*

Key words: plum tree, assortment, cultivar, tree vigor, trunk section surface.

The choice and extension in culture by pedo-climatic areas of the most valuable and productive plum breeds, with high quality fruits good for consumption in fresh state and industrial processing, resistant or tolerant to diseases, with different periods of maturation and a wide spacing out for fruit harvesting, were the major objective for the meliorating researchers from FGDS Iaşi. To attain these objectives we effectuated researches focusing on the improvement of the plum assortment by studying in comparative cultures the newest creations made in the country and abroad (1,2,3,4,5).

To improve the plum assortment from the area of Iasi and in the area of influence of the station (counties Iaşi, Botoşani and Vaslui) with autochthonous and foreign

creations, in the interval 1987-2007 we studied a comparative culture of 12 breeds and four plum hybrids from FGDS Bistrița (6,7,8,9).

MATERIAL AND METHODS

The studies were made in the interval 1987-2007, having as a research material 16 plum genotypes. The tress grafted on wax cherry trees were planted at distances of 3,5 m x 4 m and guided under the form of a free fan-shaped espalier with oblique arms. The plantation was located on a land with a slight slope from NV to SE, with an average slope of 5%, and an altitude of 165 m. The soil is of the black earth leached type, weakly eroded, on loess and clay deposits, having a clayish and sandy texture, with pH 6,3-6,9, index N 3,21, the contents in mobile phosphor of 47-75 (p.p.m) and the contents in mobile potassium of 175-500 (p.p.m). The climatic conditions were generally favourable to the growth and fructification of the plum trees, except for 1990, 1993, 1994 and especially 2007, when in February, after a very warm January (3,8^{o} C the month average value as compared to the normal value of -3,3^{o}C) they registered -20,5^{o}C, a temperature that affected the buds and destroyed the fruit production in proportion of 90-100 %.

For the breed Silvia they registered damages to tress that dried off partially or totally. In 2007 in the first six months they registered a great deficit of rain (180,5 mm), with the perspective to register a quantity much under the multi-annual average of 527,6 mm. We registered data on the tree vigor (surface of the trunk section), the unfolding of the fructification pheno-phases, the maturation for harvesting, the fruit production, their quality and resistance to the limitative factors of production.

RESULTS AND DISCUSSIONS

On the plum plantation in the 20th year of planting, they measured the trunk diameter and they calculated the surface of its section, and the registered data are presented in table 1. The lowest vigor of trees, expressed by the surface of the trunk section was registered for the hybrid BN. 68 (161,6 cm^2) and the breed Blue free (167 cm^2), and the highest vigor was registered for the breeds Dâmbovița (138,6 cm^2) and Superb (137,3 cm^2).

The fruit production registered (the average of the last 10 years) was different from one breed to another and from one year to another. The largest production was obtained by the breed Stanley (21,4 t/ha) but good productions may also be considered the ones registered by the breeds Prezident, Valor, BN. 68, Joris plum and BN 5-125-5 where they obtained between 17,6-20,0 t/ha. Making a correlation between the tree vigor and the fruit production, we notice that the largest fruit productions were registered by the breeds with an average and small vigor, whereas the high vigor breeds registered modest productions (4,7-9,7 t/ha).

The start of the main fructification pheno-phases in the conditions of years 1991-2007 occurred within large limits depending on the breed features and the climatic characteristics of the years under study (table 2).

The start of blossoming for the breeds and hybrids under study took place the earliest between March 24th and April 15th and the latest between April 30th and May 2nd and the duration of blossoming was for 7-15 days. The breeds Stanley, Carpatin, Tuleu gras, Superb, Blue free and hybrids BN 7-237-7 and BN 61-4 registered a late

blossoming. The natural fertility ranged between 1,2 % for the breed Valor and 62 % for the hybrid BN. 68. Self-fertility registered values ranging between 0 for the hybrid BN 7-237-7 and 43% for the hybrid BN. 68. The breeds Blue free (20,6%) and Stanley (17,9%) as well as the hybrid BN 61-4 (30%) manifested self-fertility too.

Table 1

Dates concerning tree vigor and yield registered until 20th year from plantation at 16 plum genotypes

Genotypes	Trunk section surface (cm^2)	Calculated given the cultivars average		Average yield on last 10 years (t/ha)
		%	Difference	
Dâmbovița	310,8	138,6	86,6	8,3
Superb	307,9	137,3	83,7	4,5
BN 7-237-7	278,3	124,1	54,1	9,7
Minerva	278,1	124,0	53,9	11,4
Silvia	238,5	106,3	14,3	7,2
Carpatin	228,3	101,8	4,1	7,8
Joris Plum	225	100,3	0,8	20,0
Average	224,2	100	0	-
BN 5-125-5	207	92,3	-17,2	17,6
Prezident	203,9	90,9	-20,3	18,9
BN 61-4	203,9	90,9	-20,3	7,9
Valor	203,1	90,5	-21,1	18,6
Stanley	201,8	90,0	-22,4	21,4
Tuleu gras	191,8	85,5	-32,4	6,5
Centenar	180,6	80,5	-43,6	15,4
Blue free	167	74,5	-57,2	15,4
BN.68	161,6	72,1	-62,6	18,2

The harvesting maturity was spaced out for a period of 56-63 days, the first breeds harvested being in order: Minerva, Carpatin and Centenar, and the latest BN. 68, Prezident and Joris plum (6.09-27.09). The number of days from the end of blossoming up to the harvesting maturity was between 75 for the breed Minerva and 164 for the breed Prezident. The main physical-chemical characteristics of fruits are presented in table 3. The average weight of a fruit registered values between 16,5 g for the hybrid BN. 68 and 54,5 g for the breed Dâmbovița. The breeds Blue free (52,5 g), Prezident and Carpatin (51,5 g) also had big fruits. The percentage of wastes (as compared to the average weight of a fruit) registered the lowest values for the breeds Carpatin (2,9%), BN 7-239-7 and Centenar (3,3%).

The adherence to the stone was considered normal (good) for the hybrid BN 5-125-5 and the breeds Valor and Joris plum, poor for Stanley, BN. 68, BN 7-237-7, Dâmbovița, Prezident and Bue free very poor for Superb, Silvia, Carpatin, Centenar, BN 61-4, Tuleu gras and Minerva.

The contents in dry substance were the highest for the breed Tuleu gras (17-22%) and the lowest for the breed Silvia (11-14%).

Table 2

The main growth stages at plum genotypes studied to Fruit Growing Research and Development Station Iasi

Genotypes	Blossoming		Natural fertility (%)	Self-fertility (%)	Harvest date	Days between end of blossoming from harvest
	Start blossoming	Days between start from end blossom				
Stanley	25.03-02.05	8-11	10,2-32,8	1,0-17,9	29.08-14.09	111-137
BN 68	24.03-30.04	8-10	32,5-62,0	33,0-43,1	6.09-21.09	131-158
BN 5-125-5	26.03-30.04	10-15	11,1-48,8	0-2,3	26.08-18.09	107-147
BN 7-237-7	30.03-2.05	9-12	3,3-25,8	0	8.08-24.08	91-128
Superb	13.04-2.05	7-10	4,5-47,3	0-1,1	11.08-23.08	105-127
Silvia	12.04-30.04	7-9	5,4-44,0	0-0,4	2.08-24.08	85-123
Carpatin	25.03-2.05	7-9	1,3-38,0	0-3,7	25.07-10.08	79-111
Centenar	25.03-30.04	8-10	5,1-21,3	0-0,8	28.07-10.08	84-115
BN 61-4	15.04-2.05	8-10	5,5-27,2	1,0-30,0	21.08-28.08	104-130
Tuleu gras	15.04-2.05	8-10	8,6-52,0	0-2,4	18.08-30.08	104-129
Dâmboviţa	15.04-1.05	8-10	2,1-28,4	0-06	22.08-30.08	105-137
Valor	14.04-1.05	6-10	1,2-35,0	0-0	29.08-8.09	110-148
Prezident	13.04-30.04	8-10	14,2-40,2	0-3,5	11.09-27.09	123-164
Joris plum	11.04-30.04	8-9	17,9-41,8	0-0,8	9.09-16.09	130-160
Minerva	14.04-1.05	7-8	6,0-35,0	0-1,1	18.07-26.07	75-106
Blue free	15.04-2.05	8-11	10,0-53,0	15,2-20,6	29.08-14.09	110-153

Table 3

Fruit main characteristics at 16 plum genotypes (1997 – 2006)

Cultivar	Average fruit weight	Offals (%)	DM %	Adherence at stone	Fund colour	Shape	Destination of yield
Stanley	22-31	5,2	13-18	Low adherent	Dark blueish	Reverse oblong	Fresh consumption, distillation.
BN 68	13-20	7,8	13-16	Low adherent	Violet	Ellipsoidal	Fresh consumption, distillation.
BN 5-125-5	42-56	4,2	14-20	Adherent	Blueish violet	Ellipsoidal	Fresh consumption, distillation.
BN 7-237-7	37-48	3,3	13-20	Low adherent	Dark blueish	Oblong	Fresh consumption, distillation.
Superb	33-47	3,9	16-21	Non-adherent	Blueish violet	Oblong	Fresh consumption, distillation.
Silvia	35-54	4,3	11-14	Non-adherent	Violet	Spherical	Fresh consumption.
Carpatin	45-58	2,9	13-17	Non-adherent	Dark blue	Oblong	Fresh consumption, distillation.
Centenar	32-48	3,3	12-15	Non-adherent	Dark blueish	Reverse oblong	Fresh consumption.
BN 61-4	40-46	3,5	14-18	Non-adherent	Violet	Oblong	Fresh consumption.
Tuleu gras	30-35	4,1	17-22	Non-adherent	Dark blueish	Reverse oblong	Fresh consumption, processing, dehydrating.
Dâmbovița	44-65	4,2	12-16	Low adherent	Dark blueish	Oblong	Fresh consumption.
Valor	43-50	5,8	15-18	Adherent	Violet	Oblong	Fresh consumption, dehydrating..
Prezident	45-58	4,3	14-19	Low adherent	Blueish violet	Reverse oblong	Fresh consumption, dehydrating.
Joris plum	50-60	5,8	16-20	Adherent	Dark blueish	Oblong	Fresh consumption, dehydrating.
Minerva	30-44	4,4	12-15	Non-adherent	Blueish violet	Oblong	Fresh consumption.
Blue free	52-63	3,5	15-17	Low adherent	Dark blueish	Oblong	Fresh consumption, distillation.

The background color ranged from purplish-blue for BN. 68, Silvia, BN 61-4 and Valor up to dark blue for Stanley, BN 7-237-7, Centenar, Tuleu gras, Dâmbovița, Joris plum and Blue free.

The resistance of the breeds to the diseases specific to the plum tree was conditioned by the breed, most of them and hybrids manifesting a good resistance to monilia disease, piercing and red staining. A slight sensitivity to piercing was manifested by the hybrids BN. 68 and BN 5-125-5. As for the breeds' and hybrids' sensitivity to plum pox, it affected the breeds Carpatin and Centenar and the hybrids BN. 68 and BN 5-125-5. In 2007, the breed Silvia proved to be sensitive to drought being affected in proportion of 50-80%.

CONCLUSIONS

1. The breed, soil and climate (except for 2007) are considered to be favourable to the plum tree culture in the area of Iasi, obtaining large and steady productions of fruits.

2. Taking into account the parameters deciding the value of breeds and the insurance of spacing out for the fruit maturity, productivity, quality and adaptability of fruits for consumption in fresh state and for industrialization, we propose the following plum tree assortment for the Iasi area: Stanley, Centenar, Silvia, Tuleu gras, Carpatin.

3. Among the breeds that stood out in the years of study, we bred and put to good use, in the last 10 years, in the area of influence of SCDP Iaşi, 44700 tress of the breed Stanley, 33000 tress of the breed Centenar, 23500 tress of the breed Tuleu gras, 11200 tress of the breed Silvia and 1500 tress of the breed Carpatin.

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INFLUENCE OF LOCALIZED IRRIGATION ON FRUIT PRODUCTION AT RESEARCH STATION FOR FRUIT GROWING CONSTANTA

INFLUENȚA IRIGĂRII LOCALIZATE ASUPRA PRODUCȚIEI DE FRUCTE LA S.C.D.P. CONSTANȚA

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Abstract. *The irrigation present checked supply of soil with supplementary water quantities from one got in natural mode for heaved level and stability insurance of fruit production. In Dobrogea conditions, zone with a deficit pluviometric regime, under 500 millimeters yearly rainfall, the growthing and development trees not can be conceived without irrigation. In this paper is reproduced the localized irrigation influence over fruits production to apricot. The remarks were making in 2003-2005 period at Research Station from Fruit Growing Constanta. Experience was of bifactorial type, with factor A-cultivar and factor B-watering variant. Experimental plot contained two apricot cultivars with ripening early (NJA 42 and Tudor) and your localized irrigation variants: V1 and V2 – drip irrigation (Tack and Tipaz dripper type), V3 and V4 – micro sprinkler irrigation (M1 and M2 micro sprinkler type). The results obtained in irrigation variants were compared with one obtained in non irrigate variant (V0). So, in irrigation variants fruit quantity varied between 38.47 kg x tree^{-1} (2004) and 62.62 kg x tree^{-1} (2003) as against non irrigate variant, where this varied between 29.8 kg x tree^{-1} (2004) and 42.3 kg x tree^{-1} (2003). The water factor insurance constitutes and important element in production process of trees.*

Rezumat. *Irigarea reprezintă aprovizionarea controlată a solului cu cantități suplimentare de apă față de cele primite în mod natural în scopul asigurării stabilității şi nivelului ridicat al producției de fructe. În condițiile din Dobrogea, zonă cu un regim pluviometric deficitar, sub 500 mm precipitații anual, creşterea şi dezvoltarea pomilor nu poate fi concepută fără irigații. În această lucrare este prezentată influența irigării localizate asupra producției de fructe la cais. Observațiile au fost efectuate în perioada 2003-2005 în cadrul Poligonului de Cercetare al S.C.D.P. Constanța. Experiența a fost de tip bifactorial, cu factorul A-soiul şi factorul B-varianta de udare. Parcela experimentală a cuprins 2 soiuri de cais cu coacere timpurie (NJA 42 şi Tudor) şi 4 variante de udare localizată: V1 şi V2 – irigare prin picurare (picurător Tack şi Tipaz); V3 şi V4 – irigare prin microaspersiune (microaspersor M1 şi M2). Rezultate obținute în variantele irigate au fost comparate cu cele obținute în varianta neirigată. Astfel, în variantele irigate cantitatea de fructe a variat între 38,47 kg/pom (2004) şi 62,62 kg/pom (2003) cu varianta neirigată unde aceasta a variat între 29,8 kg/pom (2004) şi 42,3 kg/pom (2003). Asigurarea factorului apă constituie un element important în desfăşurarea procesului de producție a pomilor.*

Water is vegetative factor of which depend largely measure processes growing and production deploy of trees. The trees irrigation applies with continuity aim to an optimal level of needed wet for each phase. The experimental results for fruits production demonstrated as apricot plantations, durables and productive with big economic efficiency obtained only in irrigation conditions. Localized irrigation consists in main slow administration of water in root system zone.

The results obtained after researches demonstrated as through localized irrigations application recorded production bigger increments than in classic irrigation methods case (*Halevy I., 1972, Iancu M. and Ionescu P., 1981, Ruggiero C., 1991*).

The researches effectuated in Dobrogea (*Grumeza N. and collaborators, 1979*) to point out important and irrigation efficacy over to the principals tree species from zone.

The paper proposes to point out the localized irrigation effect over production process of apricot tree from Dobrogea.

MATERIAL AND METHOD

The experimental scheme was following:

Factor A – apricot cultivar: a1 – NJA 42 cultivar and a2 – Tudor;

Factor B – irrigation variants: b1-no irrigation; b2- drip irrigation (Tack dripper); b3- drip irrigation (Tipaz dripper); b4- micro sprinkler irrigation (M1) and b5- micro sprinkler irrigation (M2).

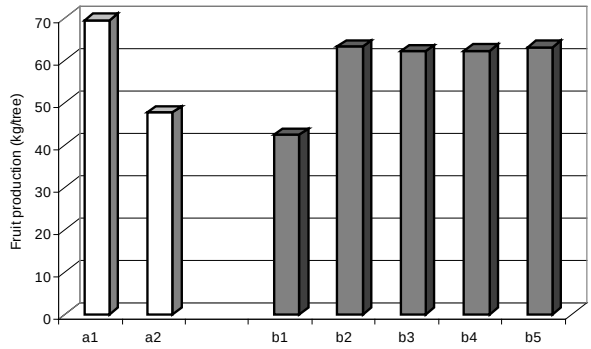
The biological material consisted of two early apricot (NJA 42 and Tudor) grafting on wild apricot. The drip irrigation realized with two types of drippers, respectively Tack and Tipaz. Norm of watering was of 180 m^3xha^{-1}. The debit to a dripper was of 4.0 $lxhour^{-1}$. The drippers were disposed on watering pipe at distance of 1.00 m between them. Watering pipe was manufactured from plastic material with outward diameter of 18 millimeter.

The micro sprinkler irrigation realized with two types of micro sprinklers, respectively M1 and M2. Norm of watering was of 300 m^3xha^{-1} for M1 and 600 m^3xha^{-1} for M2. The micro sprinklers were coupled on watering pipe from plastic material of different distances, respectively 3.00 m in micro sprinkler M1 case and 6.00 m in micro sprinkler M2 case. The irrigation applied in May- August period and watering norm varied for drip irrigation between 540-900 m^3xha^{-1}, for micro sprinkler irrigation M1 between 900-1500 m^3xha^{-1} and for micro sprinkler irrigation M2 between 1200-2400 m^3xha^{-1}.

RESULTS AND DISCUSSIONS

The localized irrigation effect over fruits production was followed on a period of three years, respectively 2003-2005. Yearly, the fruits production obtained in irrigate variants was compared with fruit production obtained in no irrigation variant.

In 2003 year (Figure 1), the localized irrigation application conducted to procurement an averages fruits production, in absolute values, of 62.6 kg/tree comparative with 42.3 kg/tree how obtained in no irrigate variant. For irrigation variants, the registered values of fruits production did not very much differentiated. These diversified between 62.1 kg/tree and 63.2 kg/tree.



Legend:

Factor A:
a1- NJA 42 cultivar
a2- Tudor cultivar

Factor B:
b1- no irrigation
b2-drip irrigation, Tack dripper
b3-drip irrigation, Tipaz dripper
b4-micro sprinkler irrigation, micro sprinkler M1
b5-micro sprinkler irrigation, micro sprinkler M2

Fig. 1. The cultivar influence and irrigation variant on fruit production (kg/tree) at apricot tree in 2003 year

As regards the cultivars studies, fruits production obtained was bigger to NJA 42 cultivar (a1), respectively 69.4 kg/tree comparative with Tudor cultivar (a2) where this was of only 47.6 kg/tree.

The localized irrigation effect materialized in 2003 year through the procurement to a fruits production what represented a percent of 148 % comparative with no irrigate variant (b1).

In the next year (Figure 2), through the localized irrigation application resulted fruits average production, in absolute values, of 38.5 kg/tree comparative with no irrigation variant where this was of only 29.8 kg/tree.

The biggest fruits production, in irrigation variants obtained in b2 variant, respectively 40.0 kg/tree, while the smallest was of 37.1 kg/tree in variant b4.

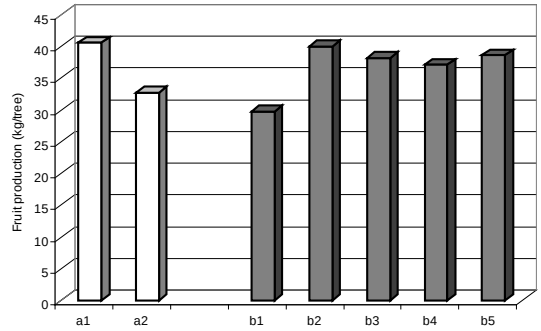
Concerning at cultivars studies, the most heaved of fruits obtained whole to NJA 42 cultivar (a1), respectively 40.6 kg/tree comparative with Tudor cultivar (a2) where this was of 32.8 kg/tree.

Through localized irrigation application obtained fruits production what represented a percent of 129% comparative with no irrigation variant.

In hindmost study year (Figure 3), in irrigation variants obtained fruits average production, in absolute values, of 48.5 kg/tree comparative with 39.2 kg/tree how obtained in no irrigation variant (b1).

The biggest fruits production, in irrigation variants, they obtained in b2 variant, respectively 49.5 kg/tree, while the smallest was of 47.3 kg/tree acquired in variant b3.

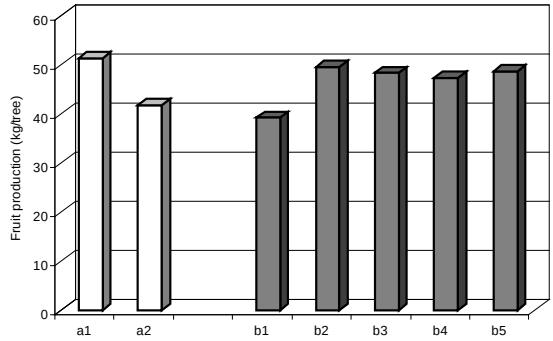
In cultivars studies case, as and preceding years, the biggest production obtained whole to NJA 42 cultivar (a1), respectively 51.3 kg/tree comparative with 41.8 kg/tree how obtained to Tudor cultivar (a2).



Legend was identical with one from Figure 1.

Fig. 2. The cultivar influence and irrigation variant on fruit production (kg/tree) at apricot tree in 2004 year

Through localized irrigation application, the fruits production acquired represented 124 % comparative with no irrigation variant (b1).



Legend was identical with one from Figure 1.

Fig. 3. The cultivar influence and irrigation variant on fruit production (kg/tree) at apricot tree in 2005 year

CONCLUSIONS

The watering tree constitutes one of the most important technological links. The results obtained through localized irrigation application to point out that tree species studied value irrigation water well, contributing to a substantial increase of fruits productions.

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ANALITICAL DATES CONCERNING THE FRUITS OF SOME SWEET CHERRY CULTIVARS OBTAINED AT FRUIT GROWING DEVELOPMENT STATION IAŞI

DATE ANALITICE PRIVIND FRUCTELE UNOR SOIURI DE CIREŞ OBȚINUTE LA SCDP IAŞI

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Abstract. *The knowledge of the physical-chemical features of the cherry fruits is a very important element to define their quality and the establishing of their destination for fresh consumption or industrialization. The evaluation of the technological features of fruits for 7 cherry cultivars (Cetățuia, Cătălina, Golia, Ştefan, Bucium, Maria, Tereza) created at the Station for Research Development in fruit growing Iaşi and of a black test (Boambe de Cotnari, one of the most spread cultivars cultivated in Romania), was made on fruit samples from the harvest of 2007 within the comparative contest culture found on the experimental plot. We focused on aspects such as: the harvest time, the fruit size, the percentage of stones, the contents in dry soluble substance, the reducing sugars, total acidity, the ratio sugar/acidity, the antioxidizing capacity expressed in rH, the contents in pigments, the contents in phenolic substances and anthocians. The cultivars Golia, (by the size of the fruit 7,6 g, the contents in sugars 12,46 % and acidity of 1,05 g%), Ştefan (by the contents in dry soluble substance 22,2 ^{0}Brix), Tereza and Bucium (by the pulp/ stone ratio) stood out.*

Rezumat. *Cunoaşterea însuşirilor fizico-chimice ale fructelor la cireşe, constituie un element foarte important pentru definirea calității acestora. S-a încercat stabilirea unor criterii pentru caracterizarea şi aprecierea fructelor din punct de vedere fizic, chimic, tehnologic şi biochimic, criterii care vor putea fi utilizate pentru promovarea şi menținerea acestor soiuri în sortimentul zonal de influență a SCDP Iaşi. Analiza însuşirilor fizice şi a compoziției chimice ale fructelor la soiuri noi de cireşe create la Stațiunea de Cercetare Dezvoltare pentru Pomicultură Iaşi, a fost realizată pe probe de fructe din recolta anului agricol 2007, din cadrul unei culturi comparative de concurs aflată în poligonul experimental. S-au luat în studiu 8 soiuri, şi s-au urmărit aspecte privind : epoca de recoltare, mărimea fructelor, % sâmbure, conținutul în substanță uscată totală şi solubilă, % apă, glucide reducătoare, aciditate totală, raportul zahăr/aciditate, rezistența la deformare, capacitatea antioxidantă exprimată în rh, conținutul în pigmenți, conținutul în substanțe fenolice şi antociani.*

Key words: sweet cherry fruit, cultivar, chemical composition, phenolic content, antioxidant capacity.

INTRODUCTION

The knowledge of the physical-chemical features of the cherry fruits is a very important element to define their quality both for fresh consumption or processing

(*Beceanu and Chira, 2003; Gherghi et al. 2001)*. The cultivars under study were created at SCDP Iaşi and homologated in the interval 1999-2006.

From the harvest of 2007, we studied the fruits from 7 new cherry cultivars making determinations and analyses regarding the following aspects: the fruit size, the percentage of stones, the contents in dry soluble substance, the reducing sugars, total acidity, the ratio sugar/acidity, the antioxidizing capacity expressed in rH, the contents in pigments, the contents in phenolic substances and anthocians and chromatic characteristics. Depending on these features we noticed the most valuable cultivar, by destinations for capitalization in the climatic conditions of year 2007.

MATERIAL AND METHODS

The fruit productions registered in 2007 for sweet cherries were lower than in the previous years, the determining factor being the excessive drought registered in April-June that caused an accentuated physiological fall of fruits and an inferior quality of these.

For experiments, we used fruits harvested from 7 new sweet cherry cultivars (*Cetățuia, Cătălina, Golia, Maria, Ştefan, Tereza and Bucium*), existing within a contest culture at FGDS Iaşi and a blank test (*Boambe de Cotnari*, the most spread cultivar from the area of influence of FGDS Iaşi).

We made observations, determinations and analyses in terms of: the fruit size, the percentage of stones, the contents in soluble dry substance, the total contents of reducing sugars, total acidity, the ratio sugar/acidity, the reduction-oxidization potential expressed in rH, the contents in colour pigments, the contents in phenols and anthocians. The physical-chemical analysis of fruits was effectuated according to the existing standards. To determine the fruit size we measured the weight of 100 whole fruits (g) and the weight of 100 dry stones (g) using a precise electronic scales and then on account of these determination we calculated the pulp/stone ratio.

The titrating acidity was determined by neutralization with hydroxide solution 0,1 N, up to the equivalence point using timol-phtaleine as an indicator.

The contents in reducing sugars were determined by the Schoorl method and the soluble dry substance was determined by refractometry using a manual refractometer Zeiss.

The reduction-oxidization potential was determined by the potentiometer using a platinum electrode and a reference electrode (saturated calomel) (Zănoagă, 1988). The rH parameter was calculated by Clark formula, the result being expressed in volts.

Preparation of the fruit samples. From each cultivar we took samples of 250 g of fruit at commercial maturity that were immediately frozen at –20 ^{o}C. From these fruits we took 10 fruits from each cultivar (x 4 repetitions), that were cold ground after which they were put into contact with 100 ml solution 5/1 methanol/HCl and then with another 50 ml 100/1 methanol/HCl. They were evaporated at 35 degrees with a rotating vapor and then adjusted to the volume of 100 ml with acidulated water of pH 2. We made the analyses using this methanol extract.

Analyses effectuated. The total contents in poly-phenols were determined through the total poly-phenolic index (TPI) at a wave length of 280 nm (D_{280}).

The determination of the anthocians contents was made through bleaching with sulphureous acid, anthocians reacting in an acid environment with the sulphureous acid forming colorless sulphitic combinations and the results were expressed in mg/l of methanol extract.

The determination of the chromatic characteristics was made through the method CIE Lab-76 expressed by luminosity parameters (parameter L) and the colour coordinates (parameter a for complementary colours red-green and parameter b for complementary colours yellow-blue).

RESULTS AND DISCUSSIONS

The quality of the cherry fruit is also determined by the fruit size that internationally tends to be more than 11 g (Webster, 1996). The fruit size is influenced by the climatic conditions and the soil characteristics. In the conditions of year 2007, the studied soils registered fruits ranging between 3,9 g and 7,6 g, from small size (the ones under 5 g), medium size (the ones with whole fruit 5-7 g) up to the big size (the ones with more than 7 g). The average weight of the fruit registered the lowest value for the cultivar *Cetățuia* (3,9 g), and the highest for the cultivar *Golia* with 7,6 g. As compared to the cultivar *Boambe de Cotnari*, the most known autochthonous cultivar, the cultivars *Golia* and *Tereza* have higher fruit weight but in terms of the ratio pulp/stone the cultivars *Tereza* and *Bucium* are superior as compared to the blank test and this happens because the cultivar *Bucium*, though having a smaller fruit than the cultivar *Boambe de Cotnari*, has a smaller stone too (*table 1*).

The chemical composition of sweet cherries has a special importance in the capitalization by consumption in fresh state or industrialization and varies depending on the cultivar. For the cultivars studied, the dry soluble substance registered values between 14 ^{0}Brix and 22,2 ^{0}Brix, the cultivars *Tereza, Ştefan* and *Golia*, having higher values than the blank test. The contents in soluble total sugars, the main component of the dry soluble substance, registered values between 7,21 % for the cultivar *Cătălina* and 14,9 % for the cultivar *Tereza*.

Table 1

The physical features of the fruits at some sweet cherry cultivars (2007, Iaşi)

Cultivar	Weight of 100 whole fruits (g)	Weight of 100 dry stones (g)	Stone percentage (%)	Flash /stone ratio	Difference of control cultivar	
					+/-	%
Cetățuia	389,59	21,9	5,62	17,79	-1,99	89,93
Cătălina	569,71	33,76	5,93	16,88	-2,91	85,30
Golia	758,62	45,86	6,05	16,54	-3,24	83,62
Maria	454,36	37,46	8,24	12,13	-7,65	61,31
Ştefan	568,74	29,58	5,20	19,23	-0,56	97,19
Tereza	637,65	26,93	4,22	23,68	3,90	119,69
Bucium	580,36	23,92	4,12	24,26	4,48	122,65
Boambe de Cotnari (as control)	632,64	31,98	5,06	19,78	-	-

Except the early cultivars *Cetățuia* and *Cătălina* that have a lower content in sugars than the blank test, all cultivars registered higher values than the blank test. The

titrating acidity registered values between 0,5222 g mallic acid /100 g fresh fruit and 1,0505 g mallic acid/100 g fresh fruit. Values lower than the blank test were registered by the cultivars *Ştefan* (0,4838 g/100 g f.f.) and *Bucium* (0,5222 g/100 g f.f.). The sweet easily acidulated taste of sweet cherries is influenced by the ratio between sugar and acidity and represents a criterion for the capitalization of the fruits in fresh state; that is why it is necessary to determine the optimum values for this ratio for each cultivar (*Webster et al. 1996, Beceanu et al. 2007, Sirbu et al. 2007*). For the cultivars under study, the ratio sugar/acidity registered values between 9,16 (*Cătălina*) and 29,75 (*Ştefan*), the cultivars *Bucium, Ştefan* and *Tereza* having higher values than the blank test cultivar *Boambe de Cotnari* (*table 2*). For the cultivars under study, we also made the analysis of the poly-phenolic total content since it is important in determining taste and sweet cherry flavour as well as an antioxidizing activity with anticancer effect. The highest values were registered by the cultivars *Golia* and *Cetăţuia* (13,41 and 13,16 respectively), and the lowest values were registered for the cultivars *Cătălina* and *Tereza* 7,58 and 7 respectively).

The cultivars *Ştefan, Maria* and *Bucium* registered intermediate values close to the control cultivar (*table 3*).

Table 2

The chemical features of the fruits at some sweet cherry cultivars (2007, Iaşi)

Cultivar	SDS (^{o}Brix)	Fraction glucide (g %)	Acidity (g mallic acid /100g)	Sugar/ acidity ratio
Cetăţuia	17,2	10,38	0,9192	11,29
Cătălina	16,2	7,21	0,787	9,16
Golia	19,4	12,46	1,0505	11,86
Maria	16	12,04	0,7879	15,28
Ştefan	22,2	14,4	0,4838	29,75
Tereza	18,4	14,9	0,7222	20,64
Bucium	14	12,6	0,5222	24,14
Boambe de Cotnari (martor)	18,2	11,77	0,6566	17,91

The contents in anthocians registered values between 16,66 mg/l and 58,75 mg/l, the highest values being registered for the cultivars *Cetăţuia* and *Golia* with 58,75 and 56,4 mg/l respectively. The cultivar *Bucium* registered only 16,66 mg/l contents in anthocians. The cultivars *Ştefan, Tereza, Maria* and *Cătălina* registered a contents in anthocians with intermediate values (*table 3*).

Table 3

The reduction-oxidation potential and phenolic and anthocianyns content at some sweet cherry cultivars (2007, Iaşi)

Cultivar	Total poly-phenolic index D_{280}	Anthocians contents (mg/l)	rH (V)
Cetăţuia	13,16	58,75	26,29
Cătălina	7,58	20,99	28,44
Golia	13,41	56,4	25,16

Maria	8,17	24,89	27,33
Ştefan	9,31	32,11	27,92
Tereza	7	26,43	-
Bucium	8,09	16,66	26,05
Boambe de Cotnari (as control)	8,12	35,31	25,75

Sweet cherries' antioxidizing capacity is superior to that of pears or apples but more reduced than that of the cultivars with small fruits such as wild strawberries, raspberries or bilberries (Battino et al., 2004). For the cultivars under study (the cultivar *Tereza* was not analyzed from this viewpoint), the reduction-oxidization potential expressed by the rH value registered values between 25,16 and 28,44. Knowing that a rH value of 28,2 from a chemical system corresponds to the neutrality from the reduction-oxidization viewpoint, we may say that the cultivar *Cătălina* is the only one with an easily oxidizing character, and the cultivars *Ştefan, Maria, Cetăţuia, Bucium* and *Golia*, as well as the control cultivar *Boambe de Cotnari*, have a reducing character (*table 3*).

The chromatic characteristics of fruits for the sweet cherries under study highlight values of luminosity ranging between 73,8 for the cultivar *Golia* and 90,6 for the cultivar *Boambe de Cotnari*. Among the colour parameters, the component a (red-green axis) presents absolutely positive values between 21,58 and 49,24, what shows a very important content in red colour pigments. The component b (yellow-blue axis) presents absolutely positive values between 4,87 and 15,93, suggesting the presence of a moderate quantity of yellow pigments (*table 4*).

Table 4

The chromatic characteristics of fruits at some sweet cherry cultivars (2007, Iaşi)

Cultivar	Luminosity L	Parameter a (red + - green -)	Parameter b (yellow + - blue -)
Cetăţuia	80,5	41,58	10,25
Cătălina	84	32,35	7,71
Golia	73,8	49,24	15,93
Maria	82,7	36,05	8,61
Ştefan	86,8	30,06	7,38
Tereza	87,5	28,92	6,37
Bucium	84,6	35,06	7,9
Boambe de Cotnari (as control)	90,6	21,58	4,87

CONCLUSIONS

In the climatic conditions of the year 2007, the cultivars created at SCDP Iaşi manifested valuable physical features. Thus, the cultivar *Golia* had a large fruit (7,6 g), as compared to the control cultivar (*Boambe de Cotnari*), and the cultivars *Tereza* and *Bucium* registered a pulp/stone ratio (23,68 and 24,26 respectively) higher than the control cultivar *Boambe de Cotnari*, though they had a smaller fruit.

As for the chemical characteristics, the ratio sugar/acidity registered superior values for the cultivars *Ştefan, Bucium* and *Tereza*, as compared to the control cultivar *Boambe de Cotnari*, so they have a better taste.

From the viewpoint of the reduction-oxidization potential, except the cultivar *Cătălina* that has an easily oxidizing character, the other cultivars have a reducing character what makes them important from the dietetic viewpoint.

The high contents in poly-phenols was registered by the cultivar *Golia*, with a total poly-phenolic index (D_{280}) of 13,41, the cultivar *Cetățuia* following closer with an index of 13,16. The lowest values were registered by the cultivars *Tereza* (TPI 7) and *Cătălina* (TPI 7,58). The contents in anthocians registered high values for the cultivars *Cetățuia* (58,75 mg/l extract) and *Golia* (56,4 mg/l extract). The lowest values of the contents in anthocians were registered by the cultivar *Bucium*.

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STUDIES ON MICROPROPAGATION EFFICIENCY IN ORNAMENTAL STRAWBERRY VARIETIES (*FRAGARIA X POTENTILLA*)

STUDII PRIVIND EFICIENȚA MICROPROPAGĂRII VARIETĂȚILOR DE CAPŞUN ORNAMENTAL (*FRAGARIA X POTENTILLA*)

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Abstract. *Although the culture media currently used for the in vitro micropropagation of the octoploid strawberry should offer also the posibility of mass propagation of ornamental strawberry, the particularities of the varieties of Fragaria x Potentilla (deriving mainly from their different genetic origin) could result in significant differences in their response to in vitro culture. In order to develop a protocol for high efficiency in vitro propagation of ornamental strawberry, two varieties with different origin were investigated (Pink Panda and Serenata). In both ornamental strawberry varieties, the mean number of shoots formed per explant (original shoot, derived from meristem culture) was slightly higher when subcultured on Murashige and Skoog medium, as compared to Lee and Fossard medium (currently used for micropropagation of commercial strawberry), irrespective of the combination of growth regulators. After the first subculture, the highest rate of shoot proliferation was achieved on either medium supplemented with 1.0 mg/l BA, 0.2 mg/l IBA and 0.1 mg/l GA, or 1.0 mg/l BA, 1.0 mg/l IAA and 0.1 mg/l GA. This increased in subsequent subculture in Serenata variety to an average of over 20 shoots per explant, while in Pink Panda variety did not exceed 11 shoots per explant.*

Rezumat. *Deşi mediile de cultură folosite în mod curent pentru micropropagarea in vitro a căpşunului octoploid ar trebui să ofere şi posibilitatea înmulțirii pe scară largă a căpşunului ornamental, particularitățile varietăților de Fragaria x Potentilla (derivând în primul rând din originea lor genetică diferită) pot determina diferențe semnificative în răspunsul lor la cultura in vitro. In scopul elaborării unui protocol pentru înmulțirea in vitro cu eficiență ridicată a căpşunului ornamental, au fost investigate două varietăți cu origine diferită (Pink Panda şi Serenata). La ambele, numărul mediu de lăstari formați per explant (lăstar inițial, format din meristem) a fost uşor mai ridicat când au fost subcultivate pe mediul Murashige-Skoog, comparativ cu mediul Lee-Fossard (folosit în mod curent pentru micropropagarea căpşunului comercial), indiferent de combinația de regulatori de creştere. După prima subcultură, cea mai ridicată rată de proliferare a lăstarilor s-a înregistrat fie pe mediul suplimentat cu 1.0 mg/l BA, 0.2 mg/l IBA şi 0.1 mg/l GA, fie pe cel cu 1.0 mg/l BA, 1.0 mg/l IAA şi 0.1 mg/l GA. In subcultura următoare, aceasta a crescut la soiul Serenata la o medie de peste 20 lăstari per explant, în timp ce la soiul Pink Panda nu a depăşit 11 lăstari per explant.*

Sexual compatibility of *Potentilla palustris* with some *Fragaria* species (Niemirowicz-Szcytt, 1984; Sayegh and Hennerty, 1993), allowed the occurence of a large range of *Fragaria x Potentilla* intergeneric hybrids, combining the ornamental value given by the beauty of their flowers and prolonged blossoming season (May - October) with production of edible fruits. As the *Fragaria* x *Potentilla* hybrids, such as “Serenata”, “Pink Panda”, “Lipstick”, “Red Ruby”and “Vivarosa”, meet the trend in ornamental horticulture, large quantities of planting material are needed to be available at any time of the year. The conventional propagation of these varieties does not allow the obtention of high number of stolons of guaranteed authenticity and biological value in a very short time. Therefore, taking into consideration that they resemble octoploid cultivated strawberries, the *in vitro* micropropagation is the first choice.

The comparison of responses on different culture media and chosing the most appropriate for obtention of a high efficiency of shoot multiplication in *Fragaria x Potentilla* hybrids is not a simple task , primarily due to their different genetic origin. Knowing the fact that the efficiency of micropropagation depends to a great extent of the culture media used for the initiation of shoot cultures and maintenance of subcultures, we initiated a study aiming at the elaboration of an reliable protocol for the high rate *in vitro* propagation of the ornamental strawberry.

MATERIAL AND METHODS

Two varieties of ornamental strawberry (*Fragaria x Potentilla*), named ”Pink Panda” and ”Serenata”, respectively, were established in vitro culture starting from meristems and then subcultured succesively on Murashige and Skoog (MS) and respectively Lee and Fossard (LF) media supplemented with various combinations of growth regulators (Table 1).

For the initiation of shoot cultures, meristems with 2-3 leaf primordia, of 0.1-0.3 mm in size, excised from runners formed by field plants of varieties ”Pink Panda” (with pink flowers), and ”Serenata” (with red flowers), were used.

Six treatments with different combinations and concentration of benzylaminopurine (BAP), kinetin (Kin), indolylacetic acid (IAA), 3-indolylbutiric acid (IBA), and giberellic acid (GA_3), added to both MS and LF basic culture media, were used in order to find an adequate medium for obtaining a high rate of micropropagation while maintaining a good vigor of micropropagated shoots (Table 1). The concentration of cytokinins in the experimental treatments covered the range currently used with commercial strawberry, thus allowing the establishment of that inducing the best morphogenetic response. To avoid major statistical errors, at least 6 culture flasks with 5 shoots per flask were used as repetitions in each of the experimental treatment investigated.

The cultures have been incubated in a growth chamber at the temperature of 22-24°C, with a photoperiod of 16 hours light/8 hours darkness, and a light intensity of about 3000 lux.

The observations were carried out at every 4 weeks, respectively at the moment of subculturing the micropropagated shoots. The micropropagation rate was calculated as the average number of shoots regenerated on each primary explant cultured *in vitro* on each of the media tested. Statistical analysis of the data obtained with ”Pink Panda” and ”Serenata” varieties respectively on the MS and LF media

supplemented with various combinations of growth regulators were performed using Windows SPSS 16.0 program (SPSS, 2007) at $p < 0.05$.

Table 1.

The combinations and concentration of growth regulators added to MS and LF media respectively, tested in order to establish an efficient protocol for the micropropagation of *Fragaria x Potentilla* varieties

Culture medium code	Basic medium	Growth regulators used and their concentration in the culture medium (mg/l)				
		BAP	IBA	IAA	GA_3	Kin
V1	MS, or LF	0.5	0.1	-	0.1	-
V2	MS, or LF	1.0	0.2	-	0.1	-
V3	MS, or LF	0.5	-	0.5	0.1	-
V4	MS, or LF	1.0	-	1.0	0.1	-
V5	MS, or LF	2.0	-	1.0	-	-
V6	MS, or LF	1.0	-	-	2.0	0.5

RESULTS AND DISCUSSIONS

After the first subculture, the highest multiplication rate calculated for "Pink Panda" variety (10.8 shoots/primary explant) was obtained with explants cultured on MS medium supplemented with 1 mg/l BAP, 0.2 mg/l IBA and 0.1 mg/l GA_3 (V2). A very closed rate of multiplication (10.15) was induced also by the LF medium supplemented with 2 mg/l BAP and 1 mg/l IAA (V5). Moreover, as shown by the Duncan's multiple range test, similar response was obtained in treatments with many different combinations of growth regulators added to either MS or LF media (Fig. 1).

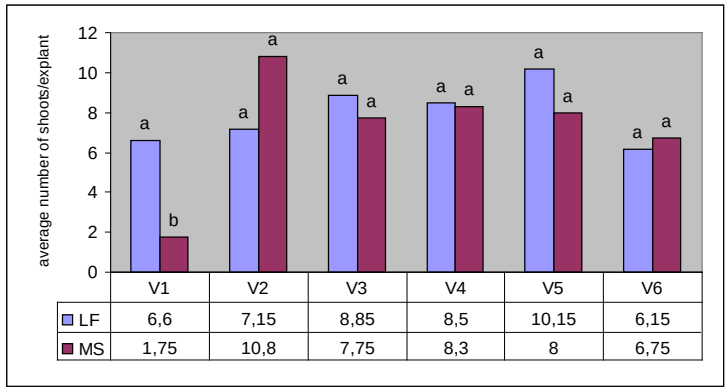


Fig. 1. The micropropagation rate of "Pink Panda" variety during the first subculture on either LF or MS media.

As compared to the "Pink Panda", the "Serenata" variety of *Fragaria x Potentilla* responded by a better rate of micropropagation during the first subculture on al the six variants of culture media, irrespective of the basic medium. Thus, an average number of 20.6 shoots formed per primary explant was calculated for the treatment with 0.5 mg/l BAP, 0.1 mg/l IBA and 0.1 mg/l GA_3 added to the MS (Fig. 2).

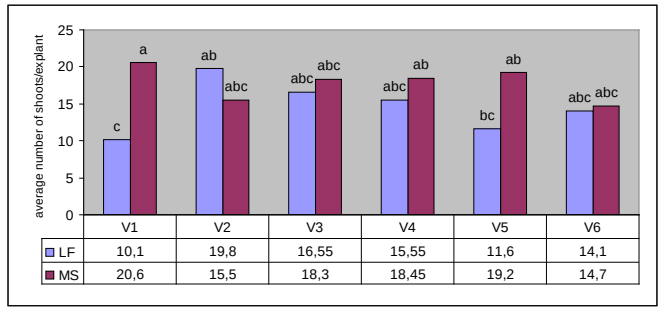


Fig. 2. The micropropagation rate of the "Serenata" variety during the first subculture on either LF or MS media.

A significantly lower rate of micropropagation was obtained with this *Fragaria x Potentilla* variety when the same combination of growth regulators was added to the LF medium. Excepting the treatment with 0.5 mg/l BAP, 0.1 mg/l IBA and 0.1 mg/l GA_3, no other combinations of growth regulators resulted in significantly different rate of shoot micropropagation on the two basic culture media tested. The overall results obtained with "Serenata" variety have shown that even the lowest micropropagation rate calculated for the first subculture on LF medium (10.1 shoots/primary explant), was closed or even exceeded the best micropropagation rates induced in "Pink Panda"variety (Fig. 2).

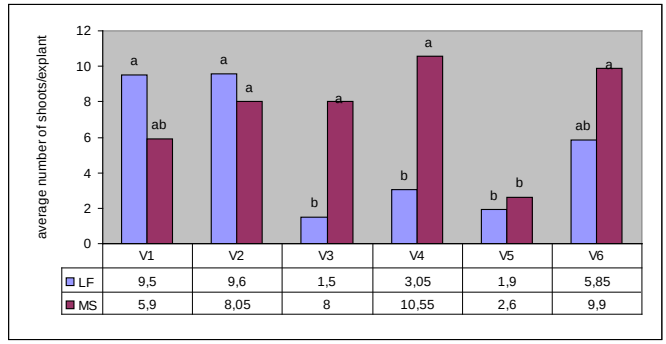


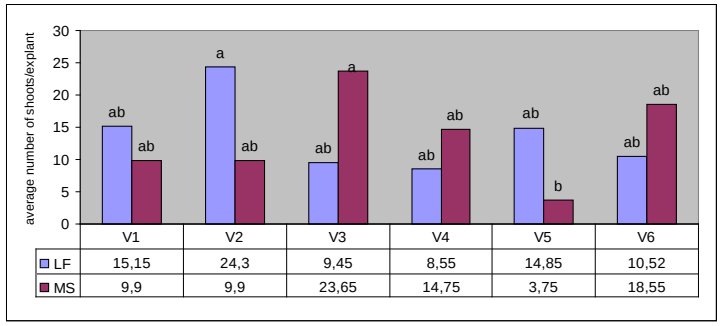
Fig. 3. The micropropagation rate of "Pink Panda" variety during the second subculture on either LF or MS media.

As shown by the Duncan's multiple range test, in "Pink Panda" variety, the number of shoots formed per primary explant on LF medium decreased in the second subculture for treatments which promoted the highest rates of shoot micropropagation at the end of the first subculture, and increased for those which previously resulted in the lowest rates of micropropagation (Fig. 3). The average number of shoots formed per primary explant when subcultured on this basic medium was highest in treatments with either 0.5 mg/l BAP, 0.1 mg/l IBA and 0.1 mg/l GA_3 (V1) or 1.0 mg/l BAP, 0.2 mg/l IBA, and 0.1 mg/l GA_3 (V2).

The same variety responded by slightly higher rates of micropropagation on MS medium, the highest number of shoots regenerated per primary explant (10.55) being found for explants subcultured on V4 variant of medium (Fig. 3). The statistical analysis revealed that similar rates of shoot micropropagation can be obtained with many other treatments.

In “Serenata” variety, the micropropagation rate maintained higher over the subsequent subculture as compared to “Pink Panda”, on any of the culture media tested, reflecting its superior genetic potential of *in vitro* multiplication. It is relevant the fact that at the end of the second subculture, on the LF medium, a rate of micropropagation as high as 24.3 was calculated for V2, respectively in treatment with 1.0 mg/l BAP, 0.2 mg/l IBA, and 0.1 mg/l GA_3 (Fig. 4).

A very closed value of the average number of shoots formed per primary explant (23.65) was calculated also for the treatment with 0.5 mg/l BAP, 0.5 mg/l IAA, and 0.1 mg/l GA_3. On the same variant of medium, a significantly lower value of the micropropagation rate was calculated for this intergeneric variety when the shoots were subcultured on LF medium, respectively 9.45 shoots/primary explant. However, the obtained results have shown that a very good rate of micropropagation can be induced in this variety also by the combination of 1.0 mg/l BAP, 0.5 mg/l Kin, and 2.0 mg/l GA_3 (which during the second subculture gave an average number of shoots formed per primary explant of 18.55).



	V1	V2	V3	V4	V5	V6
LF	15,15	24,3	9,45	8,55	14,85	10,52
MS	9,9	9,9	23,65	14,75	3,75	18,55

Fig. 4. The micropropagation rate of the “Serenata” variety during the second subculture on either LF or MS media.

An interesting response was observed during the third subculture, as the micropropagation rate decreased again in “Pink Panda” variety on all the variants of media consisting of combinations of growth regulators added to the LF basic medium which in previous subcultures promoted good rates of shoot multiplication, and increased for the explants subcultivated on variants which previously resulted in lower rates of shoot multiplication. Similarly, on the MS medium, the micropropagation rate decreases in all treatments excepting that which during the previous subculture resulted in the lowest average number of shoots formed per primary explant (V5). The overall results indicates that the highest values of the micropropagation rate were induced when 2.0 mg/l BAP and 1.0 mg/l IAA have been added to the basic culture media.

The statistical analysis have revealed that, similarly with the “Pink Panda”, the “Serenata” variety responded by a decreased ability of shoot micropropagation during the third subculture (Fig. 5). Thus, irrespective of the basic culture medium, the best rates of micropropagation does not exceeds 16 shoots formed per primary explant. However, good rates of shoot micropropagation were promoted in treatments with 1.0 mg/l BAP, combined with either 0.2 mg/l IBA or 1.0 mg/l IAA.

Fig. 5. *In vitro* micropropagated shoots in *Fragaria x Potentilla* varieties "Pink Panda" (left) and "Serenata" (right)

The statistical analysis have revealed that, similarly with the "Pink Panda" variety, the "Serenata" variety responded by a decreased ability of shoot micropropagation during the third subculture. Thus, irrespective of the basic culture medium, the best rates of micropropagation does not exceeds 16 shoots formed per primary explant. However, good rates of shoot micropropagation were promoted in treatments with 1.0 mg/l BAP, combined with either 0.2 mg/l IBA or 1.0 mg/l IAA.

CONCLUSIONS

(1) In both "Pink Panda" and "Serenata" varieties of *Fragaria x Potentilla*, the average number of shoots formed per primary explant was higher when the explants were subcultivated on the MS medium, rather than on LF medium (currently used for the micropropagation of the octoploid cultivated strawberry), indicating a more adequate composition of nutrients to the *in vitro* growth requirements of these intergeneric hybrids.

(2) Irrespective of the basic culture media, the micropropagation rate of both "Pink Panda" and "Serenata" varieties was demonstrated to be generally higher when combinations of 1.0 mg/l BAP with either 0.2 mg/l IBA or 1.0 mg/l IAA are used.

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STUDIES ON THE REPRODUCTIVE BEHAVIOR OF SOME ORNAMENTAL STRAWBERRY VARIETIES (*FRAGARIA X POTENTILLA*)

STUDII ASUPRA COMPORTAMENTULUI REPRODUCTIV AL UNOR VARIETĂȚI DE CĂPŞUN ORNAMENTAL (*FRAGARIA X POTENTILLA)*

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Abstract*. If for the obtention of intergeneric hybrids Fragaria x Potentilla combining ornamental value with the production of edible fruits, the only species of Potentilla used as parent is P. palustris (always as male genitor), at least four species of Fragaria were used as female genitors. Thus, there are intergeneric hybrids F. chiloensis (8x) x P. palustris, F. x ananassa (8x) x P. palustris, F. moschata (6x) x P. palustris, and F. vesca (2x) x P. palustris. As the species P. palustris is hexaploid, and the species of Fragaria used as female genitors are different in their ploidy level, from diploid to octoploid, the genetic background and ploidy of the intergeneric hybrids Fragaria x Potentilla are also different. Therefore, some major differences occur in their reproductive behavior. The studies carried out with two varieties of Fragaria x Potentilla (Pink Panda and Serenata) have shown remarkable differences between them in runnering ability, anther formation, pollen load and pollen viability. The consequences of vegetative (asexual) reproduction and/or generative (sexual) reproduction on both the propagation efficiency and phenotype stability of progenies are disscused.*

Rezumat. *Dacă pentru ținerea de hibrizi intergenerici Fragaria x Potentilla combinând valoarea ornamentală cu producerea de fructe comestibile, singura specie de Potentilla folosită ca genitor este P. palustris (întotdeauna ca genitor patern), cel puțin patru specii de Fragaria au fost folosite ca genitor matern. Prin urmare, există hibrizi intergenerici F. chiloensis (8x) x P. palustris, F. x ananassa (8x) x P. palustris, F. moschata (6x) x P. palustris, şi F. vesca (2x) x P. palustris. Intrucât specia P. palustris este hexaploidă, iar speciile de Fragaria folosite ca genitor matern au nivel diferit de ploidie, de la diploid la octoploid, fondul genetic şi ploidia hibrizilor intergenerici Fragaria x Potentilla sunt de asemenea diferite. De aceea, în comportamentul lor reproductiv apar deosebiri majore. Studiile efectuate cu două varietăți de Fragaria x Potentilla (Pink Panda şi Serenata) au arătat diferențe remarcabile între ele în privința capacității de formare de filamente şi stoloni, de formare de antere, a încărcăturii de polen şi a viabilității polenului. Sunt discutate consecințele reproducerii vegetative (asexuale) şi/sau generative (sexuale), atât asupra eficienței de înmulțire, cât şi a stabilității fenotipice a descendenților.*

Even if the intergeneric hybridization was considered unuseful in the case of species with high level of ploidy (Darrow, 1966), the advances from recent years in ploidy manipulation, improvement of techniques used for crossings and recovery of zygotic embryos resulted from distant crossings, have determined an almost radical

reconsideration of the practical usefulness of this method for the genetic improvement of cultivated strawberry.

The success gained by the *Fragaria x Potentilla* hybrid forms resulted in a rapid increasing of the breeders interest for obtaining intergeneric hybrids presenting both the important traits of *Fragaria* species and some traits of *Potentilla* (Sayegh and Hennerty, 1993; MacFarlane Smith and Jones, 2004), mainly those associated with ornamental value (Fig. 1). Therefore, numerous intergeneric varieties of *Fragaria x Potentilla* have been released in last decade.

Although an extensive range of traits, of great interest for genetic improvement, is available in the diploid, tetraploid or hexaploid species of *Potentilla*, the most attempts to incorporate directly traits from these species into the octoploid cultivated varieties of strawberry have failed. Currently, hybrid progenies can be obtained from such crossings, but they are either sterile, or with very low fertility to be used as genitors in subsequent crossings. Moreover, the restauration of fertility of *Fragaria x Potentilla* hybrids by doubling the chromosome number is inappropriate, due to the high level of ploidy.

In this context, the observations and measurements carried out by us according to the methodology for evaluation of *Fragaria* germplasm, were aiming at the characterization of the reproductive behavior of the intergeneric hybrid forms of *Fragaria x Potentilla* existing within National Collection of *Fragaria*, at the Research Institute for Fruit Growing Pitesti.

MATERIAL AND METHODS

The intergeneric hybrids of *Fragaria x Potentilla* with different origin and ploidy level, named "Pink Panda" and respectively "Serenata", have been investigated. In order to determine the reproductive behavior of these intergeneric hybrids, observations and measurements on adrosterility/androfertility, viability and germination ability of the gametes, as well as observations on fruit set and seed formation, were carried out.

Fig. 1. The ornamental strawberry (*Fragaria x Potentilla*)

All the measurements on flower morphology at the intergeneric were carried out at the moment when the plants exhibited at the maximum their characteristics and traits, according to the standardized methodology for the evaluation of *Fragaria* genetic resorces.

For the evaluation of pollen viability in the "Pink Panda" and "Serenata" varieties, the anthers excised from flowers in the stage of unopened buds just before blossoming, were fixed in Carnoy's fixative for 12 hours and then rinsed in 80% alcohol. Pollen viability was determined by microscopic observations on slides with aceto-carmine stained pollen (Zebrowska, 1995).

In order to evaluate its germination ability, the mature pollen collected from the two varieties investigated was sprinckled on solid culture media containing 1.5 g of agar, 15 g of sucrose, and 0.01 g of acid boric mixed in 100 ml of water, and maintained in normal conditions of temperature and humidity. The microscopic observations for calculating the frequency of pollen grains which germinated *in vitro* were carried out at two hours intervals for at least 8 hours, and finally after 24 hours.

RESULTS AND DISCUSSIONS

The flowers formed by *Fragaria x Potentilla* intergeneric hybrids of "Pink Panda" type have the morphology characteristic to *Fragaria* species. An interesting observation was that the plants of this type are forming two distinct groups, differing both by their overall vigor, and the diameter of flowers. However, the morphology and color of flowers formed by plants of both types is identical.

A gynodioecious reproductive system was found in the "Pink Panda" variety, characterized by the presence of both female and hermaphrodite flowers. However, the microscopic observation has revealed that if the anthers are formed, the load of viable microspores is most often low (Table 1).

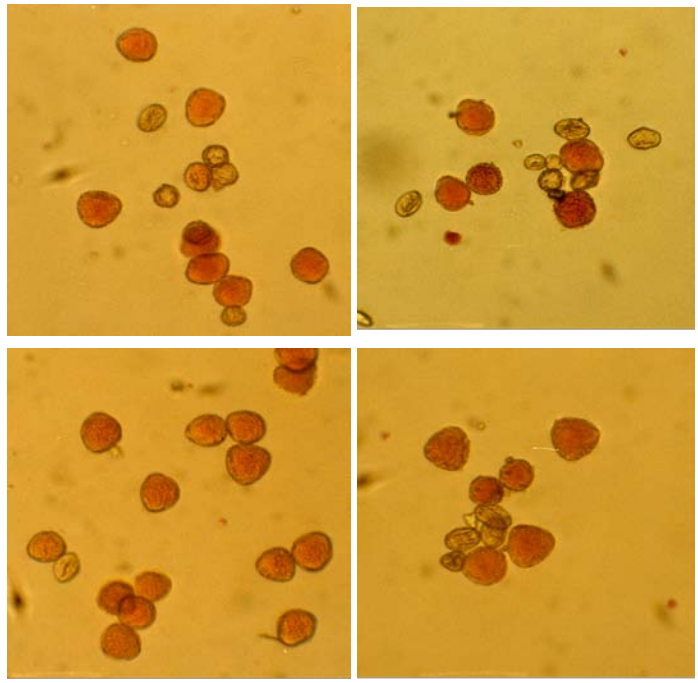

Fig. 2. Viable and non-viable (sterile) pollen formed in "Pink Panda" (left up and right up) and "Serenata" type of *Fragaria x Potentilla* (left down and right down)

The flowers formed by plants of *Fragaria x Potentilla* intergeneric hybrids of "Serenata" type have size comparable with those of "Pink Panda" type, characterized by vigor similar to the octoploid forms of *Fragaria*, but their color is red. The major difference between the flowers formed by the plants belonging to the two intergeneric hybrid forms is that those of "Serenata" types are developing anthers with normal morphology, in which viable microspores are formed. Anthers of the hermaphrodite flowers formed by the intergeneric hybrids of this type are big in size, with a length of about 2-2.5 mm, with medium to long filaments, and all of red color. They released abundantly pollen of yellow-golden color in less than 24 hours when maintained at the room temperature (20 ± 2°C).

The results of microscopic measurements have shown that *Fragaria x Potentilla* hybrids of "Pink Panda" type and respectively of "Serenata" type are significantly different in pollen size (Fig. 2). These differences have been revealed not only by the amplitude of variation in measured diameter of pollen grains, but also by their average diameter and volume, respectively. Thus, while in intergeneric hybrids of "Serenata" type (whose female parent is likely to be an octoploid species of *Fragaria*), the pollen diameter is ranging between 43 and 69 μm, in the hybrids of "Pink Panda" type (whose female parent is probably the *Fragaria vesca* species), the pollen size is ranging between 29 and 47 μm. (Table 1). As a consequence, while a frequency of 77.4% viable pollen was found in "Serenata", an average percentage of only 58.6% of viable pollen was calculated for "Pink Panda" type of Fragaria x Potentilla.

The large amplitude of variation in size of pollen grains formed by the *Fragaria x Potentilla* intergeneric hybrids can be easily explained, taking into considerations the high differences of ploidy between the parent species on the one hand, and between the *Fragaria* female parents for the investigated intergeneric hybrids, on the other hand.

Table 1

Viability and germination ability of pollen grains in "Pink Panda" and "Serenata" type of *Fragaria x Potentilla* intergeneric hybrids.

***Fragaria x Potentilla* hybrids**	**Pollen size (μ)**			**Viable pollen (%)**	**Germinating pollen (%)**	
	min.	**max.**	**average**		**after 6 hours**	**after 24 hours**
Pink Panda	29	47	39 b	58.6 b*	6 a	7 b
Serenata	43	69	56 a	77.4 a	9 a	22 a

* In each column, the mean values with different letters are significantly different (Duncan's multiple range test, $p<0.05$)

The size of pollen grains formed in anthers of investigated intergeneric hybrids and the calculated frequency of viable pollen has provided important data for establishing their origin. In this context should be mentioned the fact that even in the case when the basic number of chromosomes is identical (as is the case with species within *Fragaria* and *Potentilla* genera), the intergeneric hybrids obtained from their crossing presents

numerous abnormalities in meiosis due to the low level of chromosome homology, resulting in unbalanced distribution into gametes and implicitly in their frequent sterility.

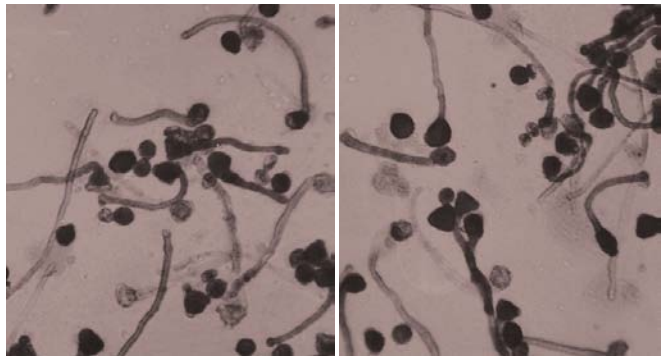

Fig. 3. Pollen germination in "Serenata" type of *Fragaria x Potentilla*.

The microscopic observations revealed that the share of viable pollen is high in *Fragaria x Potentilla* intergeneric hybrids of "Serenata" type (Fig. 2) and (when they are formed) even in those of "Pink Panda" type. Moreover, the germination ability of pollen grains is significantly higher in plants of "Serenata" type (whose female parent is considered to be the octoploid species *Fragaria chiloensis*). Thus, the calculated frequency of pollen grains forming at least an pollen tube with normal growing (Fig. 3) was 22% in hybrids of "Serenata" type compared to less than 10% in hybrids of "Pink Panda" type.

The considerable difference between the intergeneric hybrids having different *Fragaria* species as female parent in respect of fertility of the male gametes explains their different potential of fruit set. Most relevantly is the fact that the ability to set fruits is significantly higher in the *Fragaria x Potentilla* intergeneric hybrids having an octoploid species of *Fragaria* as female parent.

Observations carried out in two consecutive years on the fruit set from flowers of *Fragaria x Potentilla* intergeneric hybrids of "Pink Panda" and respectively "Serenata" type have shown that only a part of them set fruits. An interesting and surprising finding is that the frequency of fruit set is higher in hybrids of "Pink Panda" type, compared to hybrids of "Serenata" type. Thus, more than a third of the flowers from inflorescences of "Pink Panda" set fruit, while in the "Serenata" only the primary and secondary flowers from the inflorescences were found to set fruits. The number of normal achenes, containing viable embryos, is also higher in fruits formed from flowers of *Fragaria x Potentilla* intergeneric hybrids of "Pink Panda" type. As a matter of fact, as the size of fruit is decisive dependent of the number of achenes containing viable embryos, the higher size of fruits formed by the intergeneric hybrids of this type is explainable.

Since the flowers of the hybrids of "Pink Panda" type are often androsterile, the high frequency fruit set of flowers in the hybrids of this type is obviously the result of open (cross) pollination. The fruit set indicates high viability of female gametes, an essential condition for normal fruiting. Is therefore explainable the higher size and weight

of fruits in hybrids of "Pink Panda" type, as compared to those of hybrids of "Serenata" type, as it is an well known fact that the cross pollination assures always the formation of a higher number of seeds and, implicitly, formation of bigger fruits.

CONCLUSIONS

(1) The absence of anthers in many of the flowers formed by plants of "Pink Panda" type, and the low frequency of viable pollen, has great implications as, considering the fact that the plants of this type does not form runners and therefore they cannot be propagated vegetatively, the cross pollination becomes the most likely way of reproduction, which results in non-uniformity of individual plants within progenies, in which their most important characteristics (primarily the color of flowers and size of fruits) segregates.

(2) The androfertility of the *Fragaria x Potentilla* intergeneric hybrids of "Serenata" type has a major genetic consequence and practical implication, as it create the conditions for self-pollination and allows the chance of their propagation by seeds avoiding the risk of traits segregation (due to their high level of homozygosity).

(3) The differences existing between the investigated forms of *Fragaria x Potentilla* in gamete viability and fertility, resulting from their different meiotic behavior, have also an important implication in breeding. While the use as male parent of hybrids of "Pink Panda" type could be difficult or even impossible, the hybrids of "Serenata" type can be male parents in crossings with other *Fragaria x Potentilla* hybrids or with varieties of cultivated strawberry.

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GRAFT INCOMPATIBILITY IN PEAR: PHYSIOLOGICAL AND BIOCHEMICAL ASPECTS

INCOMPATIBILITATEA LA ALTOIRE A PĂRULUI: ASPECTE FIZIOLOGICE ŞI BIOCHIMICE

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Abstract: *The rootstock vigour has a very important role in variety's growing and fructification engrafted on it. This is why knowing the influences of physiological and biochemical processes upon association scion-rootstock has a major importance. The growth of scions and rootstocks of compatible and incompatible pear/quince grafts was compared. Present studies aim some aspects of the relations between photosynthetic apparatus and plant vital metabolism. A special attention was given to the assimilators pigments and the enzymes activity. There were analyzed the relations between grafting success percentage, shoots growing and thickness morphological index of the grafting zone as results of a good activity of photosynthetic apparatus. The activity of peroxidases was analyzed in both parts of the graft (scion and rootstock) to differentiate between the involvements of each in graft formation.*

Rezumat. *Vigoarea portaltoiului are o deosebită importanță în creşterea şi fructificarea soiurilor altoite, de aceea, cunoaşterea influenței proceselor fiziologice şi biochimice asupra asociației altoi-portaltoi este prioritară în producerea materialului săditor. În această lucrare s-au comparat aspectele legate de creştere la altoii şi portaltoii asociațiilor compatibile şi incompatibile păr-gutui. Obiectivul principal al studiilor efectuate a fost studiul relațiilor dintre aparatul fotosintetic şi metabolismul pomilor altoiți, o deosebită atenție acordându-se pigmenților asimilatori şi activității enzimelor antioxidante. Au fost studiate relațiile dintre procentul de prindere la altoire, creşterea lăstarilor, indicele morfologic de ingroşare în zona de altoire, ceea ce arată o bună activitate a aparatului fotosintetic. Activitatea peroxidazei a foast determinată în trei puncte ale zonei de altoire şi au fost analizate implicațiile sale în prinderea la altoire.*

In the present work the structural development of the graft union formation is studied in pear, together with the possible relationship with peroroxidases activities. From cited literature results that the majority of the researches vote for incompatibility biochemical theory (2, 5).

MATERIAL AND METHOD

Researches were performed during 2005 – 2007 and there were studied some pear varieties behaviour grafted on different rootstocks. The following varieties were used: Curé, Euras, Comptesse de Paris and Williams. The grafting method used was T budding and the four varieties were grafted on *Pyrus sativa Lam*. and *Cydonia oblonga Mill*.

There were made biometrical measurements twice during the vegetation period and was determined glucides and proteins weight in three different zones: above the joining zone (A), in the joining zone (B) and under the joining zone (C). Peroxidases activity was determined also in those three different zones, spectrofotometrically by following the increase in absorbance at 470 nm. Chlorophyll pigment content of the scions and rootstocks was determined spectrophotometricaly (1).

The statistical analysis of obtained data was carried out using a two-factorial analysis of variance and limit differences.

RESULTS AND DISCUSSIONS

At fruit growing species planting material obtained by layering or by seeds there were observed a more uniform proteins and glucides content distributed all through the stem comparing with grafted plants. Proteins and glucides accumulation in different parts of the stem is more or less uniform and this is determined by grafting and simbionts compatibility.

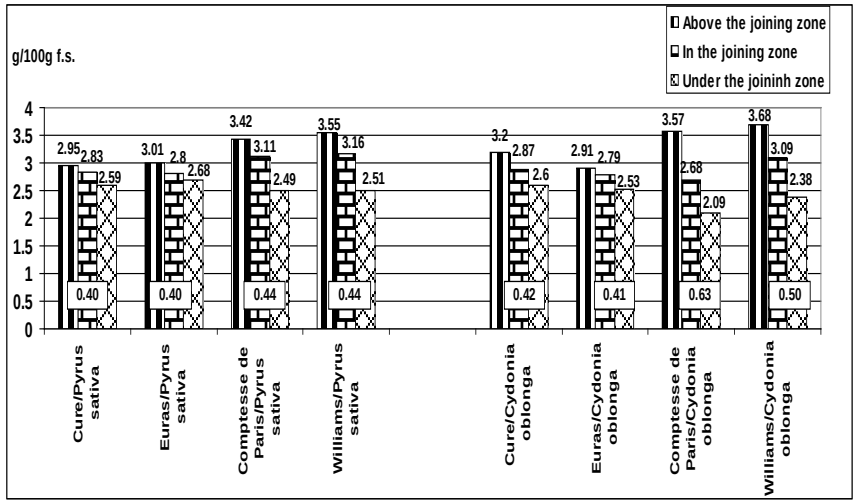

Fig. 1. Glucides determined in pear varieties leaves

The ratios between glucides accumulation determined in those three different zones (A, B, C) are reported in figure 1. As the ratio between the values of A, B, C zones is lower; the combination variety/rootstock has better affinity. When the ratio has a high value, the variety has a reduced compatibility with the used rootstock.

It was obvious the fact that under the joining zone the average glucides content was 1.17 times lower than in the joining zone and 1.32 lower than above the joining zone.

As for the glucides, proteins were present in higher quantities above the joining zone (table 1).

Proteins accumulation in a higher quantity at scion bottom (far from grafting zone) is due to a reduced connection between xylem tissues of those two partners and exudates formation highly concentrated in protein substances (4).

The analyses concerning pear varieties protein content performed above the joining zone showed that the rootstock influence the accumulation. The higher accumulation was registered at Comptesse de Paris 3.91 g/100g fresh substance in both cases of grafting (for both rootstocks). The lower accumulation were in case of Euras variety grafted on pear (2.73 g/100 g fresh substance) and Williams grafted on quince (2.19 g/100g fresh substance) (table 1.).

Proteins determined in rootstock (under the joining zone) were in lower quantities comparing with the other zones we analyzed.

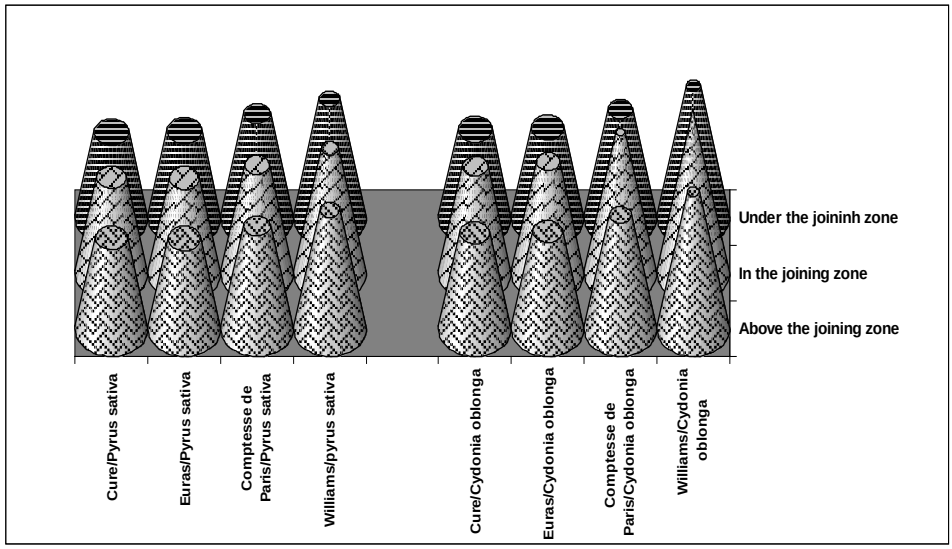

Fig. 2. The intensity of peroxidase activity

Table 1.

Proteins determined in pear varieties

Variety	Rootstock	Proteins (g/100g f.s.)	Difference to the control	Signif.
Above the joining zone				
Curé (Mt)	*Pyrus sativa Lam.*	4.03	-	-
Euras		3.15	-0.88	00
Contesa de Paris		4.17	+0.14	
Williams		3.61	-0.42	
Curé	*Cydonia oblonga Mill*	3.62	-0.41	
Euras		3.38	-0.65	0
Comptesse de Paris		5.23	+1.20	xxx
Williams		3.67	-0.36	

DL 5% = 0.60 DL 1% = 0.83 DL 0.1% = 1.15 g/100g f.s.

In the joining zone				
Curé (Mt)	*Pyrus sativa Lam.*	3.68	-	
Euras		2.73	-0.95	
Contesa de Paris		3.91	+0.23	
Williams		3.28	-0.40	
Curé	*Cydonia oblonga Mill*	3.22	-0.46	
Euras		3.21	-0.47	
Comptesse de Paris		3.91	+0.23	
Williams		2.19	-1.49	00

DL 5% = 1.07 DL 1% = 1.49 DL 0.1% = 2.07 g/100g f.s.

Under the joining zone				
Curé (Mt)	*Pyrus sativa Lam.*	3.98	-	-
Euras		2.71	-1.27	000
Contesa de Paris		2.77	-1.21	000
Williams		3.19	-0.79	00
Curé	*Cydonia oblonga Mill*	3.02	-0.96	00
Euras		2.52	-1.46	000
Comptesse de Paris		3.28	-0.70	0
Williams		1.36	-2.62	000

DL 5% = 0.53 DL 1% = 0.74 DL 0.1% = 1.03 g/100g f.s.

In fig. 2 it has been reported the peroxidases activity above the joining zone, in the joining zone and under the joining zone at studied pear varieties.

A higher intensity of peroxidases activity can be observed in the joining zone and above the joining zone for incompatible varieties (Williams and Comptesse de Paris), suggesting a continuous stress caused by grafting wounds. Moreover, at varieties with poor compatibility the higher intensity of peroxidases activity is associated with lower proteins accumulation and lower grafting success percentage.

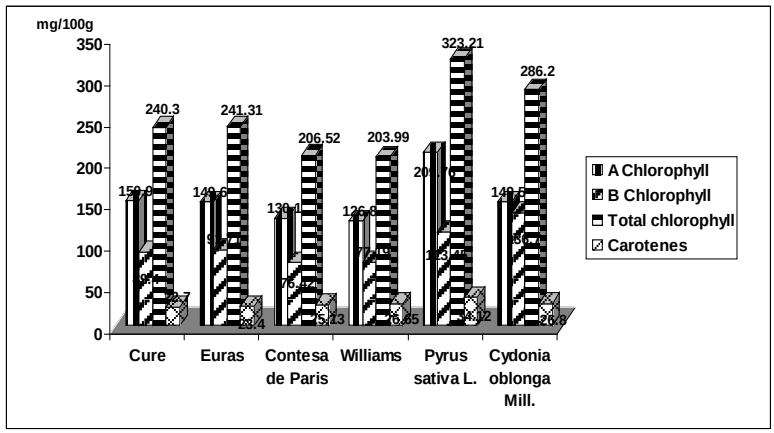

Fig. 3. Varieties and rootstocks content in chlorophyll and carotenes pigments

Chlorophyll determinations were made using leaves from varieties and rootstocks, during the period of vegetation and they showed some content differences depending on the specie and variety genetic heritage.

Chlorophyll A content in varieties leaves is as it follows: the biggest accumulation had Curé (150.90 mg/100 g) and Euras (149.60 mg/100 g) varieties while Comptesse de Paris and Williams had a lower accumulation, of 130.10 mg/100 g and 126.80 mg/100 g. Higher carotenes content had Comptesse de Paris and Williams, with 25.13 mg/100g and respective 26.65 mg/100 g while Curé had only 22.70 mg/100g accumulation and Euras 23.40 mg/100g (7).

CONCLUSIONS

1. By grafting, there was stimulated glucides accumulation above and in the joining zone and in the same time under the joining zone and rootstock the accumulation was decreased.

2. A higher glucides content in the joining zone at incompatible associations explains the existence of some deficiencies in anatomical structure that does not allow a proper assimilates circulation to the roots.

3. Proteins lower content under the joining zone at Williams variety grafted on quince highlight the localized incompatibility phenomenon that appears at grafting on quince.

4. At the associations with poor compatibility (Williams/quince) could be noticed a higher intensity of peroxidases activity and significant lower proteins content comparing with trees that had a normal development. This fact shows a higher level of stress both in joining zone and upper the joining zone caused by grafting.

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THE SUPERVISION OF THE ECO-PHYSIOLOGIC GROUPS OF MICROORGANISMS FROM THE SOIL, GIVEN THE CONDITIONS OF PRACTICING A DURABLE WIN-GROWING TECHNOLOGY

MONITORIZAREA GRUPELOR ECOFIZIOLOGICE DE MICROORGANISME DIN SOL, ÎN CONDIȚIILE PRACTICĂRII UNEI TEHNOLOGII VITICOLE DURABILE

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Abstract. *After the abundant and torrential precipitations, the acclivous terrains, planted with grape vines are supposed to certain erosion processes that determine the decrease of the production capacity of the soil. In order to prevent these phenomena and for the superior capitalization of the terrains and of the natural resources from the hilly area, we propose the use of a durable win-growing technology meant to contribute to: the maintenance of the soil micro-flora and the biodiversity of the win-growing ecosystems, the growth of the soil fertility through natural means, the pollution decrease, etc. The S.C.D.V.V. Iasi has been experiencing for 2 years the main technological links, on a demonstrative lot cultivated with the Feteasca Regala genus. In order to underline the importance to practice this type of culture there have been made several observations and determinations that allowed the evaluation of the total micro-flora and of the eco-physiologic groups of microorganisms from the soil, in relation with the vegetation phenol-phases, the evolution of the pedoclimatic factors and of the grape vine phytosanitary protection treatments.*

Rezumat. *Terenurile în pantă, plantate cu viță de vie, în urma precipitațiilor abundente şi torențiale, sunt supuse unor procese erozionale, care conduc la scăderea capacității de producție a solului. Pentru prevenirea acestor fenomene şi pentru valorificarea superioară a terenurilor şi a resurselor naturale din zona colinară, se propune utilizarea unei tehnologii viticole durabile care să contribuie la: menținerea microflorei solului şi a biodiversității ecosistemelor viticole, creşterea fertilității solului pe cale naturală, scăderea poluării, etc. In cadrul S.C.D.V.V. Iaşi, timp de 2 ani, s-au experimentat principalele verigi tehnologice, într-un lot demonstrativ cultivat cu soiul Fetească regală. Pentru evidențierea importanței practicării acestui tip de cultură, s-au efectuat o serie de observații şi determinări, care au permis evaluarea microflorei totale şi a grupelor ecofiziologice de microorganisme din sol, în corelație cu fenofazele de vegetație, evoluția factorilor pedoclimatici şi a tratamentelor de protecție fitosanitară a viței de vie.*

The prevention of the erosion phenomenon and the superior capitalization of the acclivous terrains from the grape vine plantations represented the objective of a durable win-growing technology. This technology aims to establish the role of the grape vine in the preservation of the acclivous soils, if we alternate layers

of the black field (BF) and durable grass overgrowing (DGO). In order to underline the importance of practicing this soil maintenance system [2,3,5], SCDVV Iasi has been experiencing for two years the main technological links, on a demonstrative lot with a bank side of under 10%, cultivated with the Feteasca Regala genus. Beside the observations regarding the unfurling of the vegetation phenol-phases, the fertility and the potential/real productivity, the prominence of the mechanical and technological features of the grape production, the wood maturation and the resistance of the grape vines during the winter etc., there have been also made microbiological determinations in three variations, ascent, middle and downstream in the (BF) and (DGO) soils that allowed the evaluation of the total micro-flora and of the eco-physiologic groups of microorganisms in correlation with the pedoclimatic factors and of the grape vine phytosanitary protection treatments.

MATERIAL AND METHODS

The microbiological analyses have been made on soil samples of 100 g, sampled with the help of a special sound from a 5 cm depth, after the removal of the superficial layer. The soil samples have been introduced in plastic bags and transported to the laboratory immediately. The soil samples have been sifted through metallic sifters with 2 and 5 mm meshes.

The quantitative determinations representing the total number of microorganisms [6] and the number of microorganisms from the eco-physiologic groups have been made according to the Pochon J., Barjac H. [4] quantitative method.During the working protocol, the total number of microorganisms was determined in the special artificial culture development ambient [4] and the ecophysiologic groups of microorganisms in liquid selective culture ambient, looking for the temporal reaction that characterizes the respective group, either through the substratum metabolization, or through the appearance of a catabolism in the ambient.

The quantitative determinations have been expressed through the number of total microorganisms/g of soil, according to the McCrady tables and, then, for the graphic representation, in base two logarithms (Aizaki M.) [1].

RESULTS AND DISCUSSIONS

The soil is an open, very complex and dynamic system for which the fertilization depends on its balance and on the metabolic activity of the microorganism populations. The number of microorganisms from the soil is limited and modified by the climatic factors, especially when we refer to temperature and humidity, as well as by the agro-technical works. In the present paper, the microbiological determinations have been interpreted by taking into account the evolution of the pedoclimatic factors from 2006 and 2007. The goal of this study was to obtain value data to support the durable win-growing technology.

The assembly analysis of the climatic factors in 2006 (table I) shows that the winter was very cold, with absolute minimum temperatures of -25°C in the air and of -29°C at the ground level. The spring was capricious, chilly and humid, the average temperatures from March, April and May were of 2,1°C, 11,1°C and 15,3°C. June was characterized by cold and rainy periods, the quantity of

precipitations varied between 5, 4-8, 9 mm.

According to the position on the bank side, during all the months, greater humidity values have been registered in the ascent, lower in the downstream and intermediary in the middle of the bank side both in the case of the black field (BF) and in the durable grass overgrowing area (DGO). During June and July, the absolute minimum and maximum temperatures were of 15, 8°C and 31°C, respectively of 21,0°C and 34,5°C. The average temperature values during this period of the year have been, as follows, 21,5°C, 21,0°C and 16,2°C.

Table I

Metheorologic parameters from Copou metheo station, in 2006, SCDVV Iasi

Time (month)	Temperature °C air			Temperature °C soil			Rainfalls (mm)
	Average	Maximum	Minimum	Average	Maximum	Minimum	
January	-7,0	8,6	-25,1		13,2	-29,0	0,9
February	-2,9	11,2	-17,3		13,5	-25,0	0,19
Marth	2,1	22,2	-13,2		30,5	-18,6	2,8
April	11,1	21,6	0,8		44,2	-2,5	2,0
May	15,3	32,0	5,1		54,0	0,6	1,35
June	19,3	32,2	7,7		58,2	5,8	2,48
July	21,5	31,0	10,9		32,1	28,2	65
August	21,0	33,7	10,1		30,6	27,6	69
September	16,2	25,9	7,8		22,6	21,0	67

The precipitations from July-September have been close to normal and they decreased starting from September, the water deficit (%) in the soil being higher on the durable grass overgrowing areas (DGO) – table II.

Table II

The water deficit (%) for a depth of 0 / 30 cm in the ascent, middle and downstream, for the experimental terrain in 2006

Time (month)	Black field (ON) Water deficit (%)			Durable grass overgrowing (DGO) Water deficit (%)		
	Ascent	Middle	Downstream	Ascent	Middle	Downstream
April	36	35	34	38	32	30
May	46	49	51	58	62	66
June	73	74	74	75	75	74
July	66	73	80	49	56	63
August	63	64	66	74	74	74
September	74	70	66	79	81	82

In these climatic conditions, following the microbiological determinations made on the experimental parcel, there was registered a total number of microorganisms represented through sizes of orders of $10^8 – 10^9$.

From the graphical representation of the quantitative data regarding the ecophysiologic groups of microorganisms, figure 1-a,b,c, in the soil samples (BF) and (DGO) from the ascent middle and downstream areas, it was determined that the number of ammonification microorganisms is equal for both the (BF) and (DGO), both in ascent and downstream, registering values that are 4,6 % higher for the soil samples from the middle of the bank side.

The number of nitric microorganisms was the same for the (BF) and (DGO) soil samples at the middle of the bank side and downstream, but smaller in the ascent. The number of nitric microorganisms in the ascent, middle and downstream was identical no matter what maintenance mode of the intervals between the grape vine rows. Also, the number of denitrifying microorganisms in the three places was the same valoric view point.

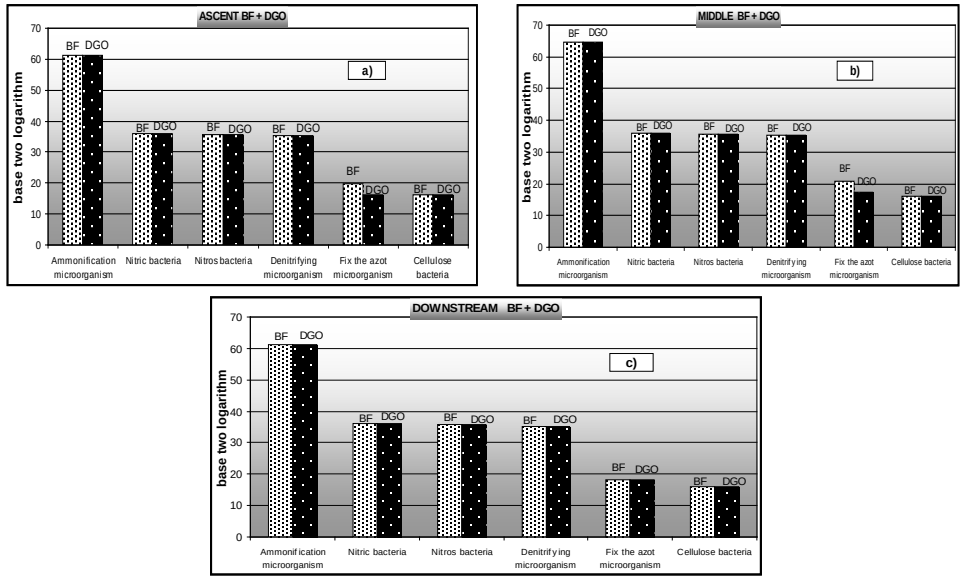

Fig. 1 a,b,c. Base two logarithms from the number of microorganisms in the soil samples from 2006, sampled from the worked field (BF) and of the durable grass overgrowing (DGO).

The dates represented in figure 1a and 1b point out a difference by number of aerobe microorganisms that fix the azote, that is higher on the durable grass overgrowing areas (DGO) than in black field (BF). The number of cellulose bacteria is the same indifferent by the place of soil test (ascent, middle, downstream) and by mentenance style of vine rows.

A general view over the obtained microbiological data shows the existence of a well-defined balance between the ecophysiologic groups of microorganisms from the soil of the parcel expressed in the 2006 temperature and humidity conditions.

In 2007, the climatic conditions presented in table III show a warmer winter that in 2006, the maximum air temperatures oscillating between 0^oC and $16,6^oC$. At the end of February, there were registered very low temperatures of $-19,6^oC$ in the air and -25^oC at the ground level. The spring was also warmer than usual, with monthly average temperatures of $7,3^oC$ in March, $10,2^oC$ in April and $34,5^oC$ in May. The excessive heat continued during July, with values of more than 40o C for some days, with daily averages between 16^oC and 31^oC. These values attenuated during August and September. The year of 2007 was also characterized

by very high values (%) of the water deficit from the soil, because of the lack of precipitations (table IV) that also maintained during July.

Table III

Metheorologic parameters from Copou metheo station, in 2007, SCDVV Iasi

Time (month)	Temperature ^{o}C air			Temperature ^{o}C soil			Rainfalls (mm)
	Average	Maximum	Minimum	Average	Maximum	Minimum	
January	4,1	16,9	-10,5	2,3	18,0	-9,0	0,69
February	0,8	16,6	-19,6	0,3	22,4	-25	1,08
Marth	7,3	20,2	-1,0	7,7	32,0	-4,2	0,80
April	10,2	22,6	1,6	12,7	46,8	-1,8	0,83
May	18,9	34,5	0,5	25,3	61,0	-1,8	0,90
June	22,8	37,0	11,6	30,0	61,6	10,9	0,51
July	25,0	42,3	11,0	32,3	66,0	8,8	1,30
August	22,0	38,8	11,6	26,3	58,9	8,4	2,94
September	15,3	26,7	4,8	16,6	39,0	2,8	2,78

Table IV

The water deficit (%) for a depth of 0 / 30 cm in the ascent, middle and downstream, for the experimental terrain in 2007

Time (month)	Black field (ON) Water deficit (%)			Durable grass overgrowing (DGO) Water deficit (%)		
	Ascent	Middle	Downstream	Ascent	Middle	Downstream
April	72	78	84	74	76	78
May	78	80	83	95	97	100
June	101	100	100	101	100	100
July	76	83	90	99	106	113
August	44	41	37	31	32	34
September	77	77	78	81	78	74

In these climatic conditions, the microbiological analyses were different from 2006. The obtained results show a decrease of the total number of microorganisms from the soil, with a size of 10^6 for this year, for all the sampling areas both for the (BF) and for the (DGO).

From the graphic presentation of the data regarding the degree of representation of the ecophysiologic groups, figure 2-a,b,c, we find that the number of microorganisms of ammonification is 5,7% higher in the ascent and 4,7% downstream in the case of the black field. The number of nitric microorganisms was variable in the (DGO) soil samples, equal in the ascent and downstream areas and 10% lower in the middle of the bank side. Regarding the presence of the nitric bacteria in the (BF), the registered values were equal for the middle and downstream areas and 4% lower in the ascent. For the grass overgrowing areas, this group of organisms is less represented, in comparison with the black field, with values of 16% in the ascent, 21% in the middle and 14% downstream.

The total number of denitrifying microorganisms both for (BF) and (DGO) was the same for the middle and downstream areas, with values that were 13% lower in the ascent. The total number of aerobe and anaerobe microorganisms that fix the azote, for 2007, was very low both for the (BF) and (DGO), because of the high temperatures at the ground level and the severe water deficit.

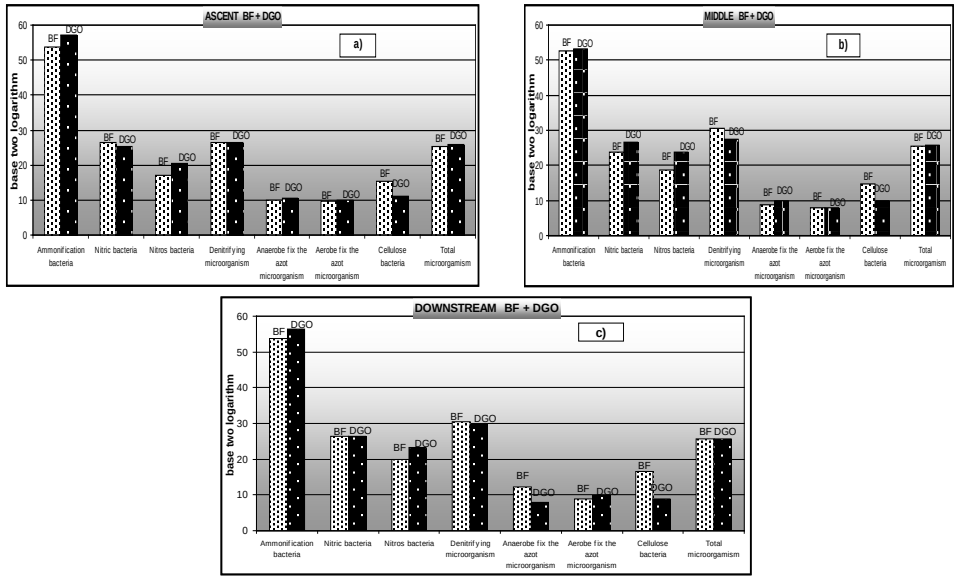

Fig. 2 a,b,c. Base two logarithms from the number of microorganisms in the soil samples, in 2007, from the worked field (BF) and of the durable grass overgrowing (DGO).

The total determined number of cellulose bacteria was 29 – 46% higher for the sampled areas (ascent, middle, downstream) of the black field, in comparison with the total number of cellulose bacteria determined on the durable grass overgrowing areas.

CONCLUSIONS

1. The results of the microbiological analyses, given the climatic conditions from 2006, show a well-defined balance between the ecophysiologic groups of microorganisms from the experimental parcel.

2. Given the difficult climatic conditions from 2007, the ecophysiologic groups involved in the azote circuit proved to be the most resistant, while those belonging to the group of azote fixative aerobe and anaerobe bacteria proved to be the most affected ones.

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ASPECTS REGARDING THE DAILY AVERAGE CONSUMPTION IN THE HILLY AREA VINEYARDS, IN HIDRIC STRESS CONDITION, IN THE CONTEXT OF A SUSTAINED AGRICULTURE

ASPECTE PRIVIND CONSUMUL MEDIU DIURN ÎN PLANTAȚIILE VITICOLE DIN ZONA COLINARĂ ÎN CONDIȚIILE DE STRESS HIDRIC, ÎN CONTEXTUL UNEI AGRICULTURI DURABILE

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Abstract. *The researches concerning the daily average consumption for grape in hidric stress conditions had been effectuated in a RDVV Bujoru wine growing plantation, established in 1980 year, the kinds of the grape taken in observation were Merlot and Aligote. Previous researches revealed water's importance in the growth and fructification of the grape, since water is one of the production limitative elements. Allowing for the evolution of the climatic factors in the last years and especially of the air temperature and precipitation, work theme brings new elements regarding the daily average consumption for grape in extreme climatic conditions. The problem put is the modernization of the grape culture technology so that precipitations to be maximum improved and soil water deficiency to be minimum.*

Rezumat. *Cercetările privind consumul mediu diurn la vița de vie în condiții de stress hidric s-au efectuat la SCDVV Bujoru, într-o plantație viticolă înființată în anul 1980, soiurile de viță de vie luate în observație au fost Merlot şi Aligote. Cercetările realizate anterior au evidențiat importanța apei în creşterea, dezvoltarea şi fructificarea viței de vie, apa fiind unul din elementele limitative ale producției. Având în vedere evoluția factorilor climatici în ultimii ani şi în special a temperaturii aerului şi precipitațiilor, tematica lucrării aduce elemente noi în ceea ce priveşte consumul mediu diurn la vița de vie în condiții climatice extreme. Se pune problema modernizării tehnologiilor de cultură a viței de vie astfel încât precipitațiile să fie valorificate la maxim iar pierderile de apă din sol să fi minim.*

MATERIAL AND METHOD

Researches concerning the daily average consumption for the hilly area vineyards in hidric stress conditions had been effectuated at RDVV Bujoru, between 2006-2007, in a wine growing plantation established in 1980. Soil slope is 10%, eastern, and the kinds of grape taken in observation were Merlot and Aligote. In the experimental house lot a sustained culture of grape technology was applied (green fertilizer, foilar fertilizer, feromons traps).The air temperature evolution and daily average precipitation. In order to obtain the necessary dates for establishing the daily average consumption, by water in soil bilance method, the soil water spare from the vegetation period start and end has been determined, and also monthly and ten days.

Soil assay were sampled on a 0-100cm profile, from 20 to 20 cm. The soil damp has been determined by 105˚C kiln method for 8 hours. For the soil water store

calculation was used the soil damp average value on the 0-100cm profile and the aparent density accrued from the pedologic study.

Soil water balance sheet ecuation: Ri+P=E.T.R. + Rf.

From this ecuation results: E.T.R.= Ri+P-Rf.

E.T.R. – actual evapo-transpiration or total water consumption realized through grape perspiration and from soil surface vaporization (m^3/ha).

Ri – represents initial soil water store at the vegetation period beginning or at the studied period starting point (m^3/ha).

P – Precipitation in the vegetation period (mm or m^3/ha).

Rf – Soil water final store at the vegetation period or studied period end.

Considering that we are situated in a wine-growing field, with hydric deficit in the vegetation period, and irrigation possibility is limitated, knowing the daily and monthly consumption matters for correct and in optimum time grape crop technology application, but also for including and maintaining in the area the grape type that proved, through experimentation, to behave best in adverse conditions, considering the hydric point.

RESULTS AND DISCUSSIONS

The Dealu Bujorului vineyard is situated in a droughty area, with a 451mm multiannual average. The considered period is characterized by a heterogen precipitation distribution, with droughty times framed by short downpour ones (table 1).

Table 1

Monthly precipitation between 2006-2007, comparatively with multiannual average, RDVV Bujoru weather station

Month	2006*	2007*	Multiannual average	Difference	
				2006	2007
I	27.1/26.1	51.5/49.8	19.6	7.5	31.9
II	10.8/0.0	23.1/19.0	20.2	-9.4	2.9
III	40.6/30.5	43.1/32.5	25.5	15.1	17.6
IV	54.2/38.2	16.6/5.2	37.5	16.7	-20.9
V	40.0/29.1	31.3/28.9	44.8	-4.8	-13.5
VI	77.7/59.5	96.4/80.8	71.0	6.7	25.4
VII	31.8/22.3	1.0/0.0	56.9	-25.1	-55.9
VIII	92.1/8/85.8	72.7/67.9	51.4	40.7	21.3
IX	34.4/31.8	36.5/32.5	37.7	-3.3	-1.2
X	7.7/0.0	54.8/50.8	30.1	-22.4	24.7
XI	4.7/00	60.1/49.4	32.2	-27.5	27.9
XII	9.4/8.2	67.3/59.3	27.3	-17.9	40.0
Total	430.5/331.5**	554.7/476,1**	451.0/299.3**	-20.5	103.4

* monthly precipitation/precipitation >5mm

**annual precipitation/precipitation in the vegetation period

In the 2006-2007 testing period, the precipitation multiannual average was 430mm/2006 and 554.7mm/2007. It's excelled the pouring precipitation frequency that are capitalized only in a 50% proportion and by those considerents, in 2007, even thought the annual precipitation amount surpass the multiannual average, we confront with crop periods, considering the hydric point, in this sens to be noticed july/2007. The vegetation period remarks through a pronounced

drought character, on a background of a crop precipitation and raised monthly average temperatures (table 2).

Table 2

The average monthly temperature in 2006-2007, comparatively with multiannual average, RDVV Bujoru weather station

Month	2006	2007	Multiannual average	Difference	
				2006	2007
I	-4.3	4.3	-1.0	3.3	5.3
II	-0.5	3.1	0.4	-0.9	2.7
III	4.6	8.3	5.1	-0.5	3.2
IV	12.3	12.1	11.4	0.7	0.7
V	17.5	21.2	18.3	-3.7	2.9
VI	22.3	25.5	22.0	-3.2	3.5
VII	24.2	28.1	23.9	0.3	4.2
VIII	23.5	25.5	23.0	0.5	2.5
IX	18.1	17.4	17.6	0.5	-0.2
X	12.5	12.1	11.6	0.9	0.5
XI	7.6	4.1	5.0	3.5	-0.9
XII	2.9	0.4	1.1	1.8	-0.7
Total	11.7	13.5	11.5	0.2	2.0

Have been recorded consecutive periods devoid of precipitation, framed by short downpour period. For example, in july 2007 have not been recorded useful precipitation, which leaded to the marked drought phenomenon unleash. On the background of some climatical accidents (hail), that phenomenon conducted to getting vine grapes productions unspecific for kinds. Reduced precipitation and raised temperatures in 2007 vegetation period, cumulated with a raised evapo-transpiration, leaded to low soil humidity (fig. 1). To be remarked that the precipitation insufficiency in winter conducts to soil humidity, at the vegetation period start, most of the times at a 50-60% from active humidity interval.

The monthly average consumption, calculated by considering water soil total, it is different from a month to another, depending on meteorology factors and plants perspiration and presents smaller values than the required vine growth and development in most favorable conditions. In hydric and atmospheric stress conditions, the calculated water consumption is low, but as a result of its availability to explore soil horizont in order to search nourishment and water, the vine recovers the minimum necessary from deep horizont. So can be explained the fact that even sometimes the soil humidity reaches the level of blight coefficient, the plant suffers but the blight and irreversible dry doesn't take place.

The monthly average consumption does not presents big differences on kinds, but significant differences between years. The annual consumption in most favorable humidity conditions is 3500-3800 m^3/ha, and in the analyzed period alters from 2860 m^3/ha to 2860 m^3/ha (table 3).

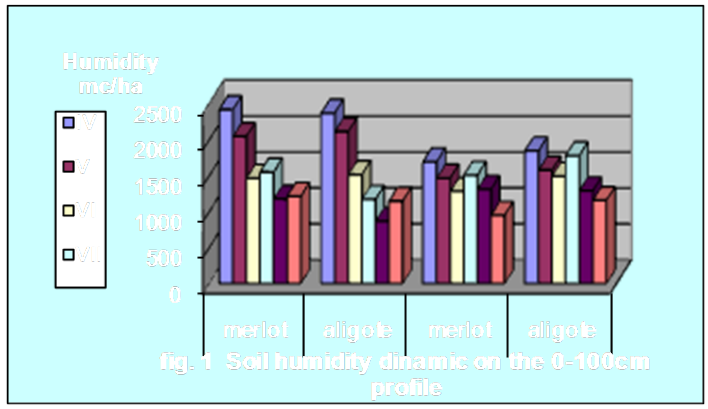

fig. 1 Soil humidity dinamic on the 0-100cm profile

Table 3

Monthly average consumption on the 0-100cm(m^3/ha) profile

Consumption	IV		V		VI		VII		VIII		Total	
Stationar*	I	II	I	II	I	II	I	II	I	II	I	II
2006/lunar	756	637	873	891	509	939	597	528	822	577	3557	3572
2006/diurn	25.2	21.2	28.1	28.7	16.9	31.3	19.2	17.0	26.5	18.6	23.3	23.4
2007/lunar	394	434	498	399	740	677	742	490	542	860	2916	2860
2007/diurn	13.1	14.4	16.1	12.9	24.6	22.5	23.9	15.8	17.5	27.7	19.1	18.7

*Stationar I – Merlot, Stationar II - Aligote

CONCLUSIONS

– 2006 and 2007 present hydric deficit because of the high temperatures in the vegetation period, but also as a result of the precipitation and downpours ununiform distribution, not rendered most favorable on plots of lands in the hillock area.

– The real monthly average consumption, calculated based on soil water, it's lower than grape consumption in most favorable humidity conditions, with no meaningfully differences between the Merlot and Aligote type.

– On short periods of time has been recorded a soil humidity at the blight rate level, but doesn't take place a grape irreversible blight as a result of its disponibility to explore soil horizont in order to search nourishment and water.

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IN VITRO INVESTIGATION OF GRAPEVINE IN THE PRESENCE OF VIRUS INFECTION (*V. VINIFERA* L., FETEASCA NEAGRA CV.)

INVESTIGAREA *IN VITRO* A VIȚEI DE VIE ÎN PREZENȚA INFECȚIEI VIRALE (*V. VINIFERA* L., SOIUL FETEASCĂ NEAGRĂ)

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Abstract. *The paper deals with the in vitro study of V. vinifera L., Feteasca neagra cv. regarding to regenerative capabilities from shoot apices in the presence of GLRaV 1+3 or GFLV infection, virus elimination by meristem culture and leafroll disease diagnosis by micrografting. During 5 sub-cultures at intervals of 25-30 days, the non-uniformity of regenerative potential in the presence of virus infections and also a significant diminish of regenerative capabilities especially due the GLRaV 1+3 infection were registered. The quantity of GFLV infected material obtained by multiplication was apparently superior to the healthy one due the adventive buds and primordia to shoots elongation detriment. The quality of GFLV infected material was lower due the vitrification processes, abnormal cuttings and necrosis observed in the end of the culture. GLRaV-3 was eliminated but GFLV-free plants were not obtained by meristem culture. In vitro micrografting registered good results for leafroll disease diagnosis using both Pinot noir and Mission cvs. as indicators.*

Rezumat. *Scopul lucrării este studierea comportamentului in vitro al viței de vie, V. vinifera L., soiul Fetească neagră, in prezența infecției cu virusul răsucirii frunzei serotip 1+3 (GLRaV1+3) sau virusul scurtnodării (GFLV). Au fost urmărite capacitatea de regenerare prin cultură de apex, posibilitatea eliminării virusurilor prin cultură de meristem şi diagnosticul răsucirii frunzei prin microaltoire in vitro. Pe o perioadă de 5 subculturi la intervale de 25-30 zile s-a înregistrat neuniformitatea potențialului regenerativ sub influența infecției virale şi în special diminuarea capacității regenerative în prezența GLRAV 1+3. Cantitatea de material infectat obținuta prin multiplicare in vitro a fost aparent superioară materialului sănătos din cauza formării unui număr mare de muguri adventivi şi primordii, în detrimentul elongării lăstarilor. Calitatea scăzută a materialului infectat cu GFLV a fost o consecință a proceselor de vitrificare, a lăstarilor anormali şi necrozărilor observate la sfârşitul perioadei de cultură. Prin cultura de meristem s-a reuşit eliminarea GLRaV1+3 dar nu şi a GFLV. Utilizarea microaltoirii in vitro a înregistrat rezultate bune în diagnosticarea maladiei răsucirii frunzei utilizând indicatorii Pinot noir şi Mission.*

The presence of virus infection in grapevine produces negative effects on micropropagation, plant growth and metabolism (Walter, 1989). The *in vitro* culture

represents an easy tool for investigation the behaviour of the plants under the influence of the virus in uniform conditions (Barba et al., 1993; Abracheva et al., 1994).

Taking into consideration the place of Feteasca neagra in the Romanian viticulture patrimony, the paper deals with the *in vitro* investigation of this variety under the influence of fanleaf virus (GFLV) or leafroll associated virus serotip 1+3 (GLRaV1+3), some of the most dangerous viruses of grapevine. In order to achieving the objective of the work, different studies have been done, concerning: comparative behaviour of infected and healthy biological material, the possibility of virus free plants regeneration by meristem culture and the biological indexing by *in vitro* micrografting.

MATERIAL AND METHODS

V. vinifera L. plants in the field, belonging to Feteasca neagra variety showing virus diseases symptoms were identified by ELISA tests to be GFLV or GLRaV 1+3 infected. The plants represented the source of inocula (apex, meristem) for *in vitro* investigation.

The behavior of grapevine virus infected biological material was studied comparatively to the healthy from the point of view of regenerative capabilities and growth particularities in apices culture, during 120-150 days (5 sub-cultures) **(**Vişoiu and Teodorescu, 2001). In the same time, the possibilities of virus sanitation by meristem culture and also the biological indexing by *in vitro* micrografting using Pinot noir and Mission varieties as indicators for leafroll disease were verified **(**Buciumeanu et al., 2001; Vişoiu et al., 2001**)**.

RESULTS AND DISCUSSIONS

In vitro comparative culture

During the period of the culture, the healthy biological material registered a significantly increasing of the multiplication rate, especially after the first and the third sub-cultures. Comparatively observations considering the evolution in the culture conditions of the GFLV infected material, emphasized the lack of the uniformity in the multiplication processes.

In the end of the forth sub-culture, the infected material registered apparently superior multiplication rates comparatively with the healthy one, due the abundant multiplication of adventive buds and primordia , specific to the viral infection which inhibits the elongation of the cuttings and prolongs the period of the multiplication.

In the case of leafroll affected material the analysis of regenerative potential showed a constant multiplication rate, without significantly modifications during the culture. However, comparatively to the non-infected and also to the GFLV infected material, a significantly diminish of the regenerative capacity was observed (Table 1).

The qualitative analysis of the *in vitro* multiplied material emphasized in the end of the culture, especially in the case of GFLV infection, the developing of compact groups of adventive buds, without multiplication, with abnormal leaves, necroses and marked vitrification fenomena. The healthy material did not show

vitrification and normal microshoots were developed during the multiplication period.

Table 1

In vitro multiplication rate of apices excised from virus infected Feteasca neagra cv. comparatively to the control (healthy) during 5 sub-cultures (I-V)

Phytosanitary status	Multiplication rate (X)				
	I	II	III	IV	V
Control (healthy)	3,5	2,2	7,9	3,6	8,8
GFLV infected	5,0	3,7	6,9	7,6	4,0
GLRaV 1+3 infected	2,8	3,3	3,3	4,2	4,2

The meristem culture

ELISA analyses for GFLV presence in the material regenerated started from meristems and apices emphasised fluctuant but decreased concentration of the virus until the end of the cultures. The results confirm the GFLV elimination difficulty by *in vitro* culture only, also known in the case of other grapevine genotypes (Buciumeanu et al., 2001). So, in order to obtain GFLV free plants, a complex method for virus elimination (thermotherapy and *in vitro* culture) is recommended.

In the case of leafroll affected material, the GLRAV 1+3 concentration was diminished until the ELISA values of negative control, both in the apex and meristem cultures (Table 2). The results showed the possibility of GLRaV 1+3 free regeneration plants by *in vitro* culture (Buciumeanu and Vişoiu, 1996).

Table 2

The average of ELISA values (A_{420nm}) in the end of meristem and apex sub-cultures (I-V) of virus infected Feteasca neagra cv. (The sample contains virus if the ELISA reading is higher than the double of virus free control value)

Phytosanitary status	Explant	ELISA values			
		I	II	III	IV
GFLV	apex	3,532	2,014	1,760	1,884
infected	meristem	2,444	3,485	2,059	1,832
Control (GFLV free)	-	0,111	0,106	0,100	0,100
GLRaV1+3	apex	0,127	0,116	0,120	0,114
infected	meristem	0,170	0,116	0,144	0,110
Control (GLRaV1+3 free)	-	0,103	0,087	0,112	0,111

Biological indexing by *in vitro* micrografting

The *in vitro* micrografting have been done in cleft cut, using Mission and Pinot noir as indicators (scion) for leafroll disease diagnostic and GLRaV1+3 infected Feteasca neagra (rootstock).

The grafted plantlets emphasized the specific symptoms of leafroll disease 1,5-2 months after inoculation. Mission indicator showed root primordia at the grafting point and red spots on leaves at the base of the microshoot. Pinot noir

indicator showed stunting and necrosis spots on the leaves. The sensitivity of the testing method was confirmed after three months of *in vitro* culture, when the symptoms increased by rolling of the leaves to the inferior surface and the absence of the roots in the case of Mission indicator, and extension of the necrosis on the leaves in the case of Pinot noir indicator (Vişoiu and Buciumeanu, 2002).

The results obtained by *in vitro* culture concerning to the diagnostic of viruses presence in Feteasaca neagra material confirm the exactness and the rapidity of the micrografting, comparatively to the classical method of woody indexing, which results can be evaluated 2-3 years after grafting (Vişoiu et al., 2001).

CONCLUSIONS

1. *In vitro* studies accomplished with apex explants collected from healthy and GFLV or GLRaV1+3 infected Feteasca neagra plants emphasized the influence of virus infection on the qualitative and quantitative characteristics of the culture.

2. ELISA analyses of regenerated material started from meristems and apices emphasised decreasing concentration of GFLV from one sub-culture to another and the possibility of GLRaV 1+3 elimination by *in vitro* culture.

3. The results obtained by *in vitro* culture concerning to the leafroll diagnostic disease confirm the exactness and the rapidity of the micrografting method, comparatively to the classical method of woody indexing.

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THE EXPOSED LEAF AREA/YIELD RATIO, A NEW CRITERION OF EVALUATION FOR THE QUALITATIVE POTENTIAL OF THE TRAINING SYSTEMS USED IN VITICULTURE

RAPORTUL SUFRAFAȚĂ FOLIARĂ EXPUSĂ/MĂRIMEA PRODUCȚIEI, UN NOU CRITERIU DE EVALUARE A POTENȚIALULUI CALITATIV AL SISTEMELOR DE CONDUCERE ÎN VITICULTURĂ

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Abstract. *The determinations carried out in 2007 in Husi, Iasi and Cotnari vineyards, point out the possibility to use the ratio between the exposed leaf area (SFE) and the level of the yield (Yield) as an indicator of the qualitative potential of the training systems used in viticulture. In the case of Feteasca alba variety, the accumulation of 180 g/l sugar in must, is correlated with a SFE/Yield ratio of 1.60 in Husi vineyard, 1.76 in Iasi vineyard and 1. 86 in Cotnari vineyard. These values show the necessity to assure a bigger exposed leaf area for the vines grown in the vineyards with a reduced amount of heliotermic resources. For the red wines varieties, a positive correlation was highlighted between the SFE/Yield ratio and the must content in anthocyans, as well as a negative one between SFE/Yield and the total acidity of the must.*

Rezumat. *Determinările efectuate în anul 2007 în podgoriile Huşi, Iaşi şi Cotnari, relevă posibilitatea utilizării raportului dintre suprafața foliară expusă (SFE) şi mărimea producției (Prod.) ca indicator al potențialului calitativ al sistemelor de conducere folosite în cultura viței de vie. La soiul Fetească albă, conținutul de 180 g zaharuri/l must corespunde unei valori a raportului SFE/Prod. de 1.60 în podgoria Huşi, 1.76 în podgoria Iaşi şi 1.86 în podgoria Cotnari. Aceste valori indică necesitatea asigurării unei suprafețe foliare expuse mai mari la vița de vie în podgoriile cu resurse heliotermice reduse. La soiurile pentru vinuri roşii a fost pusă în evidență o corelație pozitivă între valoarea raportului SFE/Prod. şi conținutul mustului în antociani, precum şi o corelație negativă între SFE/Prod. şi aciditatea totală a mustului.*

The consumers exigencies concerning the quality of wines as well as the intention to increase the economical efficiency in vine exploitations, determine the viticulture research to focus its attention on the improvement of the vine training systems, the main factor that determine the grapes quality. The vine plantation is studied as a whole, outranking the level of the technological measures improvement. Thus, it is possible to reveal some relations between the grapes quality and the training system parametres. One of these is the ratio between the exposed leaf area and the yield quantity (*SFE/Yield*). The recent research made in the French vineyards has shown that for the Grolleau variety, a 0.5 *SFE/Yield* ratio assures a sugar accumulation of 170 g/l must, while a 1.4 –

1.5 *SFE/Yield* ratio assures 204 g sugar/l must. For the Merlot variety, a 1.0 *SFE/Yield* ratio determines 204 g/l sugar accumulation, while for a 2.0 *SFE/Yield* ratio, the sugar content is 221.0 g/l (*Dufourcq T., Bonnisseau M., 2005).*

The study of the vines canopy and its correlation with the quality and quantity of the grapes, shows that *SFE/Yield* ratio can be used as an indicator for the qualitative potential of the vine training systems.

MATERIAL AND METHOD

The varieties experimented were ***Feteasca albă*** in Huşi, Iaşi and Cotnari wine-growing centres and ***Fetească neagră*** in Huşi and Iaşi wine-growing centres. Two different training systems were studied in each wine-growing centre.

For ***Fetească albă*** variety:

Huşi wine-growing centre:

- plantation with 2.0 m distance between the rows and 1.2 m between the vines on the row, bilateral cordon trellising form and the height of the trunks of 0.75 m;
- plantation with 2.2 x 1.2 m distances, bilateral cordon trellising form and the height of the trunks of 1.0 m high.

Iaşi wine-growing centre:

- plantation with 2.2 m between the rows and 1.2 m between the vines on the row, bilateral cordon trellising form and the height of the trunk of 0.75 m;
- plantation with 3.0 x 1.0 m distances, bilateral cordon as trellising form and the height of the trunks of 1.0 m.

Cotnari wine-growing centre:

- plantation with 2.0 x 1.0 m distances and low trellising form;
- plantation with 3.0 x 1.2 m distances, double cordons trellising and the height of the trunk of 1.0 m.

For ***Feteasca neagră*** variety:

- in Huşi, a plantation of 2.2 x 1.2 m distances, bilateral cordon trellising form and the height of the trunk of 1.0 m;
- in Iaşi a plantation of 2.2 x 1.2 m and 0.75 m height of the trunk.

The determinations: *exposed leaf area (m^2/ha), total leaf area (m^2/ha), foliar index (IF), yield (kg/ha), sugars (g/l), total acidity (g/l H_2SO_4), anthocyans (mg/kg grapes) for the Fetească neagră variety*.

RESULTS AND DISCUSSIONS

Exposed leaf area (SFE, m^2/ha). This factor quantifies the external area of the foliar apparatus, that is 100% photosynthetic active. Its value is stable for each training system used in vine plantations. The calculation manner is based on the canopy parametres, presented in the **fig. 1** (Murisier F., 1996)**:**

$$\textbf{SFE, m}^2\textbf{/ha} = (2 \times H + L / E) \times 10000$$

Where:

H = height of the canopy (m)
L = thickness of the canopy (m)
E = distance between the rows (m)

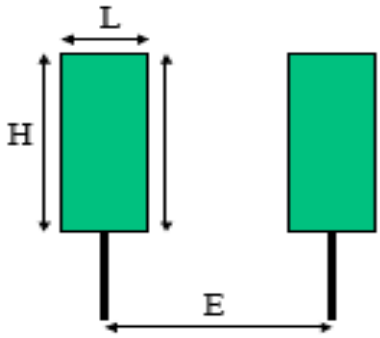

Fig. no. 1 The parametres for SFE measurement

The data show that the exposed leaf area increases at the same time with the height of the canopy and with the plantation thickness ***(tab. 1)***. The maximum value of SFE (14500 m^2/ha) is registered in plantations with 2.0 m distance between the rows and low trellising form, while the lowest is met in plantations with 3.0 m distance between the rows and vines trellised on high trunk, where the exposed leaf area is 7666 - 10000 m^2/ha.

Table 1

The canopy parametres in Huşi, Iaşi and Cotnari wine-growing centres

Wine-growing centre	Variety	Trellising form	H (m)	L (m)	E (m)	SFE (m^2/ha)
Huşi	Fetească albă	semi-high	1.10	0.50	2.0	13500
		high	0.90	0.50	2.2	10454
	Fetească neagră	high	0.90	0.50	2.2	10454
Iaşi	Fetească albă	semi-high	0.90	0.50	2.2	10454
		high	0.90	0.50	3.0	7666
	Fetească neagră	semi-high	1.10	0.50	2.2	12272
Cotnari	Fetească albă	low	1.20	0.50	2.0	14500
		low	1.20	0.60	3.0	10000

Total leaf area and the compactness of the canopy. The intense vegetative growth, typical for Fetească albă and Fetească neagră varieties, determines the development of a large total foliage, of a compact canopy, excessive shaded, with a reduced photosynthetic productivity.

Table 2

The exposure of the foliage to direct solar radiation depending on the training system, in Huşi, Iaşi and Cotnari wine-growing centres

Wine-growing centre	Variety	Trellising form	SFT (m^2/ha)	SFE (m^2/ha)	GECV (%)	IF
Huşi	Fetească albă	semi-high	26420	13500	47.5	0.47
		high	27600	10454	37.8	0.37
	Fetească neagră	high	28800	10454	36.2	0.36
Iaşi	Fetească albă	semi-high	24200	10454	43.1	0.43
		high	28900	7666	26.5	0.26
	Fetească neagră	semi-high	29300	12272	41.8	0.41
Cotnari	Fetească albă	low	25250	14500	57.4	0.57
		high	27200	10000	36.7	0.36

In 2007, a droughty year, the total foliage surface of the vines was 24 -32 % smaller than the one in the preceding years, varying between 24200 - 28900 m^2/ha for Feteasca albă variety and 28800 – 29300 m^2/ha for Feteasca neagră variety (***tab. 2***). Even in these conditions, the canopy of the vines presented a pronounced compactness, the values of the foliar index being of 0.26 – 0.37 for the high trellising form and of 0.43 - 0.57 for the semi-high and low forms. The exposure of the foliage to the sun radiation was of 57.4 % for low trellising form, of 41.8 – 43.1 for semi-high trellising form and of 26.5 - 36.7 % for high trellising form.

The quality and the size of the yield. For the Feteasca albă variety, the yield was under the biologic potential of the variety, because of the drought in the vegetative season. But, there were some differences between the trellising forms that is, for the low and semi-high forms the yield was 9.75 - 16.6 % superior to the high one (***tab. 3***). The sugar content in the must was 158.8 - 208.0 g/l, bigger in the case of the low and semi-high trellising forms compared to the high trellising form. The biggest sugar content was registered for the low trellising form and was of 208 g/l, while the lowest content for the high trellising form was of 158.8 g/l.

Table 3

Quantity and quality of the yield for Feteasca albă and Feteasca neagră varieties, in Huşi, Iaşi and Cotnari wine-growing centres

Wine growing centre	Variety	Trellising form	Yield (kg/ha)	Sugar (g/l)	Acidity (g/l ac. tartric)
Huşi	Fetească albă	semi-high	7850	191.20	3.76
		high	6970	168.6	3.84
	Fetească neagră	high	5820	178.0	4.80
Iaşi	Fetească albă	semi-high	5680	189.18	3.58
		high	4732	167.68	4.20
	Fetească neagră	semi-high	6640	190.2	4.54
Cotnari	Fetească albă	low	6839	208.0	3.45
		high	6172	158.6	4.2

The total acidity of the must was generally reduced, with values between 3.45 and 4.20 g/l tartric acid. This parametre of the quality presents different values for the trellising forms, the lowest values being registered for the low and semi-high trellising forms (3.45 – 3.76 g/l tartric acid) and the highest for the high trellising form (3.84 – 4.2 g/l tartric acid).

The exposed leaf area/yield ratio (SFE/Yield). The data presented in ***table 4*** show that the SFE/Yield ratio presents bigger values for low and semi-high trellising forms (1.71 - 2.12), compared to the high trellising form (1.42 - 1.62). These differences appear because of the large exposed leaf area of the low and semi-high trellising forms.

Table 4

The exposed leaf area/yield ratio values for Feteasca albă and Feteasca neagră varieties, in Huşi, Iaşi and Cotnari wine-growing centres

Wine-growing centre	Variety	SFE (m^2/ha)	Yield (kg/ha)	SFE/Yield	
Huşi	Fetească albă	13500	7850	1.71	1.61
		10454	6970	1.49	
	Fetească neagră	10454	5820	1.79	-
Iaşi	Fetească albă	10454	5680	1.84	1.76
		7666	4732	1.62	
	Fetească neagră	10454	6640	1.84	-
Cotnari	Fetească albă	14500	6839	2.12	1.86
		10000	6172	1.62	

The *SFE/Yield* ratio values are positively correlated with the sugar content values (r = 0.8964). The minimum value of the *SFE/Yield* ratio (1.49) corresponds to a sugar content of 166.6 g/l, and the maximum value of the ratio (2.12) to the maximum sugar content (208.0 g/l) (***fig. 2***). This positive correlation, evidenced by the experimental data, attests the possibility to use the *SFE/Yield* ratio as an indicator for the qualitative potential of the vine training systems.

The data analysis shows that the value of 1.0 of the *SFE/Yield* ratio corresponds to a sugar content of 117.7 g/l in Huşi wine-growing centre, 101.36 g/l in Iaşi wine-growing centre and 98.5 g/l in Cotnari wine-growing centre. In Iaşi wine-growing centre, a 167.8 g/l sugar content needs a *SFE/Yield* ratio of 1.62 while in Husi wine-growing centre a similar sugar accumulation of 168.6 g/l needs a *SFE/Yield ratio* of 1.49. These data reflect the necessity to adapt the *SFE/Yield* ratio values to the thermic and solar resources that characterize the vine-growing area.

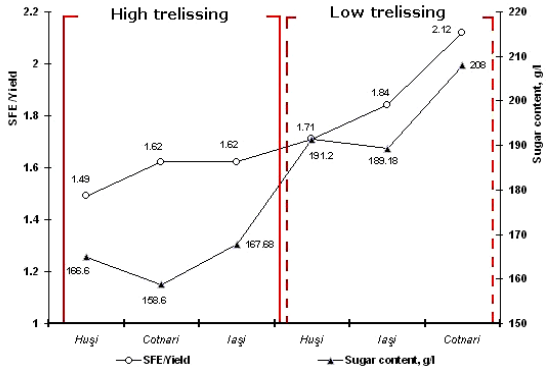

Fig. no. 2 The sugar content in the must according to the *SFE/Yield* ratio and to the trellising form of the vines, for Feteasca albă variety

As far as the total acidity of the must is concerned, the biggest values (3.84 – 4.2 g/l tartric acid) are registered for high trellising form, while the smallest (3.76 – 3.45 g/l tartric acid) for low and semi-high trellising forms. The data analysis showed the negative correlations between *SFE/Yield.* ratio and must acidity (r = 0.7469).

For the Fetească neagră, the highest sugar content (190.2 g/) and anthocyans content (724.8 mg/kg grapes) are registered at the semi-high trellising form (*SFE/Yield*. = 1.84), **(tab. 5)**. At the high trellising form (*SFE/Yield*. = 1.79) the must acidity is higher (4.8 g/l ac. tartric), and the sugar and anthocyans content smaller (178 sugar/l; 642.0 mg anthocyans/kg grapes).

Table 5

The quality characteristics of the must, depending on *SFE/Yield* ratio and the trellising forms, for Feteasca neagră variety

Wine-growing centre	Variety	Trellising form	SFE/Yiel.	Sugar (g/l)	Acidity (g/l ac. tartric)	Anthocyans (mg/kg)
Huşi	Fetească neagră	high	1.79	178.0	4.80	642.0
Iaşi		semi-high	1.84	190.2	4.54	724.8

CONCLUSIONS

1. The exposed leaf area of the canopy is of *14000 m^2/ha for low trellising form*, of *10454 – 13500 m^2/ha for semi-high trellising form* and of *7666 – 10454 m^2/ha for high trellising form.*

2. The average value of the *SFE/Yield ratio is* of 1.61 in Huşi wine/growing centre, of 1.76 in Iaşi wine-growing centre and of 1.86 in Cotnari wine-growing centre.

3. The *SFE/Yield* ratio values are positively correlated with sugar content (r = 0.8964) and negatively with the acidity (r = 0.7469).

4. The value of 1.0 of the *SFE/Yield* ratio assures a *117.7 g sugar/l must* accumulation in Huşi wine-growing centre, *101.36 g sugar/l must* in Iasi wine-growing centre and *98.5 g sugar/l must* in Cotnari wine-growing centre.

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THE INFLUENCE OF THE CANOPY ON THE QUALITY OF THE YIELD AT FETEASCA NEAGRĂ VARIETY

INFLUENȚA COVORULUI VEGETAL ASUPRA CALITĂȚII PRODUCȚIEI LA SOIUL FETEASCĂ NEAGRĂ

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Abstract. *The anthocyans accumulation in the grapes is largely conditioned by the exposed leaf area and the direct solar radiation. The use of inadequate training systems that determine the increase of the canopy thickness and reduce the leaf area exposure to the solar radiation, prevents the anthocyans accumulation in the grapes and increases the total acidity of the must. For the Feteasca neagra variety the increase of the canopy thickness determined the decrease of the anthocyans content from 588.7 mg/kg of grapes to 372. 9 mg/kg of grapes, while the total acidity grew from 5. 24 g/l H_2SO_4 to 6.34 g/l H_2SO_4. The sugar content in the must was not significantly influenced by the canopy thickness,varying from 176.4 g/l to 173.1 g/l of must.*

Rezumat. *Acumularea antocianilor în pieliţa boabelor la soiurile de viţă de vie este condiţionată, în mare măsură, de expunerea aparatului foliar la radiaţie solară directă. Utilizarea unor sisteme de conducere necorespunzătoare, care determină îndesirea covorului vegetal şi împiedică expunerea frunzelor la radiaţie solară directă, are ca efect acumularea unor cantităţi mici de antociani în boabe şi creşterea aciditătii totale a mustului. La soiul Fetească neagră, îndesirea covorului vegetal a determinat diminuarea conţinutului de antociani de la 588.7 mg/kg struguri la 372.9 mg/kg struguri şi creşterea aciditătii mustului de la 5.24 g/l H_2SO_4 la 6.34 g/l H_2SO_4. Conţinutul mustului în zaharuri nu a fost influenţat în mod semnificativ de îndesirea covorului vegetal, fiind cuprins între 176.4 g/l şi 173.1 g/l.*

INTRODUCTION

The increase of economical efficiency in vine plantations is often related to the increase of the yield, a parameter which can be controlled more easily than the quality can. Usually the technologist uses bigger bud-loads or more fertilizers, technological measures that have tangible results, but which determine, at the same time, an excessive development of the foliar apparatus. The effect on the vine plants is, besides a yield augmentation, a decrease in the grapes quality, due to prominent thickness and shadows of the canopy, and a diminution of the leaf exposure to direct solar radiation. Research made on vine canopy, show that its shadowing limit sugar, aromatic compounds and antocyans accumulation slow down the malic acid diminution and generate favorable conditions for diseases.

The aim of canopy management is to maintain an optimum foliage surface, exposed entirely to direct solar radiation, with minimum thickness.

The work presents the influence of the canopy on yield quality for Feteasca neagra variety, in Copou – wine growing centre conditions, in Iasi vineyard.

MATERIAL AND METHOD

The research was carried out in grape-vines varieties Collection of the Faculty of Horticulture in 2006, on the local red wines variety Feteasca neagra. The trellising form of the vines is bilateral cordon, the height of the trunk is of 0.75 m, the distance between the rows is 2.2 m; the distance between the plants on the row is 1.1 m; the shoots are vertically trained and form a foliage plan of 1.1 m long, 1.1 m high and 0.45 m thick. There were established 4 experimental variants, with an equal number of inflorescences but a different number of shoots, as follows:

Variant 1 = 15 shoots, 15 inflorescences
Variant 2 = 20 shoots, 15 inflorescences
Variant 3 = 25 shoots, 15 inflorescences
Variant 4 = 30 shoots, 15 inflorescences

Determinations: total leaves area; exposed leaves area; canopy thickness; weight of the grapes; sugar, antocyans and organic acids content of the grapes.

RESULTS AND DISCUSSIONS

The data analysis (***tab. 1)*** shows that for V_1, the *total leaves area* ***(Sft)***is equal with the exposed leaves area ***(Sfe)***. As consequence, the canopy has an optimum thickness (IF = 0.98), the foliage is entirely exposed to direct solar radiation (Ef = 98%), and the grapes microclimate is favourable to sugar and antocyans accumulation.

Table 1

The canopy parameters depending on the number of shoots for Feteasca neagră variety

SPECIFICATION	V_1	V_2	V_3	V_4
Total leaves area (m^2/m row)	2.65	3.48	4.34	4.94
Total leaves area/grape (m^2/grape)	0.194	0.255	0.318	0.329
Exposed leaves area (m^2/m row)	2.65			
Foliar index (SFe/SFt)	0.98	0.75	0.61	0.53
Leaves exposure at direct solar radiation (Ef, %)	98	75	61	53

For V_2, V_3 and V_4 variants, the increased the number of shoots determines an alteration of canopy thickness: the canopy is partially thick for V_2 (IF=0.75), thick for V_3 (IF=0.61) and severely thick for V_4 (IF=0.53). The leaves proportion exposed to direct solar radiation decreases with the thickness of canopy to 75% for V_2, 61% for V_3 and 53% for V_4. The canopy modification does not influence the yield level and increases from 3.19 kg/vine for V_1, to 5.07 kg/vine for V_4 **(tab. 2).**

Table 2

The grapes weight and the yield level for the Feteasca neagră variety

SPECIFICATION	V 1	V 2	V 3	V 4
Grapes weight (kg)	0.213	0.283	0.331	0.338
The yield (kg/but.)	3.19	4.24	4.96	5.07

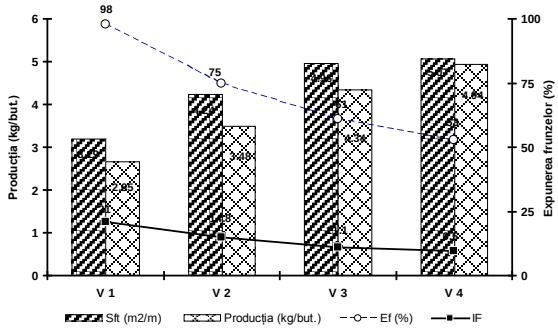

Fig. 1 Correlations between canopy parameters and the yield for Feteasca neagră variey

The yield (kg grapes/vine) is positively correlated with the total leaves area and does not depend on the foliage thickness or its exposure to direct solar radiation **(fig. 1)**. But these factors significantly influence the content of the grapes in organic compounds (**tab. 3**). This is because of the diminished values of light and temperature, characteristic for the dense vegetal canopies: the shadowed berries temperature is 6.7 ºC less than shiny berries and the shadowed leaves intercept only 2 - 6% from the direct solar radiation **(Smart R., 1973).**

Table 3

The sugar content, the anthocyans and the total acidity for Feteasca neagra variety

SPECIFICATION	V 1	V 2	V 3	V 4
Sugar content (g/l)	176.4	173.4	173.6	173.1
Antocyanins (mg/kg grapes)	588.7	523.4	433.1	372.9
Total acidity (g/l H_2SO_4)	5.24	5.67	6.34	6.34

Sugar accumulation was not significantly influenced by the thickness and shadows of the canopy. The maximum sugar content was registered at V_1 (176.4 g/l), and the minimum one at V_4 (173.1 g/l). Significant differences were registered in the case of the anthocyans content and the total acidity of the must (**fig. 2**).

The anthocyans content was maximum at V_1 (588.7 mg/kg grapes), whose foliage was of 98 % exposed to direct solar radiationm, and minimum at V_4 (372.9 mg/kg grapes), whose canopy is the thickest, shadowed and of only 53% exposure to direct solar radiation.

The total acidity of the must increased at the same time with total leaves area and canopy shadowing. The lowest acidity (5.24 g/l H_2SO_4) was registered for V_1, whose foliage is well exposed to direct solar radiation (98%), and the highest for V_4 (6.34 g/l H_2SO_4), whose canopy is dense and shadowed. This evolution is explained by an intense diminution of the malic acid in shiny berries from V_1, whose temperature is higher because of their optimum exposure to direct solar radiation.

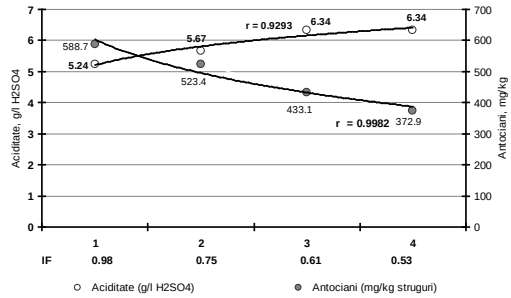

Fig. 2 Correlation between the canopy parametres and the quality of the yield on Feteasca neagra variety

CONCLUSIONS

1. The yield is positively correlated with the total leaves area and is not significantly influenced by the canopy thickness.

2. The canopy thickness influences the grapes microclimate and determines important variations of their organic compounds.

3. Antocyanins compounds of the grapes are positively correlated with the berries exposure to direct solar radiation. For Feteasca neagră variety, the highest antocyans content (588.7 mg/kg grapes) was registered at the variant with an optimum exposure of the foliage to direct solar radiation (Ef = 98 %).

4. The total acidity of the must is positively correlated with the leaves exposure to direct solar radiation. For Feteasca neagră variety, the lowest acidity was registered at the variant with a shiny canopy (Ef = 98 %), and the highest (6.34 g/l H_2SO_4) at V_4, with a significant shadowed canopy (Ef = 53%).

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THE INFLUENCE OF THE CLIMATIC FACTORS OVER THE MATURATION PROCESS OF THE STRINGS OF THE MAIN VINE VARIETIES FROM THE COPOU WINE-GROWING CENTER

INFLUENȚA FACTORILOR CLIMATICI ASUPRA PROCESULUI DE MATURARE A COARDELOR LA PRINCIPALELE SOIURI DE VIȚĂ DE VIE DIN CENTRUL VITICOL COPOU

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Abstract. *The vine strings' maturation is one of the growth phenophases with a special practical importance because the vine resistance at the low temperatures during winter depends on this stage. The maturation of the sprigs' tissues occurs through an ensemble of morphologic, anatomic and biochemical changes and represents the transition from the herbaceous to the lignification state. The factors that influence the sprigs' maturation are of biologic, ecologic and technologic nature. In the current paper the maturation degree of the wood at the main varieties Vitis vinifera from the Copou wine-growing center was assessed through the ascertainment of the spare matter content (sugar, starch) and of the humidity of the vine strings' tissues. The climatic factors' evolution in 2007 in the Copou vineyard ensured a proper maturation of the sprigs, the carbohydrate content of the strings ranging between 12.87% and 16.85%.*

Rezumat. *Maturarea coardelor de viță de vie este una din fenofazele de creştere cu o importanță practică deosebită, de această etapă depinzând rezistența viței de vie la temperaturile scăzute din timpul iernii. Maturarea țesuturilor lăstarilor se realizează printr-un ansamblu de transformări morfologice, anatomice şi biochimice şi reprezintă trecerea de la starea erbacee la starea lignificată. Factorii care influențează maturarea lăstarilor sunt de natură biologică, ecologică şi tehnologică. În prezenta lucrare s-a apreciat gradul de maturare a lemnului la principalele soiuri Vitis vinifera din centrul viticol Copou prin determinarea conținutului în substanțe de rezervă (zaharuri, amidon) şi a umidității în țesuturile coardelor de viță de vie. Evoluția factorilor climatici în anul 2007 în podgoria Copou a asigurat o maturare corespunzătoare a lăstarilor, conținutul în hidrați de carbon a coardelor variind între 12,87 – 16,85 %.*

The starch represents the most important polysaccharide as a spare matter ensuring the vital processes in the rest period of the vine, the resistance at the winter frost, the initial growth of the sprigs after the debudding, the slip rooting, and the formation of a callus at the grafted vines [2,5]. The starch accumulation begins at the end of July and ends in the autumn, at the leaf fall when the so-called „starch maxim" occurs within the sprigs [3,7]. According to some authors [4,5] the maturated wood presents the following biochemical characteristics: carbohydrates minimum 12%, starch 6-8%, water over 41% (stock slips) and 44% (graft strings).

MATERIAL AND METHOD

Between November and December 2007 it was ascertained the maturation degree of the wood at the main vine varieties from the Copou wine-growing center: Fetească albă, Aligoté, Muscat Ottonel, Fetească regală, Chardonnay, Sauvignon, Grasă de Cotnari and at the clones and varieties created at SCDVV Iaşi – Busuioacă de Bohotin cl 5 Is, Frâncuşă cl 14 Is, Chasselas dore cl 20 Is, Golia, Gelu and Paula. The works were carried out on average samples which were harvested during the leaf fall period from 10 strings belonging to 10 different vine stocks. The ascertainments were carried out during the leaf fall period because the spare glucide deposits within the sprigs increase almost until the leaf fall, after which they undergo a small decrease and, again, an increase that exceeds the level before the leaf fall [4].

The strings' humidity was ascertained by drying them at the stove (105°C) until reaching a constant mass of transverse sections on the entire string length.

The carbohydrates were ascertained through the chemical method with the anthrone reagent [4], on three growing areas: the string basis (the 1-2 node area), the middle of the string (the 3-6 node area) and the top of the string (7-10 node area). The sugar was extracted in ethyl alcohol, the starch in perchloric acid. The colour obtain by the reaction between the resulted extracts and anthrone was determinated at UV-VIS spectophotometer.

RESULTS AND DISCUSSIONS

The water content, in correlation with the dry matter, is one of the characteristics of the maturation process of the vine strings. The values obtained at the ascertainment of the strings' humidity at the main vine varieties are graphically represented in figure number 1.

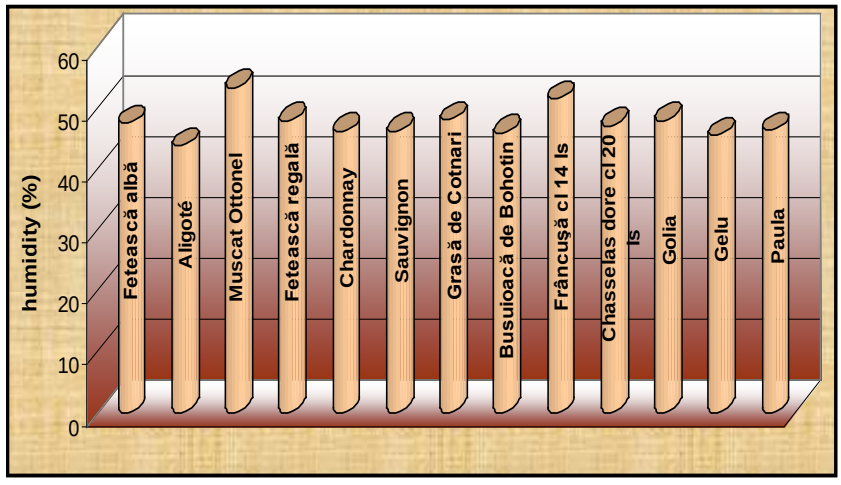

Fig. 1. Humidity at the main vine varieties from the Copou wine-growing center

At all the analyzed varieties, the strings' humidity registered values of over 40%, a humidity value which is considered the limit at which a planting material can be accepted for reproduction. The humidity' minimum value was

registered at the Aligoté variety 43.63%, and the maximum one at the Muscat Ottonel variety 53.26 %. An important coefficient for the assessment of the maturation degree of the sprigs is the carbohydrate content (sugar and starch).

Table 1

The carbohydrate content at the main vine varieties

No.	Sample		Starch %	Sugar %	Average on string %
1.	**Fetească albă**	basis	10,00	7,42	**16,09**
		middle	8,78	7,57	
		top	8,01	6,48	
2.	**Aligoté**	basis	6,66	7,40	**13,88**
		middle	6,36	7,69	
		top	6,28	7,26	
3.	**Muscat Ottonel**	basis	5,83	7,50	**12,87**
		middle	5,64	7,02	
		top	5,49	7,13	
4.	**Fetească regală**	basis	9,00	6,90	**15,43**
		middle	8,74	6,57	
		top	8,33	6,74	
5.	**Chardonnay**	basis	9,05	6,62	**14,67**
		middle	8,38	6,14	
		top	7,85	5,98	
6.	**Sauvignon**	basis	9,20	7,24	**15,61**
		middle	8,60	7,21	
		top	8,05	6,52	
7.	**Grasă de Cotnari**	basis	7,60	10,21	**16,85**
		middle	6,79	9,80	
		top	6,43	9,72	
8.	**Busuioacă de Bohotin cl 5 ls**	basis	7,73	6,83	**14,18**
		middle	7,51	6,47	
		top	7,44	6,57	
9.	**Frâncuşă cl 14 ls**	basis	9,62	6,98	**16,32**
		middle	9,57	6,9	
		top	9,37	6,53	
10.	**Chasselas dore**	basis	8,19	7,45	**14,79**
		middle	7,75	6,90	
		top	7,45	6,62	
11.	**Golia**	basis	7,89	7,64	**14,52**
		middle	7,44	6,92	
		top	6,93	6,75	
12.	**Gelu**	basis	7,87	6,02	**13,14**
		middle	7,87	5,43	
		top	7,18	5,05	
13.	**Paula**	basis	8,55	6,93	**14,74**
		middle	8,33	6,36	
		top	8,18	5,86	

Table number 1 presents the data regarding the starch content (the most important spare matter) expressed in percents, as well as the total amount of carbohydrates from the vine strings, on the three sectors – basis, middle, and top.

At all the studied varieties, the starch content varies on the length of a vine string, with bigger values at the string's basis which slightly decrease then towards the string's top. Thus, the starch content from the strings' basis varies in the interval 5.83 %, a value which was registered at the Muscat Ottonel variety and 10 % at Fetească Albă variety. The lowest starch content from the strings' top was 5.49 % registered at the Muscat Ottonel variety. The average per string of the starch content varies quite enough, and thus the inferior limit is 5.65 % registered at the Muscat Ottonel variety and the superior one 9.52 % obtained for the Frâncuşa vine variety.

Unlike the other vine varieties, at the Aligoté, Muscat Ottonel and Grasă de Cotnari varieties the starch values are lower as compared with those of the sugar. This can indicate a maturation in process, namely the transformation of the sucrose into polysaccharides. After it is synthesized within the leaves, the sucrose is conveyed through the free vessels towards the strings, vine stocks, sprigs, where, in the presence of the specific enzymes, is deposited in the shape of polysaccharides among which we can include the starch as well [3].

For the interpretation of the obtained data, the string maturation was considered to be insufficient for a content under 12 % carbohydrates, sufficient at a content of 12-14 %, good, with 14-16 % carbohydrates and very good at over 16 % carbohydrates. By analyzing the values obtained for the total carbohydrate content we can ascertain that most of the varieties from the Copou wine-growing center had an appropriate string maturation.

In figure 2 the string maturation degree from the Copou wine-growing center is graphically represented.

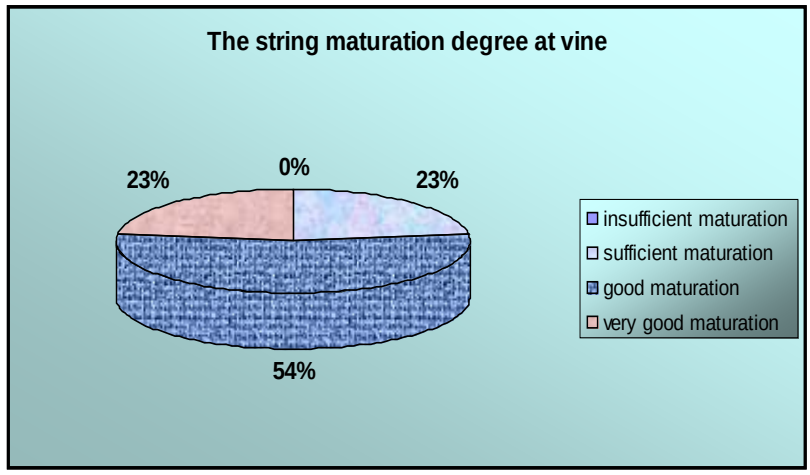

Fig 2. The string maturation degree at the varieties from the Copou wine-growing center

Thus, 54 % of the analyzed varieties' strings have a good maturation. As a result of the analyses for the ascertainment of the carbohydrate content, no insufficient wood maturation was tracked down at the vine varieties. These carbohydrate values represent the premise of a good production in the viticultural year 2008.

The values of the water and carbohydrate content were largely influenced by the meteorologic parameters in 2007, which occurred during the vegetation period and especially in the phenophases of ripening and maturation of the grapes and then of the fruit elements. Table 2 presents the data registered by the weather-station located within the vine plantation of the Copou wine-growing center between January and December 2007.

Table 2

The values of the main climatic elements registered in 2007

Month	Temperature °C, air			Temperature ˚C, soil			Quoted hygroscopes %	Rainfalls mm	Insolation no hours
	average	maximum	minimum	average	maximum	minimum			
I	4,1	16,9	- 10,5	2,3	6,7	- 4,6	69	21,5	78,2
II	0,8	16,6	- 19,6	0,3	22,4	- 25,0	76	30,1	71,1
III	7,3	20,2	- 0,8	7,7	33,0	- 4,2	62	25,6	203,5
IV	10,2	22,6	1,6	12,7	46,8	- 2,5	50	25,1	201,8
V	18,9	34,5	0,5	25,3	61,0	- 1,8	51	28,0	276,5
VI	22,8	37,5	11,6	30,0	61,0	10,9	49	15,4	290,6
VII	25,0	42,3	11,0	32,3	66,0	9,0	40	40,3	311,2
VIII	22,0	38,3	11,6	26,3	58,9	8,4	65	91,3	215,1
IX	15,3	26,7	4,8	16,6	39,0	2,8	70	83,5	196,1
X	10,5	21,0	1,6	10,8	29,5	- 1,6	75	58,7	127,8
XI	2,5	11,8	-5,5	2,1	15,5	-8,2	78	50,5	92,3
XII	-0,9	9,4	-11,8	-1,1	7,0	-11,7	87	53,5	12,5

By analyzing the values of the climatic elements (table 2), we can notice that in 2007 we had a warm winter and the maximum temperature registered in the air was of 16.9°C. However, at the end of February (23 – 25 February), we had very low temperatures of -19.6°C in the air and of -25.0°C at the ground, which affected both the bud complex and the one-year-old strings and the belts to a very high extent, as a result of the annealing phenomenon of the vine stocks under the influence of the high temperatures from the previous period. The warm spring, with monthly average temperatures of 7.3°C (March), 10.2°C (April) and 18.9°C (May) and the excessive heat from the summer months when temperatures of 37.5°C, 42.3°C and 38.3°C were registered several days favoured the subsequent maturation of the vine strings.

The insolation assessed through the number of hours of sun brightness registered higher values, superior to the multianual average. The rainfall amount from January – July 2007 was under the normal one by a long chalk and the rainfall deficit was of 108 L/m^2. The abundant waterfalls from July, August,

September and October caused the partial retrieval of the ground humidity and of the air hygroscopicity, which increased from 40% in July to 75% in October.

CONCLUSIONS

The climatic conditions registered during the vegetation period of the vine in 2007 favoured the maturation process of the strings, thus 54% of the total number of varieties studied had a good maturation and 23% a very good maturation.

The strings of the vine varieties studied had a humidity higher than the inferior limit, namely values of over 44%, and the Muscat Ottonel variety even registered a humidity of 53.26%.

The starch content, the main spare matter of the vine strings, decreases from the basis to the top of the string and registers values of over 7%, which shows a proper maturation of the strings. The total carbohydrate concentration determinated at ten vine varieties and three vine clones was ranges between 12.87 and 16.85%.

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INFLUENCE OF THE ROOTSTOCK IN CALLUSING PROCESS OF GRAFTING CUTTINGS ON GELU AND PAULA VARIETIES

INFLUENȚA PORTALTOIULUI ÎN PROCESUL DE FORȚARE A BUTAŞILOR ALTOITI LA SOIURILE DE VIȚĂ DE VIE GELU ŞI PAULA

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Abstract. *The diameter of rootstock had an significant influence during the callusing process of grafting cuttings. The best efficiency concerning the callus formation on the grafting point, formation and growing the shoots from the graft buds, has achieced using in the grafting process rootstocks cuttings of 8-10 mm diameter. Inferior rezults has achieced using in the grafting process rootstocks cuttings of 10-12 mm diameter and especially of 7-8 mm diameter. After the ending of callusing process the average of proper graftings cuttings was better on Gelu variety (81,8%), than Paula variety (76,2%).*

Rezumat. *Diametrul butaşilor portaltoi a influențat semnificativ comportarea butaşilor altoiți pe parcursul forțării la soiurile Gelu şi Paula. Cele mai bune randamente privind formarea calusului la punctul de altoire, pornirea în vegetație şi creşterea lăstarului format din ochiul altoi s-au realizat în cazul folosirii la altoire de butaşi portaltoi cu diametrul de 8-10 mm. Rezultate inferioare au fost obținute în cazul folosirii la altoire de butaşi portaltoi cu diametrul de 10-12 mm, şi în special de 7-8 mm. După încheierea procesului de forțare, procentul mediu de butaşi altoiți corespunzători înregistrat la soiul Gelu a fost de 81,8%, iar la soiul Paula 76,2%.*

The quality of the grafted vines obtained in the nursery is influenced by a large range of factors: the rootstock varieties, the conditions during callusing process, the technologies applied in the nursery etc. (2).

The characteristics of the rootstock cuttings used for grafting, represented mainly by maturation degree (the content of starch) and their diameter, influence in a significant way the evolution of the grafted cuttings along the callusing process and the yield of grape vines realized in the nursery (1, 3).

MATERIAL AND METHODS

Experiments were made at S.C. VINIFRUCT COPOU SA Iaşi in 2007.

It was experimented the influence of the thickness and the degree of maturation of rootstock cuttings of the Oppenheim 4 selection, on the Gelu and Paula grafted varieties, in the production process of grafted vines, three experimental variants being established:

V_1- rootstock cuttings of 7-8 mm thickness;

V_2- rootstock cuttings of 8-10 mm thickness;

V_3- rootstock cuttings of 10-12 mm thickness;

During the process of production of grafted vines, some observations and determinations were made concerning: the diameter and the maturation degree of the rootstock cuttings used for graftings; the dynamics of the callus formation at the grafted point; the dynamics of the vegetation start of the grafts; the growth dynamics of the vine shoots; the situation of the grafted vines after the callusing process;

For each varieties and each experimental variant, 300 cuttings were grafted, and they were studied during the callusing process. The data obtained were synthetically presented, in tables, and they were compared to the average of the variants.

RESULTS AND DISCUSSIONS

The diameter of the rootstock cuttings for both varieties was given by the experimental variant; the length of the rootstock cuttings was of 30 cm in all the experimental variants, some differences existed concerning the average mass of the cuttings and their degree of maturation (table 1).

Table 1

The characteristics of rootstock cuttings used for grafting

No.	Variety		No. grafted cuttings	The size of the rootstock cuttings			The starch content (%)
				Diameter (mm)	Lengh (cm)	The average weight (g)	
1	Gelu	V_1	300	7-8	30	18,9	7,5
		V_2	300	8-10	30	26,6	9,1
		V_3	300	10-12	30	30,3	8,7
2	Paula	V_1	300	7-8	30	16,7	7,1
		V_2	300	8-10	30	23,2	8,9
		V_3	300	10-12	30	28,3	8,5

The degree rootstock cuttings maturation, expressed by starch content, was correlated to the diameter of the cuttings in both varieties, the highest content of starch being registered in V_2, with the diameter between 8-10 mm, followed by V_3, with the diameter between 10-12 mm, and the lowest content of starch was registered in V_1, with the diameter of the cuttings between 7-8 mm.

The callus starts to form at the grafted point 7-9 days after the beginning of the callusing process. At Paula variety the callus appears earlier compared to Gelu variety, after 7 days in V_2, and after 8 days in V_1 and V_3. At Gelu variety the callus appears after 8 days in V_2 and 9 days in V_1 and V_3.

12 days after the start of callusing process (table 2), at Gelu variety, between 2.3% (V_1) and 6.0% (V_2) of the total number of the grafted cuttings have completely formed callus at the grafted point; after this period, at Paula variety, the number of grafted cuttings with complete callus formed at the grafted point was lower, between 1.6 % (V_1) and 3.6% (V_2). 15 days after the start of callusing process, the number of the grafted cuttings with completely formed callus at the grafted point was increasing, up to 45.0 % at Paula variety (V_2), and 49.3% at Gelu variety (V_2).

After 19 days of callusing process, the largest part of the grafted cuttings have complete formed callus at the grafting point, the differences were due to the influence of the variety and of the thickness of the rootstock cuttings; the highest per cent of the adequately grafted cuttings after callusing process was observed at Gelu variety (V_2- 96.0 %), and the lowest one at Paula variety (V_1- 80.3 %).

Table 2

The dynamics of the callus formation at the grafted poin during callusing process

No.	Variety		No. grafted cuttings	The start of callus formation	Grafted cuttings with completely formed callus at the grafted point after :					
					12 days		15 days		19 days	
					No.	%	No.	%	No.	%
1	Gelu	V_1	300	9	7	2,3	114	38,0	259	86,3
		V_2	300	8	18	6,0	148	49,3	288	96,0
		V_3	300	9	11	3,6	132	44,0	273	91,0
2	Paula	V_1	300	8	5	1,6	101	33,6	241	80,3
		V_2	300	7	11	3,6	135	45,0	279	93,0
		V_3	300	8	7	2,3	127	42,3	269	89,6

After the callus formation at the gtrafted point, the grafted vine shoots start to vegetate(table 3); the first grafted vine shoots start to vegetate after 8-11 days; at Paula variety they start earlier (8-10 days), compared to Gelu variety (10-11 days). 12 days of callusing process the grafts percent that started to vegetate was low, between 1.0-3.0 %. After 15 days of callusing process the percent of grafting points that started to vegetate increased significantly, between 25.6-38.3 % (table 3). After 19 days (at the end of the callusing process), the percent of grafts that started to vegetate was higher at Gelu variety, it registered the highest values in V_2 (87.0 %), and significantly lower values in V_3 (81.6 %) and in V_1 (79.3 %); at Paula variety the percent of the grafts that started to vegetate was reduced, between 74.3 % and 79.6 %.

Table 3

The dynamics of the vegetation start of the grafts

No.	Variety		No. grafted cuttings	The begining of vine shoots formation	Vine shoots started to vegetate after :					
					12 days		15 days		19 days	
					No.	%	No.	%	No.	%
1	Gelu	V_1	300	11	4	1,3	98	32,6	238	79,3
		V_2	300	10	9	3,0	127	42,3	261	87,0
		V_3	300	10	7	2,3	115	38,3	245	81,6
2	Paula	V_1	300	10	3	1,0	77	25,6	223	74,3
		V_2	300	8	7	2,3	114	38,0	239	79.6
		V_3	300	8	5	1,6	112	37,3	231	77,0

After 12 days of callusing process the grafted vine shoots start to form, they have a length of approximately 1.0 cm at both variety (table 4); After 15 days of callusing process, an obvious increase of the grafted vine shoots was noticed as they have lengths of approximately 2.0 cm and influences generated by the vatiety of grafts and by the used rootstock start to be observed; the highest lengths were registered by the vine shoots formed at Gelu variety, with 2.1 cm in V_1 and 2.0 cm in V_3; Paula variety registered lower lengths of the grafted vine shoots at this date, between 2.3 cm in V_2 and 1.7 cm in V_1.

Table 4

The growth dynamics of the vine shoots

No.	Variety		No. grafted cuttings	The begining of vine shoots growth	The midium length of the vine shoots (cm) after :		
					12 days	15 days	19 days
1	Gelu	V_1	300	11	0,8	2,1	3,8
		V_2	300	10	1,1	2,5	4,4
		V_3	300	10	1,0	2,0	4,1
2	Paula	V_1	300	10	0,9	1,7	3,2
		V_2	300	8	1,0	2,3	3,9
		V_3	300	8	1,0	1,9	3,7

Table 5

The situation of the grafted vines after the callusing process

No.	Variety		No. grafted cuttings	Adequately callused grafted cuttings				Grafted cuttings callused and without shoots		Inadequate grafted cuttings	
				No.	%	Diferences	Smnif.	No.	%	No.	%
1	Gelu	V_1	300	234	78,0	-3,0	-	38	12,7	28	9,3
		V_2	300	260	86,7	+23,0	***	27	9,0	13	4,3
		V_3	300	242	80,7	+5,0	*	21	7,0	37	12,3
		X	300	245	81,8	-	-	28,8	9,5	26,0	8,7
2	Paula	V_1	300	218	72,7	-19,0	00	42	14,0	40	13,3
		V_2	300	240	80,0	+3,0	-	33	11,0	27	9,0
		V_3	300	228	76,0	-9,0	0	37	12,3	35	11,7
		X	300	228	76,2	-	-	37,3	12,5	34,0	11,3
3	Media		300	237	79,0	-	-	33,0	11.0	30,0	10,0

DL5% = 4,8
DL1% = 12,3
DL0,1% = 19,7

After the ending of callusing process (table 5), the highest percent of adequately callused cuttings was registered at Gelu variety, with 86.7% in V_2 (very significant positive differences compared to the average), 80.7% in V_3 (significant positive differences compared to the average), and 78.0% in V_1 (insignificant differences compared to the average). At Paula variety the percent of adequately callused cuttings was slightly reduced, with values between 72.7 in V_1 (significant negative differences compared to the average), 80.0% in V_2 (insignificant differences) and 76.0% in V_2 (significant negative differences compared to the average).

CONCLUSIONS

The callus started to form at the grafting point after 7-9 days from the beginning of the callusing process, earlier, after 7-8 days at Paula variety, compared to Gelu variety, after 8-9 days. At the end of the callusing process, the highest percent of grafted vines with completely formed callus at the grafting point was realized at Gelu variety (V_2- 96.0 %), and the lowest percent at Paula variety (V_1- 80.3 %).

The start to vegetation of the grafts was correlated to callus formation at the grafting point; at Paula variety this process started after 8-10 days, and at Gelu variety after 10-11 days; the grafted vine shoots that were formed registered medium lengths with the values between 1.7 and 2.0 cm at Paula variety, and between 2.1 and 2.5 cm at Gelu variety.

After callusing process, the highest percent of adequately grafted vines was registered at Gelu variety, with an average of 81.8%; at Paula variety the percent of adequately grafted vines was slightly reduced, with an average value of 79.0%.

The start to vegetation of the grafting and the growing of the vine shoot formed out of this are correlated to the quantities of reserve substances from the rootstock cuttings, so that the best results at the rating of the grafted vines after the callusing process were, both at Gelu and Paula varieties in V_2, with the highest glucides level content in the rootstock cuttings.

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THE APPLICATION OF DISCRIMINANT FACTORIAL ANALYSIS FOR THE ESTABLISHING PHENOTYPICAL HOMOGENITY FOR CLONES OBTAINED FROM CABERNET SAUVIGNON GRAPEVINE VARIETY

APLICAREA ANALIZEI FACTORIALE DISCRIMINANTE PENTRU STABILIREA OMOGENITATII FENOTIPICE LA CLONELE SOIULUI CABERNET SAUVIGNON

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Abstract. *The discriminat factorial analysis is a mathematics-statistics multivariation methode, which permits to corelate a big number of quantity variable, such as it can be establish phenotipical homogenity degree of individuals analysed which belong to one group specifics and also the diferences between gropus. In this paper he application discriminat factorial analysis was made to the clones obtained of Cabernet Sauvignon grapevine variety plants: Cabernet Sauvignon - population, Cabernet Sauvignon – 4 Is, Cabernet Sauvignon – 7 Dg and Cabernet Sauvignon – 33 Vl, cultivated in ampelographic colection of Horticultural Faculty of Iaşi.*

Rezumat. *Analiza factorială discriminantă reprezintă o metodă statistico-matematică multivariațională, care permite corelarea unui număr mare de variabile, ce pot fi folosite pentru stabilirea gradului de omogenitate fenotipică a fiecarui individ analizat, putându-se evidenția apartenența sau nu la grupurile luate în studiu. In această lucrare s-a efectuat analiza factorială discriminantă la clonele soiului Cabernet Sauvignon, cultivate în colectia ampelografică a Facultății de Horticultură Iaşi: Cabernet Sauvignon - populatie, Cabernet Sauvignon – 4 Is, Cabernet Sauvignon – 7 Dg şi Cabernet Sauvignon – 33 Vl.*

In ampelography discriminatory analysis helps characterize the phenotypical homogenity of individual varieties (of the population) and establish any similarities that may exist among varieties, from a phenotypical perspective.

Discriminatory linear analysis is a multidimensional statistical-mathematical method, descriptive and predictive which allows for the evidentiation of links between data by means of calculation of the main components. The method is used by techniques aimed at the classification or allocation to priorly known classes of individuals characterized by a large number of nominal or numerical variables.

In the first stage, discriminatory analysis is aimed at separating, from the basic sample, the individuals characterized by *p*-variables into *q*-classes defined a priori by a *y*-nominal qualitative variable. The second stage will

evidence the way in which a new individual, characterized by the same *p*-variables, influences the already identified classes in the basic sample.

Discriminatory analysis calls for two descriptive and decisional approaches: establishing the discriminatory linear function for the individual sample and subsequently the linear combinations of quantitative variables, i.e. establishing the quantitative values that best separate individual classes; determining the class affected by new individual characterized by the same explanatory variables.

MATERIAL AND METHOD

The study comprises application discriminat factorial analysis to the clones obtained of Cabernet Sauvignon grapevine variety plants: Cabernet Sauvignon - population, Cabernet Sauvignon – 4 Is, Cabernet Sauvignon – 7 Dg and Cabernet Sauvignon – 33 Vl, characterized by 30 quantitative variables established by means of ampelometric measurements of leaves.

Each clone was represented by 10 stems (individual group) that yielded adult leaves.

Ampelometric measurement (variables) comprised: length of main nervures (N1, N2, N3, N4); angles A, B, C between main nervures; ratios 21a, 31a and 41a of nervure lenghts; angles F and AP defining the shape of the middle lobe of the leaves; angle ABE formed by the middle nervure and extremity of the lower lateral lobe; the distances U and O between the basis of the sinuses and the petiol point; the opening of the lower and upper lateral sinuses SS and SI; the opening of the petiol sinus SP; the length of the leaf limb ALT; limb width AN; outer leaf contour ENS, ENM, ENI and NL; inner leaf contour DS1, DS2 and DS; ratios UN2 and ON3 of lateral sinus basis and the nervures wich support those sinuses; ratio L/A of limb length and width.

Figure 1 explains the ampelometric measurements operated on leaves.

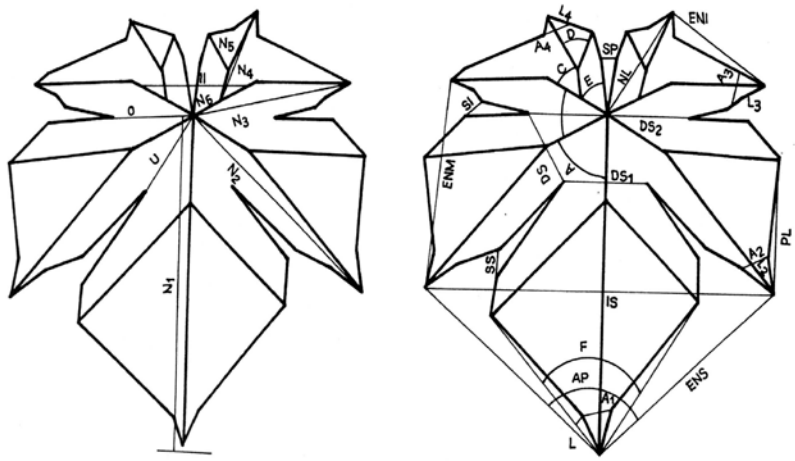

Fig. 1 Ampelometric measurements (variables) in vine leaves

INTERPRETATION OF RESULTS

In the first stage the intergroup or interclass variance-covariance matrix was calculed. For a satisfactory grouping of individuals into classes the matrix values should be high, either negatively or positively. When values approach zero, the variable's capacity of grouping individuals into classes is reduced.

The study has indicated that the highest value of +79645.89 is yielded by the DS1/DS2 correlation referring to the inner leaf contour while the lowest value –33450.12 is yielded by the AN/SP correlation referring to the limb width and the petiol sinus opening.

Next, each variance-covariance matrix was calculated. The closer to zero the values, the more homogeneous (phenotypically stable) the individual group. At this stage we can note first that, in point of group homogeneity, a wide range of character variability indicated less similarity of the individuals, and second, that we have a good indication of which variables may have a decisive contribution to variety discrimination.

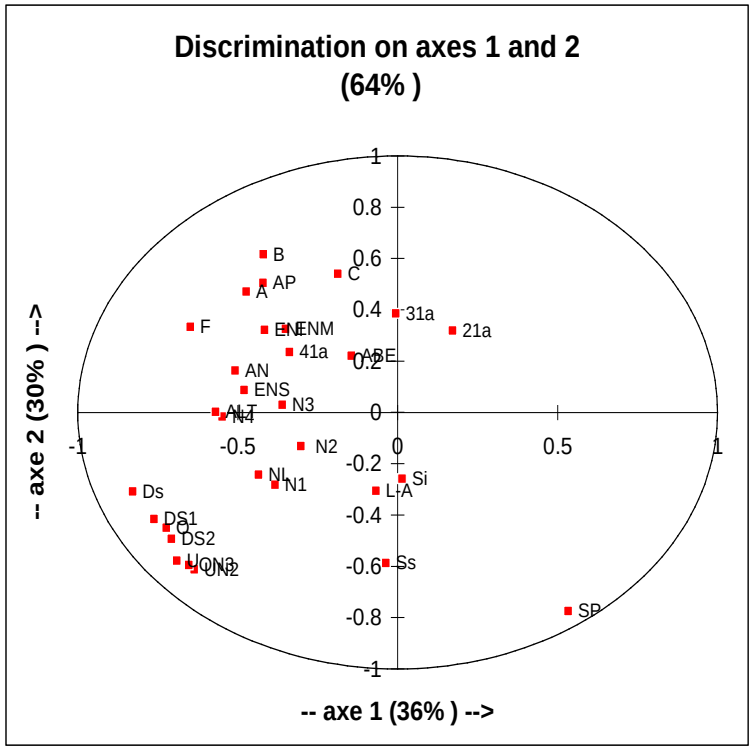

Fig. 2 - Discrimination of ampelographic characteristics versus the first two factors

Finally, the total variance-covariance matrices are calculated, by summing up the interclass and the total intraclass matrices. The resulting limit values were very high, between –44705.12 for the AN/SP correlation and +116120.59 for the DS1/DS2 correlation.

Correlation circle analysis. It resulted thet the first two discriminating factors have a total segregation (discrimintion) capacity of 46% (25.932 for the first and 20.188 for the second). Most of the discriminating function correlations have negative values (see figure 2).

The best correlations with these discriminating factors have been evidenced in the variables DS (-0.827015), DS1 (-0.761423) and DS2 (-0.703581) which determine for inner leaf contour.

The second factor yields the highest correlation values with the variables B (0.615894), C (0.540347), AP (0.504357) which determine the angles formed by the nervures and the middle lobe shape. Important correlations with factor 2, but with negative values, are yielded by the variables: SP (-0.774655), UN2 (-0.612812), ON3 (-0.595173), SS (-0.587155) determined by the sinuses opening and depth.

All these variables are situated toward the extremity of the correlation circle.

The second stage was aimed at determining the classes affected by a posteriori classification. All the 40 individuals grouped into 4 a priori classes, each comprising 10 individuals characterized by the 30 variables, indicate that the initial structure of classes was modified.

The classification error was of only 0.0667, while the class structure was as folows: 10 individuals belong in the group Cabernet Sauvignon - 7 Dg; 9 in the Cabernet Sauvignon - 9 Is clone, 10 in the Cabernet Sauvignon population clone, 11 in the Cabernet Sauvignon - 33 Vl (see table 1).

Table 1

Synthesis of individual reclassification following DFA application

Group	Individues in group 1	Individues in group 2	Individues in group 3	Individues in group 4	Total
Cabernet Sauvignon - 7 Dg (group 1)	10	0	0	0	10
	0.07	0.00	0.00	0.00	0.07
Cabernet Sauvignon - 4 Is (group 2)	0	8	1	0	9
	0.00	0.05	0.01	0.00	0.06
Cabernet Sauvignon - population (group 3)	0	1	7	2	10
	0.00	0.01	0.05	0.01	0.07
Cabernet Sauvignon - 33 Vl (group 4)	0	1	2	8	11
	0.00	0.01	0.02	0.05	0.08
Total	10	10	10	10	40
	0.07	0.07	0.07	0.07	1
Classification error : 0.0667					

The Cabernet Sauvignon - 7 Dg clone (group 1) indicates that all individuals belong in the group, of which only 7 are typical, showing 100% belonging (noted 1), the other 3 belonging to the group in proportion of 0.9183-0.9997.

The Cabernet Sauvignon - 4 Is clone (group 2) shows little homogeneity with only 8 specific individuals, of which only one is typical , while the 2 remaining ones can be grouped alongside the Cabernet Sauvignon - population and Cabernet Sauvignon - 33 Vl clone.

The Cabernet Sauvignon - population (group 3) also shows reduced homogeneity, with 7 individuals conforming to the variety parametres, of which none is typical; proportion variability ranges between 0.6771-0.9989 and 2 individuals may belong in the Cabernet Sauvignon - 4 Is and Cabernet Sauvignon - 33 Vl.

The Cabernet Sauvignon - 33 Vl clone (group 4) has 8 individuals belonging in the group but none is typical, proportion variability ranging between 0.4605 and 0.9950.

CONCLUSIONS

1. The application of DFA to the 4 clones of Cabernet Sauvignon selected with a view to assessing phenotypical homogeneity has indicated high heterogeneity among individuals making up the population (clones). Given the variability of morphological characteristics, their single use to idetify vine clones is insufficient thence the need to investigate the genome expression.

2. The variables allowing for the best discrimination of clones have proved to be: SP, ON3, UN2, U, DS2, O, DS1. These correlate best with factors 1 and 2 and mainly define the opening and depth of lateral sinuses and the petiol sinus.

3. Phenotypical homogeneity analysis has shows the following:
   - high stability varieties: Cabernet Sauvignon - 7 Dg clone;
   - midlle stability varieties: Cabernet Sauvignon - 4 Is and Cabernet Sauvignon - 33 Vl clones;
   - low stability varieties: Cabernet Sauvignon - population. Many individuals making up these populations have shown large fluctuations of ampelographic characteristics, such that, as a result of DFA application, they allowed for their grouping alongside different varieties.

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ESTABLISHING THE DEGREE OF PHENOTYPICAL SIMILARITY AMONG THE MERLOT VARIETY AND ITS CLONES BY MEANS OF THE CLUSTER ANALYSIS

STABILIREA GRADULUI DE ASEMĂNARE FENOTIPICĂ INTRE SOIUL MERLOT SI CLONELE SALE PRIN FOLOSIREA ANALIZEI CLUSTER

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Abstract. *In paper have used the Cluster Analysis to determine the phenotypical similarity among the Merlot varieties and its clones, with a view to establish the polyphiletic groupings among the biological material under analysis. The author presents employs Cluster Analysis in the processing of ampelometric measurement of vine varieties. Following the dendrogram analysis of Merlot varieties and its clones under study, two polytetic groups have been established which testify to the polyphiletic relation between the respective individues.*

Rezumat *In lucrare s-a utilizat analiza cluster în scopul determinării similarității fenotipice dintre soiul Merlot şi clonele sale, în vederea stabilirii grupurilor polifiletice din materialul biologic supus analizei. Autorul prezintă modul de utilizare a analizei cluster în analiza şi măsurătorile ameplometrice la viţa de vie. Dendrograma rezultată în urma analizei asupra materialului biologic din soiul Merlot şi clonele sale, a permis stabilirea a două grupuri polifiletice şi a relațiilor existente între acestea.*

The using of Cluster Analysis on define grapevine varieties and their clones determine establishing of phenotypical similarity degree. Such been used on based the minimal inertia loss principle (the generalized Ward principle), expressed in the numeric value of the similarity index. In each stage it's tried the most split in class resulted from unit a two elements subject on grouping resultant, in finally, the dendrogramme on the basis of their respective dissimilarities or similarities.

Grapevine variety Merlot was bring in our country in postfilloxeric period, where was spread in almost vineyards on obtained red wines, because his big productions. Owing his agrobiological and technological values was proceeding to obtained valuable clones, most adapted for ecological conditions to Romania. In consequence, the phenotypical similarity between old variety and news clones.

MATERIALS AND METHOD

From the Merlot grapevine variety and its clones, each considered as a monothetic grouping, a number of 30 adult leaves have been collected from the mid third part of the shoot, an area where the variability of ampelographic

characteristics is lowest. Fifty-one points of reference have then been established in the leaf architecture and a number of sixty-eight direct ampelometric measurements have been taken. The data collected has allowed for calculating 53 ampelometric parameters: sums, fraction, etc. (*fig. 1*).

In case of symmetrical characteristics both parameters have been measured and computed. These have allowed for establishing a statistical population consisting of ample series (variation rows) of 30 parameters each, for all of the 121 characteristics under study, and for all the varieties under study.

The genetic material analysed is presented in Table 1

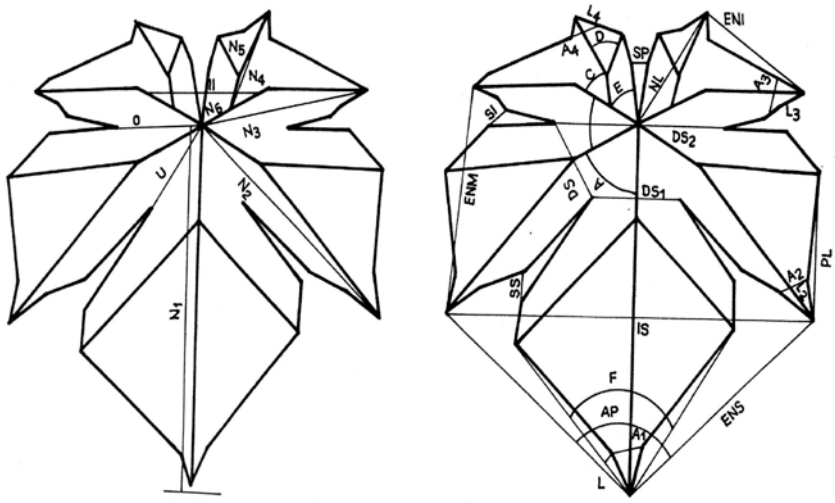

Fig. 1 Ampelometric measurements for leaves of vine varieties

Table 1

Genetical Material Analysed

Genotype	Place of Omologation	Year of omologation
Merlot - population	-	-
Merlot – 8 VI	ICDVV Valea Călugărească	1984
Merlot – 17 Od	SCDVV Odobeşti	1984

RESULTS AND DISCUSSIONS

In view of establishing the dendrogramme of the hierarchized classification of the genetic material, the authors have used the minimal inertia loss principle (the generalized Ward principle), expressed in the numeric value of the similarity index (*figure 2*).

The lower the similarity index, the more phenotypically similar the varieties within the groupings (*figure 3*).

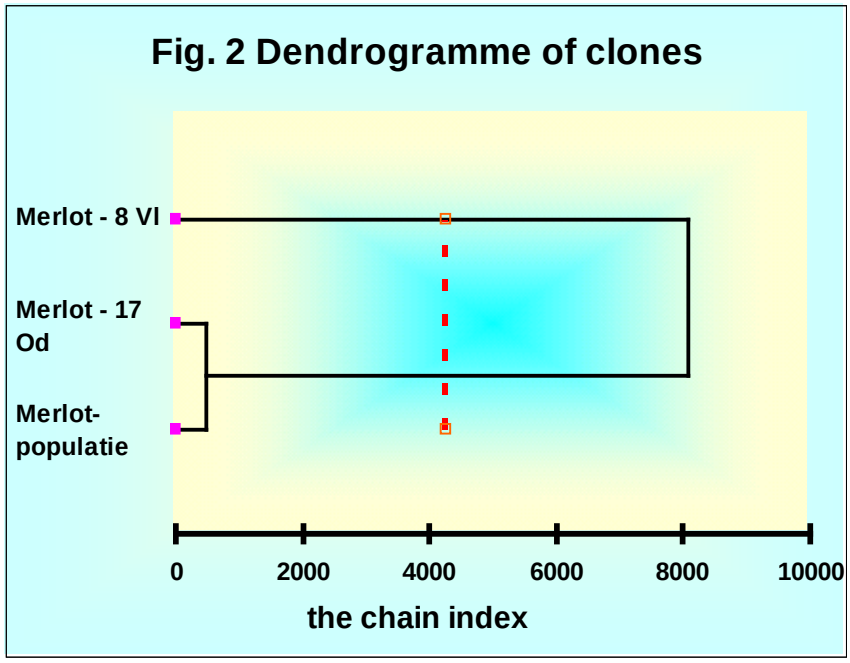
Fig. 2 Dendrogramme of clones
Merlot - 8 Vl
Merlot - 17 Od
Merlot-populatie
0
2000
4000
6000
8000
10000
the chain index

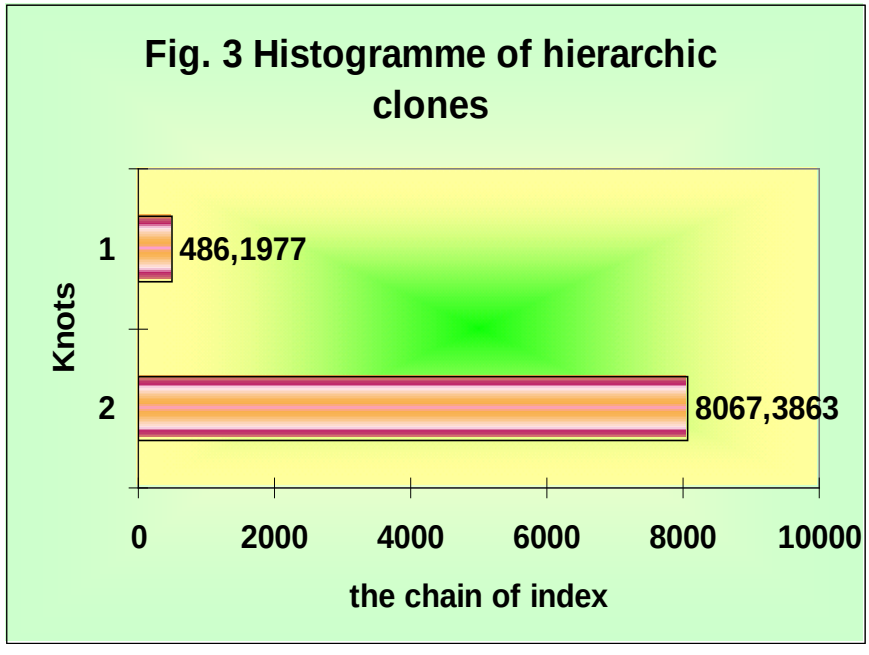
Fig. 3 Histogramme of hierarchic clones
Knots
1
2
486,1977
8067,3863
0
2000
4000
6000
8000
10000
the chain of index

The analysis of the dendrogramme allows for establishing the existence of two major polythetic groupings of the Merlot grapevine clones:

- the grouping containg this clone with the closest phenotypical similarity to the Merlot variety. Within this grouping, the first varieties to aggregate and are, conseqvently most phenotypically similar, are Merlot - 17 Od, chain index node is .486,1977.

- the second grouping includes the Merlot - 8 Vl clone, with a high value of the chain index 8067,3863 compared to the preceding node (*table 2).*

Table 2

Levels of Varieties Chain in Dendrogramme Establishment

Knots structure	Nr. of clones in node	Index Value
Merlot -populatie ~ Merlot - 17 Od	2	486,1977
Merlot - populatie ~ Merlot 17 Od ~ Merlot - 8 Vl	3	8067,3863

CONCLUSIONS

The use of Cluster Analysis in the determination of phenotypical similarities among the Merlot grape vine variety and its clones has evidenced the following:

- a clone was most fenotypical similary of Merlot population is the clone obtained at SCDVV Odobeşti: Merlot - 17 Od.
- the clone Merlot 8 Vl evince a very reduced rich similarity, given the high value of the chain index (8067,3863).

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THE DELIMITATION OF MULTI-CRITERIA CLIMATIC GROUPS ON THE LEVEL OF THE WIN-GROWING REGIONS AND DANUBE'S TERRACES

DELIMITAREA GRUPELOR CLIMATICE MULTICRITERIALE DE LA NIVELUL REGIUNII VITICOLE A TERASELOR DUNĂRII

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Abstract: *The proposals existing on the world level regarding the promotion on large scale of viticulture products of high quality especially emphasize the area of grape vine culture. The quality and typicality of the wine is depending on the natural and human factors. It is known that on the world level as well as in our country, the climate of different viticulture regions determine, to great extend, a diversity of the sorts of cultivated types, of obtained viticulture products, but especially of the wine's quality and typicality. On international level, J. Tonietto and A. Carbonneau, (2000) proposed the adoption of a multi-criteria climate classification (C.C.M.) by using three criteria (multi-criteria) which under the eco-climatic report are represented by three synthetic indicators (the drought index – IS, the helium-thermal index – IH and the night cooling index – IF). This problem became of great actuality for the Romanian viticulture, on the verge of the integration in the European Union. From here it results the necessity of calculating and analyzing the values taken by the multi-criteria indexes (IS, IH and IF), on the Romanian territory, data contoured in the viticulture climates and implicitly in the climatic groups which they form. As a result, these indicators have been calculated also for the viticulture region of Danube's Terraces, using climatic data on a period of up to 100 years.*

Rezumat: *Stabilirea aptitudinii oenoclimatice a unei zone climatice, pe baza folosirii unui singur indicator sintetic, nu este în măsură să aprecieze în mod corespunzător gradul de favorabilitate al unor centre viticole din diferite zone sau subzone climatice şi cu atât mai puţin spectrul larg de cuprindere privind variabilitatea condiţiilor ecoclimatice de la nivelul viticulturii naţionale şi mondiale. Pe plan mondial, s-a trecut în ultima vreme la utilizarea mai multor criterii (multicriterii), respectiv mai mulţi indicatori sintetici, care să integreze principalele componente ale ecoclimatului viticol din timpul perioadei de vegetaţie convenţională, şi anume: indicele de secetă – IS, indicele heliotermic – IH şi indicele de răcire al nopţilor – IF. Aceşti indicatori, folosiţi într-un sistem multicriterial, au fost calculaţi şi pentru regiunea viticolă a Teraselor Dunării, utilizând date climatice pe o perioadă de până la 100 de ani, permiţând astfel evidenţierea diferenţelor de climat din cadrul acestei regiuni, dar şi comparativ cu alte regiuni viticole, oferind posibilitatea de stabilire a climatului viticol pentru fiecare centru viticol în parte, dar şi conturarea grupelor climatice multicriteriale.*

MATERIAL AND METHOD

In order to make this study, there have been utilized eco-climatic dates which concern the heliothermal resources and the hydric resources from the conventional vegetation period, from a number of 8 winegrowing centers from the Danube's Terraces. The obtained data base, was used in calculating the three synthetic indicators which have a eco-climatic

character and are used by the multicriterional method: drought index (IS), heliothermal index (IH) and night cooling index (IF).

This indicators, used in a multicriterial system, had been calculated also for the wine growing center of the Danube's Terraces, using climatic data stretched over a period of 100 years permitting in this way to see the different climate in this region, treat also to compare it with other wine-growing centers, offering the possibility to establish the wine-growing climate for each center, and also to outline the multicriteria climatic groups.

RESULTS AND DISCUSSIONS

The specific climate of viticulture centers on the region of the Danube's Terraces

The viticulture region of the Danube's Terraces composed of eight viticulture centers placed in two vineyards represent a climate that varies in reduced limits thus for the drought index (IS) the values situate within the classes IS_1 (moderate drought climate) and IS_2 (pronounced drought climate); for the night cooling index we find the classes IF_3 (climate with cool nights) and IF_4 (climate with very cool nights); and the helium-thermal index remains constant, being placed only in the variation class IH_4, specific to the warm temperate climate. As a result of the performed calculus we notice differences on the level of the multi-criteria indicators (table 1), thus:

- for the drought index, the majority holds the class of the climate with pronounced drought (IS_2), credited with five viticulture centers and a percentage of 62% of the total;

- for the night cooling index, class IF_4 (climate with very cool nights) holds the largest percentage, respectively six viticulture centers, that is 75%;

- the helium-thermal index is situated, in this region, only in the class of the warm temperate climate (IH_4 – 100%).

Table 1

The statistical of some viticulture climates in region Danube's Terraces

►Indicators	Specification	IS		IH	IF	
		IS_1	IS_2	IH_4	IF_3	IF_4
Viticulture centers	Nr.	3	5	8	2	6
	%	38	**62**	**100**	25	**75**

This fact emphasizes a pass to the very cool nights climate (IF_4 = 75%) and pronounced drought (IS_2 = 62%), based on high helium-thermal resources without being excessive (for their realization contributing the vicinity of the Danube and the lacks in the area).

The climate groups representative for the viticulture region of Danube's Terraces

For this viticulture region we have four climatic groups, unequally constituted with variations from one single center (Zimnicea – IS_1, IH_4 IF_3, Aliman – IS_2 IH_4 IF_3), until maximum four centers for the climatic group IS_2 IH_4 IF_4 (Ostrov, Baneasa, Oltina and Fetesti). It is ascertained that the groups specific to this region are somehow agglomerated, existing a small discontinuity related to the existence of two intermediary climate groups (IS_1 IH_5 IF_3 and IS_2 IH_3 IF_3), which do not present any viticulture centers (figure 1), although the next two climatic groups are populated, even hold the

majority with a percentage of 62%. This underlines the fact that in the two intermediary groups not occupied by viticulture centers, there are favorable conditions for viticulture.

Under climatic report, the four groups do not cover a very large specter of situations, but report only to the two types of predominant climate which are: two climatic groups contain the drought index situated in the class IS_1, resulting in a moderate drought climate, warm temperate, based on cool or very cool nights (IS_1 IH_4 IF_4, IS_1 IH_4 IF_3 – 38%) and the next two groups (IS_2 IH_4 IF_4 and IS_2 IH_4 IF_3 – 62%), present a pronounced drought climate, warm temperate, based on cool or very cool nights.

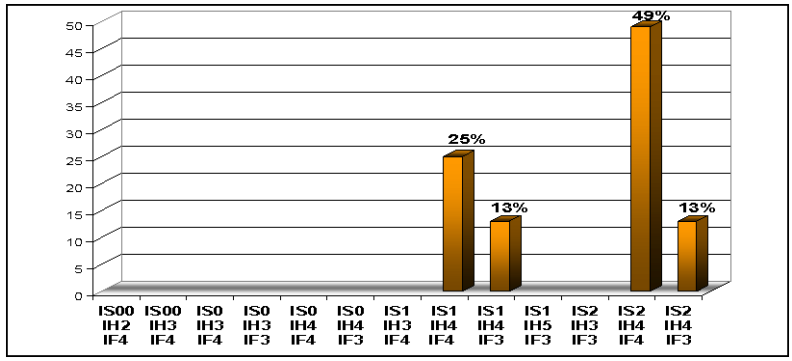

Fig. 1. The disposal of climatic groups in the viticulture region of the Danube's Terraces

The last two groups contoured in the viticulture region of Danube's Terraces that include the drought index situated in the class of IS_2 (pronounced drought climate), hold the majority of the viticulture centers of this region (62% of the total), centers that benefit, under the meteorological aspect, from a precipitations regime of the poorest, a high quantity of solar radiations and rich helium-thermal resources. The orientation of the climatic groups to the right, the credited area with the highest helium-thermal resources, based on a drought climate (moderated to pronounced), makes the cultivation of types for red superior quality wines as well as the table grapes possible. We may conclude that the four climate groups presented here represent 3% of the 120 theoretically possible groups (table 2).

Table 2

THE POSITIONING OF THE MULTI-CRITERIA CLIMATIC GROUPS

for 8 viticulture centers of the region of the Danube's Terraces

The night cooling index	IS_1	IS_2	Observations
	IH_4	IH_4	
IF_4	2	4	IF_4 is stable, contains six viticulture centers composing two climatic groups.
IF_3	1	1	IF_3 is in two climatic groups, with a small number of centers (two).
IF_2			-
IF_1			-

4 = the number of viticulture centers

CONCLUSIONS

1. In the viticulture region of the Danube's Terraces we find, in great measure, a pronounced drought climate (IS_2 – 62%), but we find, in a smaller percentage, the moderate drought climate (IS_1 – 38%). The character of pronounced drought climate from the IS_2 point of view, suggests the existence of an estival drought, with positive influences over the maturation of grapes and the concentration of sugars in must, under these conditions of hydric stress the irrigation must be a current practice.

The helium-thermal resources situate the present region in the area of the warm temperate climate (IH_4), credited with 100%, so the viticulture center benefit, under meteorological aspect, from a large quantity of solar radiation and rich helium-thermal resources, under the conditions of a regime poor in precipitations.

What concern the night cooling index, this is situated, in great measure, in the IF_4 class (very cold nights), reaching a percentage of 74%, class that exerts a benefic influence over the qualitative features regarding the specific flavor of type, the accumulation of anti-oceanic substances and tannin, typicality, etc. The presence of cold nights in September is marked by the variant class IF_3, class that through the taken values allows a good maturation of the grape.

2. According to the multi-criteria evaluation, the group IS_2 IH_4 IF_4 (dominant in this region), is defined as presenting a pronounced drought climate, warm temperate, with very cold nights in September, and it is credited with four viticulture centers and a percentage of 49% of the total. This group, through its particular climate, does not have a correspondent on European level, but on world level: Australia – Nuriootpa, Chile – Santiago, SUA – Medford.

3. The climatic group on the third place as percentage in this region (IS_1 IH_4 IF_3 – 13%) is found at an European level and includes famous vineyards such as: Montelimar inFrance, Anadia in Protugal and Rioja in Spain.

4. Although the viticulture region of the Danube's Terraces is composed of only two vineyard (with a total of with viticulture centers), here we can find four types of viticulture climate, which reach a percentage of 11% of the 38 types real possible that are found in the level of Geo-viticulture.

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THE RESEARCH'S OF INFLUENCE ABOUT ANNUAL GRASSING ON THE GROWTH AND FRUCTIFICATION OF GRAPEVINE IN THE VINEYARD OF ODOBESTI

CERCETĂRI PRIVIND INFLUENȚA ÎNIERBĂRII ANUALE ASUPRA CREŞTERII ŞI FRUCTIFICĂRII VIȚEI DE VIE ÎN PODGORIA ODOBEŞTI

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Abstract. *Considering the nutritional needs of the grapevine and the longevity of the plantation, the soil's nutrients supply must be maintained at a medium level. Under the conditions of the biological viticulture, the environment-friendly method of increasing organic matter in the soil is the use of green fertilizers, which balance all the chemical, biological and physical phenomena taking place in the soil-plant system. In this paper we present the influence of the annual vetch grassing over the main agrochemical indices of the soil in grapevine plantations, on quantity and quality of the yield, under environmental conditions present in the vineyard of Odobesti.*

Rezumat. *Tinând seama de cerințele de nutriție ale viței de vie şi longevitatea plantațiilor, solul trebuie menținut la un nivel mediu de aprovizionare cu substanțe nutritive. In condițiile aplicării viticulturii biologice, metoda nepoluantă de creştere a cantității de materie organică din sol este prin aplicarea îngrăşămintelor verzi, cu rol de echilibreare a tuturor fenomenelor fizice, chimice si biologice ce au loc în sistemul sol - plantă. In lucrare este prezentată influența înierbării anuale cu borceag, asupra principalilor indici agrochimici ai solului în plantațiile de viță de vie, cantității şi calității producției, în condițiile pedoclimatice existente în podgoria Odobeşti.*

Key words: grapevine, green fertilizers, photosynthesis, leaf surface productivity

Obtaining consistent yield, qualitative and constant in time, implies adopting a rational maintenance, fertilization and erosion-preventing system by employing technologies for durable agriculture in grapevine plantations which avoid the pollution of the environment.

In order to meet the requirements of grapevine nutrition and plantation longevity, the soil must be maintained at a medium level of nutrients supply. According to data in the specialized literature, an optimum level of nutrients in the soil is reached when the total nitrogen content ranges from 0.10-0.20%, mobile phosphorus (PO_4 – AL) 30 – 50 ppm, mobile potassium (K_2O – AL) 120 -200 ppm. In the last period of time, grassing has been considered a technological, environmental and economical alternative of maintaining the plantation soil, with the purpose of "balancing" all the physical, chemical and biological phenomena taking place in the soil-plant system.

Under the conditions of biological viticulture practice, the non-polluting method of increasing the quantity of organic matter in the soil is to apply green fertilizers. Therefore, if the floristic composition contains a leguminous plant, which fixes the nitrogen in the atmosphere, the nitrogen in the soil increases. The nitrogen from the

leguminous plant species is easily accessible to plants and the accumulated organic matter is rapidly decomposed in the soil, enriching it in humus. Grassing is an efficient method of maintaining and increasing fertility and also the biological activity of the soil, while the green fertilizers constitute a non-polluting and economical replacement of mineral fertilizers. Thus, if farmyard manure is applied through incorporation at a maximum depth of 35 cm, green fertilizers ensure a proper repartition of the organic substances in the soil.

This paper presents the influence of the annual vetch grassing on the main agro-chemical indices of the soil in grapevine plantations and on the quantity and quality of the yield considering the pedoclimatical conditions in the vineyard of Odobesti.

MATERIAL AND METHODS

Research was conducted inside the experimental perimeter of farm no.1 of S.C.D.V.V. Odobesti, in experimental range cultivated with the Italian Riesling variety, placed on a slope of about 10%.

The experimentation was carried out during the years 2006-2007.

The soil type is aric-cambic blacksoil (according to "Romanian soil clasification"), with carbonates present below the depth of 100 cm, with a clay loam texture and weak settlement and erosion. The soil manifests a weak acid reaction on the surface with a pH value of 6.4-6.7 in the profile; from 90-91 cm the reaction is neutral (pH=7.1) and from 110 -113 cm it becomes weak alkaline (pH=7.8).

The studied experimental variants are:

V1 (control) - fallow land

V2 - strips grassed with vetch/winter fodder, on a ratio of one grassed interval to two fallow land intervals

The planting distance is 1.8 x1.4 m. The form of guiding vines is semi-high, the pruning system: Guyot on half stem with a load of 30-32 eyes per vine (12-13 eyes/m^2).

The purpose of grassing is the increase in soil fertility by enriching it in organic matter, grass acting as fertilizer and anti-erosion agent.

The grassing of intervals using winter fodder (a mixture of peas and oat at a 2:1 ratio and a quantity of 180kg/ha) has been done on an annual basis, through sowing at the beginning of April, on 1.4 m stripes.

In June, when the pea plant was in blossom, the winter fodder was mowed and the resulting plant mass was left to dry on the soil and then incorporated.

During August, soil samples were collected, from a pre-determined profile at depths of 0 -20 cm and 20 - 40cm and chemical analysis were conducted.

In order to establish the effect of grassing on the quantity and quality of the yield, phenological observations were made concerning the vegetation state of the vines and their yielding capacity. In this respect, determinations on the apparent photosynthesis were made, through the measuring the quantity of accumulated dry substance, the productivity of the leaf surface and chemical analysis.

RESULTS AND DISCUSSIONS

The climatic conditions presented in table 1 reflect the development of the natural factors during the research period (2006-2007), with annual distribution and growing period. During the active life of the vine distributed over 197-203 days, a high volume of precipitation was recorded, with values between 506.2mm (in the year 2006)

and 649.8mm (in 2007). The cumulated value surpasses the multiannual average values, however, with an uneven distribution over the growing and fructification phenological phases. The year 2007 recorded a significant precipitation deficit during June and July (50 l/m ²; 37.0 l/m²), determining an important soil-water deficit, associated with high temperatures (monthly average temperatures between 23.1˚C and 25.3˚C, with an absolute maximum of 38.6˚C on the 24th of July). The recorded temperatures were surpassed the multiannual average for that specific period by 2.3-3.4˚C. On the whole, the meteorological context is characterized by high temperatures alternating with dangerous thunderstorms, sometimes with hail. From the recorded meteorological data, we consider the rain to be characteristic in August, in large quantities (128-199.6mm) or in the form of downfalls - figure 1, different from the multiannual meteorological context.

From the data that substantiate the meteorological context we may observe its negative influence on the growth and development of the plants used for grassing and also the cumulated influence on the grapevine.

Table 1

The main climatic elements in the interval 2007-2008

Year	Duration of growing season days	Average annual temperature (°C)	Precipitation sum (mm)		Temperature degrees sum (°C)		Numbers of insolation hours
			anuale	per. de veg.	totale	utile	
2006	197	11,3	663,1	506,2	4393,8	1712,2	1609,4
2007	203	12,3	917,1	649,8	4591,6	1867,1	1747,5
Multiannual average values	193	10,5	598,0	389,2	3480,0	1521,2	1526,9

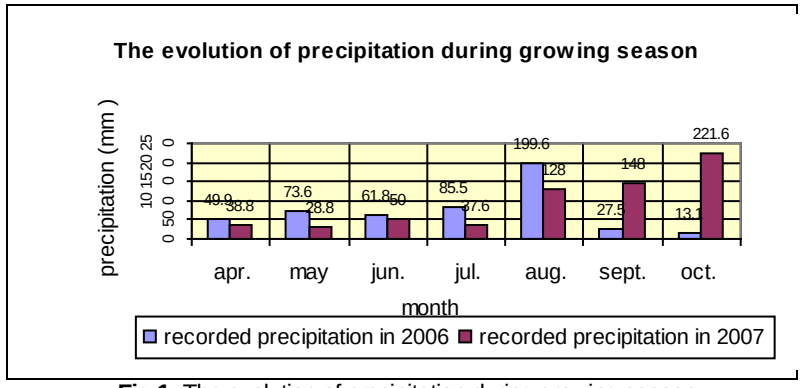

Fig.1: The evolution of precipitation during growing season

The data presented in table 2 illustrate the biometric and quantitative features of the plants used for soil grassing. Thus, the values recorded during 2007 are clearly lower than those from the previous year, due to unfavorable weather conditions in the growing period (May-June), respectively precipitation under 150 mm, unevenly distributed and excessive temperatures.

The total quantity of dry mass incorporated in the soil ranges from 0.33-0.38 kg/m² in peas and 0.32 - 0.36 kg/m² in oat.

The data about the chemical analysis of soil samples, collected on the 11th of August 2007 are presented in table 3. Thus, the soil from the experimental lot V2 shows a weak acidic reaction with pH values of 6.17-6.28 and a higher humus content on the surface (1.9-2.2%) compared to the control (V1), which presents a soil with neutral reaction (7.0-7.13) and a lower humus content (1.6-1.7%). In the grassed variant the mineral nitrogen content has close values on the two depths (0.079-0.084ppm), values which are superior to those of the control (0.079-0.084ppm).

Compared to the fallowfield, in the grassed variety the soil content becomes richer in K2O and PO4. Thus, in the control lot (V1), the mobile phosphorus content is very low (14.0 ppm at a depth of 20-40 cm and 25 ppm at the depth of 0-20 cm) and the mobile potassium content is medium, with values ranging from 120 and 145 ppm.

Table 2

Biometric and quantitative plant features

Specification/plants culture	Period of crop (Years)		Average 2006-2007
	2006	2007	
Peas			
Number of plants/mp	60,00	32,00	46,00
Inaltimea medie a culturii (cm)	80,00	49,30	64,65
Green mass quantity (kg/mp)	1,60	0,65	1,13
Root quantity (kg/mp)	0,69	0,49	0,28
Dry mass quantity (kg/mp)	0,38	0,33	0,36
Oat			
Number of plants/mp	135,00	130,00	132,5
Inaltimea medie a culturii (cm)	70,00	38,70	54,35
Green mass quantity (kg/mp)	0,74	0,92	0,83
Root quantity (kg/mp)	0,60	0,58	0,59
Dry mass quantity (kg/mp)	0,36	0,32	0,31

In the grassed lot (V2, the values for mobile phosphorus and potassium, expressed in ppm are high: 46-58 ppm (P) and 165-225 ppm (K).

The degree of base saturation (V) is over 90% in both variants and constitutes a favorable value for grapevine culture.

Table 3

The nutrients content of the soil

Variant	Depth (cm)	pH (watery)	Humus (%)	N total (%)	P mobile (ppm)	K mobile (ppm)	V (%)
V1	0-20	7,0	1,7	0,079	25	145	96,0
(Mt)	20-40	7,13	1,6	0,084	14	120	96,4
	0-20	6,17	2,2	0,104	58	225	90,1
V2	20-40	6,28	1,9	0,094	46	165	91,2

The eco-climatic conditions, different from those usually recorded in the Odobesti vineyard, led to the disturbance of all the biochemical processes which take place in the leaves of the grapevine.

Photosynthesis as growth process in ensuring the vegetative growth and yield, is sensitive to the moisture deficit in the soil and air, cumulated with the level of high temperatures. Photosynthesis functions under optimum conditions when the relative air hygroscopicity is of 70-75% and decreases strongly when the hygroscopicity drops under 40%. The soil moisture influences photosynthesis intensity because it correlates proportionally with the humidity of the leaves, and drought periods longer than 40 days decrease photosynthesis by one third. (C.Tardea, L. Dejeu, 1995).

The experimental data obtained, during the research of the two variants indicates a decrease of the photosynthetic activity (by 2.23-4.0 mg.su./dm²/h) in the phenological phases of growth and ripening of the grapes, in 2007 compared to the previous year, when the value of the soil moisture deficit was under 20% of the AUR, and the registered average daily temperatures were above the normal temperatures of the respective periods. The photosynthetic activity records values close to the two variants, slightly lower only in the phenological phase of the growing of grapes, in the year 2006 in the grassed lot (11.4 mg.su/dm²/h in the grassed variant and 12.7 mg.su/dm²/h in the control lot) - table 4.

Table 4

Photosynthesis intensity dynamics

Varianta	Soil maintenance system	Photosynthesis intensity dynamics (mg.s.u./dm^2/ora)					
		Grape growth		Ripeness		Full maturation	
		2006	2007	2006	2007	2006	2007
1(Mt)	Ogor negru	12,7	9,50	7,88	4,72	6,12	5,25
2	Grassed	11,4	9,17	7,75	4,27	5,97	5,00

The biologic potential of the Italian Riesling variety in the fallow field variant (V1) expressed through the productivity indices with values of relative and absolute recorded higher values in 2006 than the grassed variant (V2). Thus, the relative productivity index records values ranging from 136.5 (V1) to 127.4 (V2), and the absolute productivity index ranges from 63.0 (V1) to 71.5 (V2) table 5.

Table 5

The quantity and quality of grape yield and leaf surface productivity

Studied elements		2006		2007	
		V1(Mt)	V2	V1Mt)	V2
Fertility	C.f.r	1,30	1,30	1,34	1,29
	C.f.a	0,60	0,73	1,13	1,04
Number of clusters per vine		24	26	35	35
Weight of a cluster (g)		105,0	98,0	63,0	69,0
Productivity	l.p.r	136,5	127,4	84,8	88,7
	l.p.a	63,0	71,5	71,1	71,3
Leaf surface (m^2/vine)		4,16	3,96	3,81	3,68
Yield (kg/vine)		2,50	2,55	2,21	2,36
Sugar	g/l	182	185	202	203
	g/vine	318,5	329,3	288,9	309,1
Leaf surface productivity (cm^2/1g sugar)		130,6	120,2	131,8	119,0

During 2007, insufficient precipitation with uneven distribution in the first part of the growing period together with very high temperatures caused, physiologically, critical periods for the grapevine which reflected in reduced offshoot grow and implicitly smaller leaf surface, respectively 3.81mp (V1) and 3.68 mp (V2) and reduced production capacity of the vines, compared to 2006.

In the studied variants, productivity indices have close values, slightly higher in the grassed variants (the absolute productivity index has a value of 84.8 in V1 and 88.7 in V2). The sugar quantity accumulated in the grapes was higher in the grassed variant, with average values between 182-202 g/l, compared to the control variant which recorded 185-203 g/l.

The productivity of the leaf surface of vines in control variant (V1), expressed in cm^2 of leaves for a gram of sugar, has values of 130.6-131.8, being lower than in the grassed variant recorded values between 119.0-120.2.

CONCLUSIONS AND RECCOMENDATIONS

1. The experimental period 2006-2007 is characterized by a significant annual water supply (663.1-917.1 mm) with periods of drought followed by periods with surplus from the pluviometric point of view, not characteristic of the vineyard of Odobesti, but with an annual precipitation sum higher than the multiannual average.

2. The analysis of the main chemical properties of the soil in the variant grassed with winter fodder highlights an increase in the humus quantity n the soil after incorporating the plants and their decomposition, up to 2.2%, a good supply of phosphorus (46-58ppm) and very good one of potassium (165-225 ppm).

3. Under the pedological and anvironemental conditions at SCDVV Odobesti, the interval grassing for two consecutive years ensured the improvement of the enrichment soil with organic matter, the increased mobility of the nutrients, a better sugar accumulation in the grapes (203 g/l) and also a slight increase of the leaf surface productivity (119 cm^2 leaves for the accumulation of a gram of sugar).

Based on the data obtained during the experiment, we recommend that at the moment of determining the soil maintaining system the following factors should be taken into consideration: the climatic conditions of the area, the quantity of precipitation and the distribution during the growing period, the type of soil, the cultivated varieties and grapevine culture particularities and also the reciprocal conditioning of the parameters.

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THE CLONE PLANTATIONS – A STRATEGY FOR THE OBTAINING OF QUALITY PRODUCTIONS

PLANTAȚIILE CLONALE - O STRATEGIE PENTRU OBȚINEREA PRODUCȚIILOR DE CALITATE

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Abstract. *The Romanian viticulture is currently facing a real problem due to the existence in the culture of many sorts which are valuable from a qualitative point of view but which do not ensure constant productions from one year to the next and which can not adapt to the pedo climatic existing natural conditions. Therefore one must start, taking into account the demands on the market, but also in order to be able to respond to the requirements of the European union, a phase of modernization by means of restructuring the types of sorts, by extending into production of the valuable clones and selections of these sorts in order to diversify the vine-viticulture products and to improve their quality. Therefore, the choice of the clone selection which manifests the highest degree of adapting to the eco pedo climatic conditions and which presents increased resistance to the stress of the environment factors as well as the approach to a complex study regarding the fund of the autochthon clone germoplast by using it in the increase of the certified biological material in order to recreate the plantations and create the polyclonal vineyards are important possibilities of development in the wine-viticulture industry of Romania.*

Rezumat. *Viticultura românească se confruntă actual cu o problemă reală datorită existenței în cultură a multor soiuri valoroase din punct de vedere calitativ, dar care nu asigură producții constante de la un an la altul şi care nu se pot adapta condițiilor naturale pedoclimatice existente. Se impune astfel, ținând cont de cerințele pieții, dar şi pentru a putea raspunde cerintelor Comunitatii Europene o etapă de modernizare, prin restructurarea sortimentelor de soiuri, prin extinderea în producție a clonelor şi selecțiilor valoroase a acestor soiuri în scopul diversificării produselor viti-vinicole şi a îmbunătățirii calității acestora. Ca urmare, alegerea selecții clonale, care manifestă cel mai mare grad de adaptare la condițiile ecopedoclimatice şi care prezintă rezistențe sporite la stresul factorilor de mediu, precum şi abordarea unui studiu complex asupra fondului de germoplasma clonala autohtonă prin punerea în valoare a acesteia cu înmultirea materialului biologic certificat în scopul refacerii plantatiilor şi înființarea podgoriilor policlonale, constituie importante posibilități de dezvoltare a industriei vitivinicole din România*

MATERIAL AND METHOD

In order to reach the proposed goal one has taken into the study the clone selections of the Grasa de Cotnari (4 Pt, 45 Pt), Tamaioasa Romaneasca (36 Pt), Babeasca Neagra (94 Pt), Muscat d'Adda (5 Pt), Muscat de Hamburg (4 Pt), Busuioaca de Bohotin (26 Pt) sorts. They can be found in the Ampelographic collection of the Pietroasa viticulture center. No matter what the selection was they were carried out on the semi stalk and the type of cutting was the Guyot on the semi stalk, with only eyelets / vine.

In order to determine the agro biological and technological potential of the experimental variants taken in the study one has analyzed the following indicators – the

percentage of viable eyelets / vine, the fertility absolute and relative coefficients, the productivity indices (absolute and relative ones), the average weight of a grape, the mass of 100 grapes, the production assessed from a quantitative (kg/ vine) point of view and from a qualitative point of view, the sugars concentration (g/l), the contents of total acidity (g/l tartric acid), the contents of antocyans (mg/kg). The aspects mentioned above have been determined for all the experimental variants at the moment of full maturity for each individual viticulture sort , but fir the preliminary study proposed one has analyzed the results only for one year of harvest, due to the fact that the comparative analysis of these sorts has been thoroughly studied.

RESULTS AND DISCUSSIONS

The analysis of the main meteorological factors per the period of sowing

In order to analyze the behavior of the clone selections in the climatic conditions of the Pietroasa viticulture center, the data we have used have been extracted from the own data base of the Meteorological institute and the main values of the average meteorological parameters of the studied interval of 2006-2007 were compared with the average, determined as being the multi annual average. From a climatic point of view, the viticulture year of 2006-2007 was characterized by unusually high temperatures during summer (41.1 °C- 23.07) accompanied by little precipitations, one noting unfavorable climate conditions in the months June -July which determined a speeding of the process o maturity, this fact influencing in an unsatisfactory way the quality of the production. The registered relative draught caused the burning of the leaves and the wilting of the clusters as well as the growth of the grapes and the accumulation of a smaller quantity of antocyans, thusly having a negative effect on the quality of the production as well as on its quantity.

Analyzing from a comparative point of view the representation of this index from table 1 for the viticulture center of Pietroasa, one finds the following: the average value of 1.49 shows that the vineyard has high helio thermic resources and the obtained value surpassed with only 0.06 the average multi annual value. This shows that mainly in this vineyard one can cultivate table sorts and sorts of wine with early and medium maturity.

The average value of this coefficient is for the viticulture center of Pietroasa in accordance with the multi annual averages 0f 1.07 and for the viticulture year of 2006-2007 – 0.61 therefore low resources showing that from the point of view of the hydric resources in the vineyard one can cultivate sorts for the obtaining of the quality wines (demisec and sweet) but also wines for current consumption and raw material for distillation. In the conditions of the Pietroasa viticulture center the bioclimatic index has an average value of 7.56 in accordance with the multi annual averages registered in the vineyard and of 10.40 for the year 2006-2007, one noting as general aspect a very large spectrum of this index which locates the vineyard on the upper limit of favorable characteristics, in comparison with the multi annual average for the region, thusly reflecting very favorable conditions for growth and ripening on one hand, and on the other hand the obtaining of a production at the most times of a superior quality, irrespective of the analyzed category of sorts.

From the point of view of this index, the average values registered are of 4880.4 in accordance with the multi annual registered averages in the vineyard and 5072.7 for 2006-2007 which places the viticulture center in one of the classes with high favorable characteristics in regard to the obtaining of superior quality wines as well as the culture of the table sorts. The values registered in the period of experimentation offered the possibility of obtaining some exceptional quality wines, placing the viticulture center of Pietroasa in one of the classes with high favorable characteristics in regard to this point of view. The assessment of the agro biological and technological capabilities of the studied clone selections in the eco pedo climatic conditions of the viticulture center of Pietroasa carried out by means of indices of productivity shows that the genotype has a direct connection with this index and their average values are also influenced by the climate conditions.

The average eight of one grape (g) Together with the number of grapes per vine, the average weight of a grape can be considered the second element of the measuring of the production of grapes per vine, which determines the production of grapes which can be obtained per one hectare.

The smaller or greater weight of one grape also presents such a special practical importance, being a biological characteristic of each sort, naturally modified within certain limits of the eco pedo climatic conditions, of the different production direction, the culture technologies, the supports used etc.

The analysis of the data will be carried out punctually from now on, in accordance with table 2, taking into account the particularities of each clone selection, their capabilities as well as the production direction. The clone selections of Grasa de Cotnari 4 Pt and 45 Pt register values of the average weight of a grape within the normal limits specific for the sort, 130 g (Pt) and 140 g (45 Pt). The analyzed average weight of a grape proves that at clone level there are no great differences and where there are any differences they are non ensured from a statistical point of view.In what regards the selections of the Tamaioasa romaneasca sort one notes differences among them, differences which will be felt also at the level of the obtained production. Thusly the clone 38 Pt has the average weight of a grape of 120 g and the clone 5 Pt that of 133 g. For the selection Busuioaca de Bohotin 26 Pt this parameter does not register values which are different from the population of the sort, the weight being practically classified within the limits of the sort (90 g).Analysing the results obtained for the Babeasca neagra 94 Pt selection one notes that there are no values registered as different for the population of the sort, the weight being classified practically within the limits of the sort (120 g). In the case of the clone selections of the table sorts of Muscat de Hamburg 4 Pt and Muscat d'Adda 5 Pt, the values of this parameter are also registered within the limits of the average values obtained by the populations of the 2 sorts, 186 g for the Muscat de Hamburg sort and a little larger for the Muscat d'Adda sort, 195 g.

The mass of 100 grapes (g). In this sector one has noted significant differences only for the sorts of Grasa de Cotnari and Tamaioasa romaneasca, one being able to make the comparison due to the existence of the 2 selections, and in the case of the other selections one can make the mention that they classify within the average normal limits of the sorts from which they have been selected.

The sugars (g/l tartric acid). From the total fund of gathered data, the carried out study selects the particularities of the levels of the main parameters which define the quality of the grapes, under the influence of the climate elements as well as the assessment of the qualitative value of the production. The climate conditions have influenced in great extent the ripening of the grapes, from the point of view of the dynamics of ripening one noted an advance of 7-10 days. The Grasa de Cotnari sort is recognized from the point of view of its production quality, registering high accumulations of sugars accompanied by an average production, favorable for the obtaining of white wines of superior quality. For this viticulture year the clone selections of the Grasa de Cotnari sort accumulate great quantities of sugar, ranging from 239 g/l for 4 Pt and 237 g/l for 45 Pt, followed by the selections of the Tamaioasa romaneasca sort with sugar accumulations ranging between 237-238 g/l and at a very short distance the selections of the Busuioaca de Bohotin sort, 234 g/l.One notices also that the selection of the Babeasca neagra 94 Pt sort has accumulated sugars at the superior limits of the sort, 198 g/l allowing the obtaining of a wine with a rather high alcoholic potential. In the case of the clone selections of the Muscat de Hamburg 4 t and Muscat d'Adda 5 Pt table sorts, the values of this quality parameter were also classified within the limits of the average values obtained for the populations of the 2 sorts, 187 g/l for the Muscat de Hamburg sort and a little lower for the Muscat d'Adda sort, 183 g/l. However for all the selections one notes that practically there is a determining influence of the genotype on the accumulations of sugars in the grapes, being practically a hereditary characteristic. From the resulted data regarding this quality parameter one can reach the following conclusion with synthetic character – there is an intrinsic connection between this index an the genotype, this being practically a genetic characteristic.

The acidity g/l. The contents of acidity present a special importance for the obtaining of some finite products of superior quality. The level of acidity has been correlated with the quantity of sugars accumulated in the grapes of the experimental variants, one noting that it was accompanied by approximately equal values between the experimental variants noting that they vary not only in relation with the genotype but also in relation to the climate conditions. For the total acidity of the stum (g/l tartric acid) in the experimental variants subjected to the comparative study there were minimal differences which did not surpass 0.1 g/l, difference maintained both at the level of medium effect as well as at the clone level.

The production kg/grape vine. The grape production of the comparatively studied experimental variants in the eco pedo climatic conditions of the Pietroasa viticulture center in the viticulture year of 2006-2007 have varied from one year to another being especially influences by the climate conditions, but also by the productive potential of these cloned species, as well as by the aspect of the health condition. One deems that this year, 2007 is a difficult year, excessively dry in summer and rainy in autumn.Comparing the average values one finds that the Grasa de Cotnari 45 Pt selection has supplied a higher production of grapes (0.810 kg/grape vine- 3.37 t/ha) that Grasa de Cotnari 4 Pt(0.7 kg/grape vine- 2,91 t/ha).

Table 1

The synthesis regarding the quantitative and qualitative production obtained with the 8 homologated clone selections in the Pietroasa viticulture centre

The viticulture year	Experimental variants (clone selections)	Average weight of grape (g/l)	Weight of 100 grapes (g/l)	Sugars g/l (H2SO4)	Acidity g/l	Production kg/grape vine	Production t/ ha	The degree of attack (Botrytis cineara)
	Clones for superior white wines							
2007	Grasa de Cotnari 4 Pt	130	120	239	3.44	0.700	2.91	0
	Grasa de Cotnari 45 Pt	140	125	237	3.46	0.810	3.37	0
	Clones for aromatic wines							
	Tamaioasa romaneasca 36 Pt	120	110	238	3.44	0.770	3.2	0
	Tamaioasa romaneasca 5 Pt	133	115	237	3.45	0.800	3.33	0
	Clones for rose wines							
	Busuioaca de Bohotin 26 Pt	90	80	234	3.45	0.800	3.33	0
	Clones for read wines for current consumption							
	Babeasca neagra 94 pt	120	110	198	4.00	0.880	2.93	0
	Clones for table grape sorts with medium maturity							
	Muscat de Hamburg 4 Pt	186	143	187	4.6	1.00	4.1	0
	Muscat d' Adda 5 Pt	195	154	183	4.5	1.10	4.58	0

In the case of the two clone selections of the sort Tamaioasa romaneasca the productions were classified in the limits of the production capacities of the sort, aiming at the obtaining of a quality production thusly: 0.77 kg/grape vine (3.22 t/ha) respectively 0.800 kg/grape vine (3.33 t/ha).

In the case of the Busuioaca de Bohotin 26 Pt clone selection the production also classifies within the limits of the production of the sort, aiming at the obtaining of a quality production thusly: 0.60 kg/grape vine (2.49 t/ha). The production obtained at the Babeasca neagra 94 Pt is rather small, only 0.880 kg/grape vine (2.93 t/ha).In the case of the Muscat de Hamburg 4Pt and Muscat d'Adda 4 Pt selections the grape production, as an expression of the degree of valorification at the highest degree of the eco pedo climatic conditions of a viticulture center was not very large, 1 kg/ grape vine for the first selection (4.1 t/ha) and for the second selection 1.1 kg / grape vine (4.58 t/ha).

In what regards the quality of the production from the point of view of the state of health one notes that the production was healthy 100%, the degree of attack of *Botrytis cinerea* being equal to zero.

CONCLUSIONS

- the physical geographical frame specific for the Pietroasa viticulture center allows the economical culture of the clone sorts and selections with early-medium and medium maturity, like the sots Grasa de Cotnari, Tamaiosa romaneasca, Busuioaca de Bohotin, Babeasca neagra, Muscat de Hamburg, Muscat d'Adda in order to obtain some DOC quality wines as well as some high merchandise productions, in the case of the clone selections of the analyzed table sorts.

- the success of the integration of the clone selections studied in the ecosystem of the viticulture center of Pietroasa is favored in its entirety by the total of the active thermic balance as well as by the quantities of fallen precipitations which allow the meeting of the main requirements which are necessary for the obtaining of some superior quality wines of the DOC type.

The total of the obtained results from the point of view of the agro biological and technological behavior lead to the idea that the clone selections taken for the study can be multiplied with success in order to obtain an autochthon certified biological material, at the sale time justifying the necessity of their introduction and extension in the culture.

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STUDIES CONCERNING THE IMPACT OF THE CROP TECHNOLOGIES ON THE RESILIENCE CAPACITY OF THE VITICULTURAL ECOSYSTEMS

STUDII PRIVIND IMPACTUL TEHNOLOGIILOR DE CULTURĂ ASUPRA CAPACITĂȚII DE REZILIENȚĂ A ECOSISTEMELOR VITICOLE

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Abstract. *The influence of the grapevine technologies on the viticultural ecosystem and, respectively on the resilience capacity (tolerance of the dynamic good balance of an ecosystem to the action of anthropogenic factors) was highlighted by the researches which were carried out in Valea Calugareasca viticultural center within 2006-2007. Three technological factors were taken into study: soil maintenance system, fertilization system and disease/pest control system inside three sub-types of viticultural ecosystems: plateau, slopes arranged and not arranged in terraces. The experimental results obtained outlined that under the ecoclimatic conditions characterized by high helyothermic regime and poor water resources, the experimented technological variants had differentiated impact on the resilience capacity of the viticultural ecosystem. The resilience capacity of the viticultural ecosystems taken into study was generally ensured within the experimental variants (CV < 15%), in respect of the pest and disease control system, of the soil management system and of the fertilization system, too. Under conditions of pedological drought, the permanent herbage of the intervals between the grapevine rows represented a technological intervention which determined a diminution of grapevine fertility and productivity.*

Rezumat. *Influența tehnologiilor de cultură asupra ecosistemului viticol şi respectiv a capacității de rezilință (toleranța echilibrului dinamic al unui ecosistem la acțiunea factorilor antropogeni). a fost pusă în evidență prin cercetările efectuate în centrul viticol Valea Călugărească în perioada 2006-2007.Au fost luați în studiu 3 factorii tehnologici:sistemul de întreținere a solului, sistemul de fertilizare şi sistemul de combatere a bolilor şi dăunătorilor în cadrul a 3 subtipuri de ecosisteme viticole:platou, versant neamenajat şi versant terasat. Rezultatele experimentale obținute au evidențiat faptul că în condițiile ecoclimatice, caracterizate printr-un regim heliotermic ridicat, pe fondul unor resurse hidrice reduse, variantele tehnologice experimentate au avut un impact diferențiat asupra capacității de rezilință a ecosistemului viticol.Resilience capacitya ecosistemelor viticole luate în studiu a fost, în general asigurată în domeniul variantelor experimentale (CV < 15%), atât în ceea ce priveşte sistemul de combatere a bolilor şi dăunătorilor viței de vie, cât şi în privința sistemului de lucrare a solului şi a celui de fertilizare.*
În condiții de secetă pedologică, înierbarea permanentă a intervalelor dintre rânduri a reprezentat o intervenție tehnologică ce a determinat o reducere a fertilității butucilor de viță de vie şi a productivității acestora.

The functioning of the viticultural ecosystem and its productive capacity may be modified by the action of the anthropic factors represented by the applied culture technologies (Dejeu and Matei, 1996; Fregoni, 1998; Avenard and colab., 2003; Cozzolino, 2004)

The research performed in the Valea Călugărească viticultural centre during 2006-2007 focused on establishing the influence of some differential systems of soil maintenance, viticultural plantations fertilization, disease and vine pest control of the viticultural ecosystem and its resilience capacity

MATERIAL AND METHOD

The experimented technological factors were:

A Factor: Vine pest and disease control system, with the degrees:

a_1 – chemical control; a_2 – integrated control; a_3 – biological control.

B Factor – Soil maintenance system with the degrees:

b_1 – black field; b_2 – black field + selective herbicidation; b_3 – permanent grass growing; b_4 – soil mulch.

C Factor – Fertilization system, with the degrees:

c_1 – not fertilized; c_2 – organic fertilization; c_3 – mineral fertilization (on DOExp level); c_4 – organic - mineral fertilization.

The research has been performed within 3 ecological stationeries located under different relief and soil conditions, namely:

S_1- Ecosystem of the vine plantations under plateau conditions (hill top) - Cabernet Sauvignon variety;

S_2- Ecosystem of the vine plantations located on wild hill side (14-16% slope)- Italian Riesling variety;

S_3- Ecosystem of the vine plantations located on terraced slope (broad 17.2 m terraces with 8 rows of vine) – Merlot variety.

The viticultural ecosystem dynamic balance's tolerance to the anthropic factors represented by the applied culture technologies represents the "resilience capacity" of that particular system.

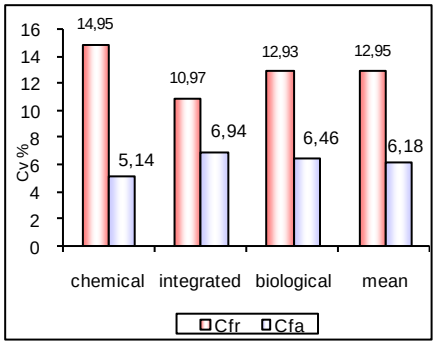
In order to assess the "*resilience capacity*" of the viticultural ecosystems, a series of synthetic indicators have been taken into consideration, that may quantify the viticultural ecosystem operation: fruitage constant, vine cenosis productivity expressed into productivity indexes and the grape production (kg/grape vine) and the vine cenosis productive quality, preserving useful entomofauna.

The variation coefficient (CV%) of the above-mentioned synthetic indicators has been used in order to express and delimit the resilience capacity. For the normal functioning of the viticultural ecosystem, a maximum 15% variation of these indicators was considered acceptable.

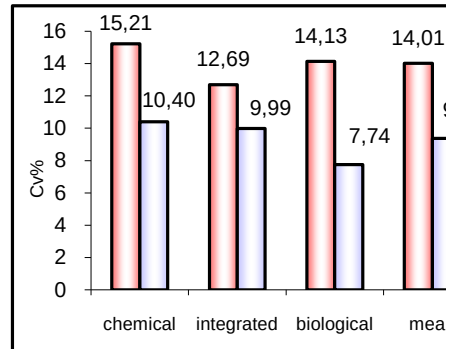
RESULTS AND DISCUSSIONS

Resilience capacity according to the vine pest and disease control system

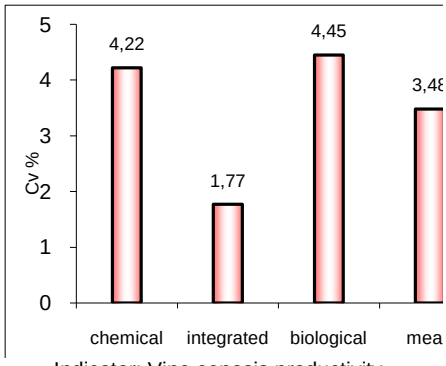
Analyzing the variation coefficients of the main synthetic indicators one may notice that in terms of expressing the resilience indicators the maximum values of the variation coefficients generally have not overrun the 15% value for the fertility, productivity indexes, grape production and its quality coefficients (Fig.1).



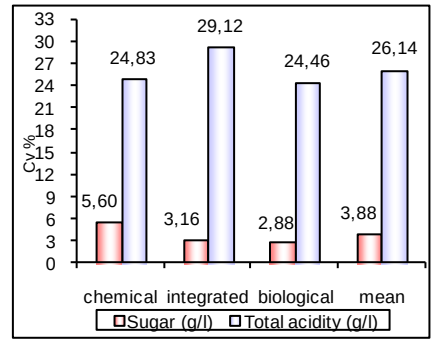
Indicator: Fruitage constant



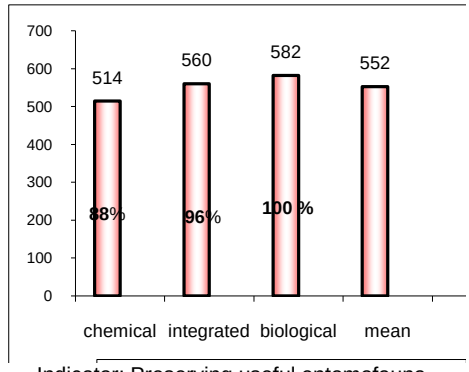
Indicator: Vine cenosis productivity
(expressed into productivity indexes)



Indicator: Vine cenosis productivity
(expressed into grape production)



Indicator: Vine cenosis productive quality



Indicator: Preserving useful entomofauna

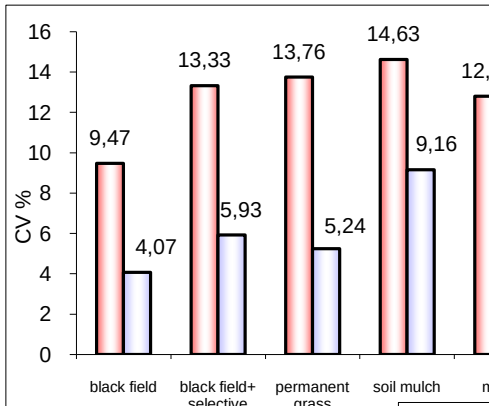
Fig. 1- Resilience capacity according to the vine pest and disease control system

In case of wort acidity, the variation coefficient had high values, over the resilience level, due to the fact that the Italian Riesling variety grown within S_2 (unarranged slope) recorded a very low wort acidity, being a drought sensitive variety.

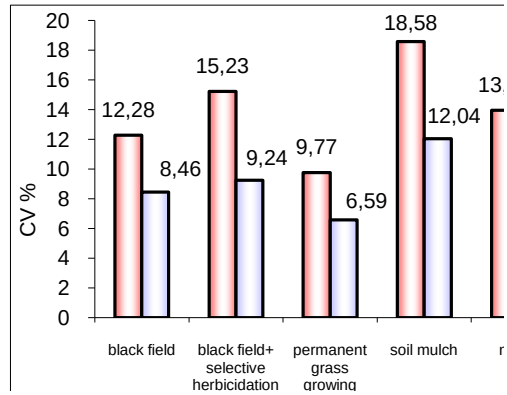
Regarding the abundance of useful entomofauna, it was noticed that the controlling system that assured the greatest abundance (no. of species and no. of individuals/species) was the biologic control system. Compared with this system, the other two controlling systems: chemical and integrated ones have determined a 12%, respectively 4% reduction of the useful insects populations, that do not affect the resilience capacity.

Resilience capacity according to soil maintenance system in viticultural plantations

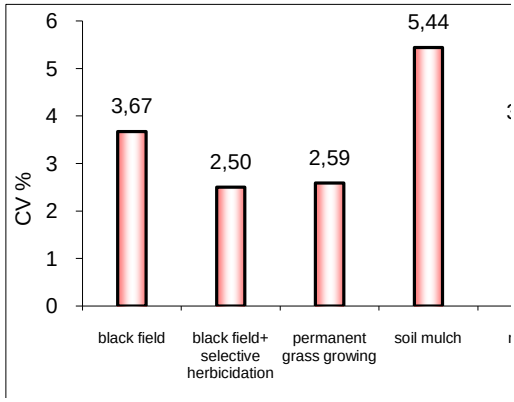
Regarding the influence of the soil maintenance systems over the ecosystem's resilience capacity, variation coefficients values have been higher, emphasizing their higher impact on the ecosystem's functionality (Fig.2)



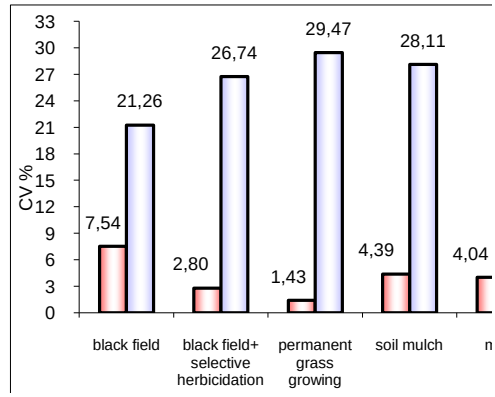
Indicator: Fruitage constant



Indicator: Vine cenosis productivity (expressed into productivity indexes)



Indicator: Vine cenosis productivity (expressed into grapes production)



Indicator: Vine cenosis productive quality

Fig. 2 – Resilience capacity according to soil maintenance systems

Analyzing the variation coefficients values, it was noticed that generally, the viticultural ecosystem's resilience capacity was assured for the soil

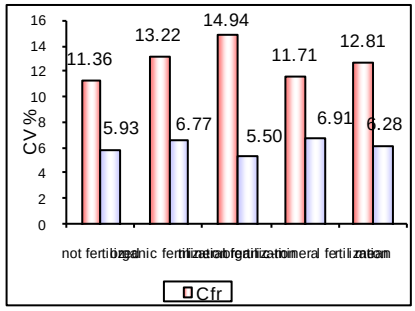
maintenance systems regarding the fruitage constant and the grape production quality, the CV values not overpassing the 15% threshold. As for the vine cenosis productivity and wort acidity, the variation coefficient took over higher values than 15%, overpassing the viticultural ecosystem's resilience capacity.

In the two years of research with shortage of water values, during the vine vegetation period (especially in 2007), the soil maintenance by permanent grass growing had a negative impact on the viticultural ecosystem, negatively influencing the grape vine fertility and consequently the vine cenosis productivity.

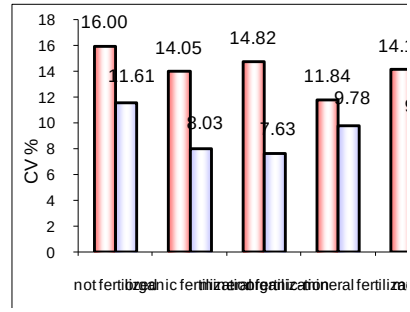
Regarding the grape production quality, there was no negative influence noticed on the grapes sugar content while wort acidity is lower. Using mulch with green fertilizers remains (sowed in spring, hashed and left on the ground as mulch) contributed to the increase of grape vine productivity and implicitly to the grapes/grape vines production, due to the fact that under the aridity conditions recorded during the two years of research, this system enabled the maintenance of soil humidity reducing surface evaporation.

Resilience capacity according to soil fertilization system in viticultural plantations

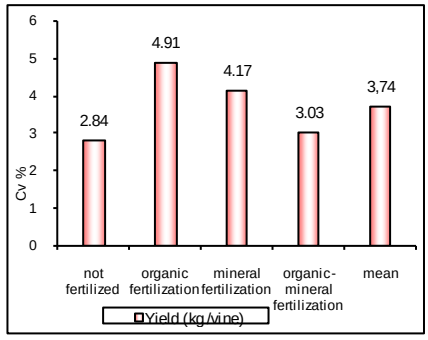
For the fertilization systems, the resilience capacity of the viticultural ecosystems has been ensured, the variation coefficient taking over lower values than the 15% threshold (Fig 3).



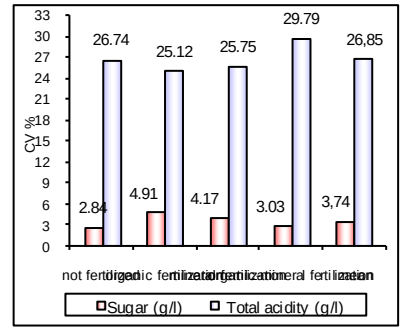
Indicator: Fruitage constant



Indicator: Vine cenosis productivity (expressed into productivity indexes)



Indicator: Vine cenosis productivity (expressed into grapes production)



Indicator: Vine cenosis productive quality

Fig. 3 – Resilience capacity according to soil fertilization systems

The only exception was recorded for wort acidity, for which the variation coefficient's values are higher than 15%.

A positive influence over the fruitage constant and the vine cenosis productivity was induced by the organic and organic – mineral fertilization ensuring the greatest grape productions.

In case of vine plantations non-fertilization, the fruitage constant as well as the vine cenosis productivity decreased, the CV taking over > 15% values for Ipr, which emphasizes that no fertility may cause a disturbance of the viticultural ecosystems' functionality, especially under stressing eco-climatic conditions and intensive exploitation of the viticultural plantations.

As for grapes production quality there is no significant influence induced by a certain fertilization system over the sugar content in the grapes and wort acidity.

CONCLUSIONS

1. The viticultural ecosystems' resilience capacity studied was generally ensured in the domain of the experimented technological variant, regarding vine pest and diseases control system, as well as the soil maintenance and fertilization systems.

2. The control systems differently influenced the useful entomofauna preservation, the biologic control system ensured the greatest abundance of the useful insect populations compared with the other two controlling systems: chemical and integrated.

3. Under pedologic drought, the soil maintenance by mulch with green fertilizer remains, contributed to the increase of grape production, due to the fact that this system enabled the maintenance of soil humidity reducing surface evaporation. The permanent grass growing of the paths between the rows was a technological intervention that induced the fertility reduction and the grape vines productivity, overpassing the viticultural ecosystems' resilience capacity.

4. The organic and organic-mineral fertilization systems had a positive influence on the fruitage constant and the vine cenosis productivity compared to the non fertilized system, emphasizing that no fertility may cause a disturbance of the viticultural ecosystems' functionality, especially under stressing eco-climatic conditions and intensive exploitation of the viticultural plantations.

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THE IMPACT OF SOME NOURISHING SUBSTRATES AND THEIR PHYSICAL AND CHEMICAL QUALITIES ON GROWTH PARAMETERS OF GRAPEVINE

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Abstract. *It was investigated the behavior of some nourishing substrates holding different active natural components and their effect on growth parameters of grapevine. Different levels of grape marc compost, peat, and manure and celery soil were tested as active substrates components. A clone of rootstock varieties of Sauvignon and Kober 5BB obtained by super selection with viruses' elimination was used as biological material. It was found that the physical properties of the substrate (porosity and water capacity) are linear correlated with the organic matter level. It was studied, in dynamics, the relationship between major nutrient levels in substrates and the nutrient uptake distributions. The availability of nutrients in the substrate strongly affected the production and quality of crops. It were established the variants of substrate which it confer optimal growth conditions and an enlarged productivity. Based on these studies we established as benefic to substitute the pet with grape marc compost-an inexpensive and available material-in substrates composition.*

Rezumat. *A fost investigat comportamentul unor substraturi nutritive alcatuite din diferite componente naturale si efectul lor asupra unor parametri de crestere ai plantelor de vita de vie. Drept componente active de substrat s-au folosit tescovina compostata, turba, gunoiul de grajd si pamantul de telina in diferite proportii. Ca material biologic s-a utilizat o clona obtinuta prin superselectii cu devirozare apartinand soiului Sauvignon grefat pe portaltoiul Kobber 5BB. Insusirile fizice ale substratului (porozitatea si capacitatea pentru apa) s-au corelat liniar cu continutul de materie organica. S-a urmarit in dinamica evolutia concentratiei principalelor elemente nutritive in corelatie cu absorbtia si distributia acestora in planta. Concentratia formelor asimilabile de macroelemnete din substrat a influentat puternic productia si calitatea plantelor obtinute. Au fost stabilite variantele de substrat care confera conditii optime de crestere si productivitate sporita. Pe baza studiilor intreprinse s-a stabilit ca fiind benefic provcedeul de inlocuire in substrat al turbei cu tescovina compostata,material ieftin si disponibil la unitatile de profil.*

Replacement of peat as a growing medium by a renewable material, such as an organic waste, is an issue of concern since harvesting of peat has a considerable environmental impact and is a non-renewable resource. Grape marc is a common waste product of the wine production industry. When partially composted and mixed with other organic and inorganic materials may confer optimum growth conditions for grapevine. The purpose of this study was to detect possible changes in the physical and chemical properties of grape marc compost when it is mixed with different materials and use as nutritional substrate, correlated with growth parameters of grapevine and productivity. The aim of these researches was to find an optimum substrate to increase productivity, especially

for new improved variety, cloner selections and biological material which is passed by virus elimination technology.

MATERIAL AND METHOD

An experiment was designed with eight variants of substrate (table 1) obtained by mixing some aboriginal organic and inorganic materials: composting grape marc (GM), oligotrophic peat (P), cattle manure (M), celery soil (CS), perlite (P) and sand (S). A mixture of 25%M+50%CS+25%P was used as reference. The mixtures were located in pots, in an open system, under green house conditions (figure 1). A clone of Sauvignon grafted to Kober 5BB was used as biological material.

Table 1

Substrate composition

Variant	Substrate component					
	Grape marc (GM)	Manure (M)	Peat (P)	Celery soil (CS)	Perlite (P)	Sand (S)
V_1	25	25		50		
V_2	25	25		25	25	
V_3	25		25	50		
V_4	25	25	25	25		
V_5		33	33	33		
V_6	25	25	25			25
V_7			25	50		25
V_8 (M)		25		50	25	

The evolution of chemical composition of substrates correlated with the developed and growth parameters of the plants were followed on the vegetative period. Biometric measurements were performed to plants by investigate the grapevine highness, the shoots lengthiness and diameter, the number of leafs, the foliar surface. Some plants were sacrificed to measure the dry and fresh matter content and the nutrients level in different organs. Those measurement were performed by using classical methods: dry and fresh matter –gravimetric, total nitrogen-by Kjeldahl method, total phosphorus – colorimetric, potassium – flam photometric, calcium and magnesium-spectrophotometrically. The grapevine plants and substrate samples were analyzed in three phases on the vegetative period: June and August (as moments that correspond to the time to plant green potted vines) and the end of October. The analyses were performed to correlate the concentration of nutrients in plant organs with the levels of the hydro soluble forms of nutrients in substrates.

Fig. 1. Experimental variants

The substrate samples were collected, air-dried and ground to pass through 2mm sieve for the analysis of pH, organic matter (OM), hydro soluble N, P, K, Ca and Mg. Substrate pH was determined with a pH electrode at a substrate to water

ratio 1:5 (g:g) for the celery soil and the sand, and 1:10 (g:g) ratio for the others components. The same extract ratios were used for the macronutrients. The OM was analyzed by calcinations. The macronutrients in substrates were dosage by using classical methods of specialty literature.

RESULTS AND DISCUSSIONS

Each substrate component has a different composition. As we can remark (table 2) higher values for the macronutrients were reported for GM, M and P. These materials have had a positive effect to the initial chemical composition of the substrates (table2). The values for the macronutrients level and the organic matter content were higher in the V_1-V_6 due to the rate of GM with M or P.

Table 2

Chemical compositions of substrate materials (A.E. 1:10, g:g)

Material	pH	$N\text{-}NO_3$ ppm	$N\text{-}NH_4$ ppm	P ppm	K ppm	Ca ppm	Mg ppm	S.C. %	O.M %
Peat	4.2	88.4	16.3	47.3	231.9	456.7	285.6	0.478	64
Manure	7.8	75.3	25.9	58.5	1087	617.8	406.8	0.869	86
Cellery soil	6.4	26.8	13.9	15.7	205.5	227.5	182.5	0.186	18
Sand	6.2	13.4	8.6	3.3	39.2	65.1	27.8	0.037	-
Perlite	6.3	-	-	-	81				-
Grape marc	6.1	85.5	19.6	64.6	547.5	527.3	338.5	0.903	78

Table 3

Chemical compositions of substrate (average values, A.E. 1:10, g:g)

Variant	PH	$N\text{-}NO_3$ Ppm	P ppm	K ppm	Ca ppm	Mg ppm	S.C. %	O.M. %
V_1	6.47	53.8	34.6	504.9	425.4	246.6	0.528	54
V_2	6.50	49.2	29.3	438.4	347.5	212.7	0.442	45
V_3	6.41	48.3	24.8	311.2	339.7	296.3	0.421	48
V_4	6.49	60.5	41.6	497.5	442.2	303.4	0.553	65
V_5	6.40	52.6	37.5	424.2	395.0	260.6	0.485	58
V_6	6.61	54.5	31.4	468.3	376.8	225.7	0.472	60
V_7	6.48	26.4	23.3	134.8	217.9	168.1	0.235	24
V_8 (R)	6.58	33.6	27.1	387.4	268.7	184.3	0.364	32

Two aspects can be signalized by analyzing the average values of the principal nutrients, hydro soluble forms, at the three moments of investigation (table 4):

- a better supply with nutrients for V1 and V4, in generally for all V1-6 variants;
- an accentuate decrease of N-NO3 levels, and also of P and K levels as a consequence of absorption in plant in the intense vegetative growing period

Generally, best balanced ratios were obtained for V1 and V4. The peat percentage in V4 variant does not lead to significant modifications of nutrients supply. So, we can appreciate that a substrate like the one used in V1 it's profitable from economic point of view.

Table 4

The evolution of substrates chemical composition (average values A.E.1:10 g:g)

Variant	N - NO_3 ppm			P Ppm			K ppm			Ca ppm			Mg Ppm		
	June	Aug.	Oct.	June	Aug.	Oct.	June	Aug.	Oct.	June	Aug.	Oct.	June	Aug.	Oct.
V_1	54.2	16.5	27.0	23.1	16.1	14.6	396.8	318.6	272.3	376	477	371	228	297	263
V_2	42.2	10.3	21.0	19.0	11.4	11.2	314.7	244.9	206.2	311	369	318	187	234	213
V_3	40.4	6.6	14.8	15.7	9.6	7.0	265.3	205.0	169.8	279	376	311	268	327	294
V_4	57.0	17.8	30.3	24.3	18.6	15.0	367.4	308.3	268.6	401	479	432	294	345	321
V_5	40.9	5.7	17.9	21.6	15.2	13.7	345.1	279.0	239.3	397	472	362	239	271	254
V_6	48.7	15.9	25.0	20.3	13.0	10.6	357.1	286.6	245.9	351	408	314	221	253	241
V_7	30.7	4.6	7.8	14.3	7.7	6.3	127.4	81.1	63.9	214	299	231	152	186	173
V_8 (R)	35.6	6.6	15.2	17.3	9.2	11.4	295.3	235.9	201.9	259	339	2 74	176	211	180

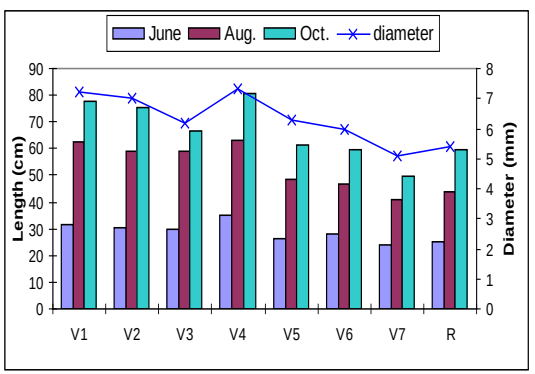

Fig. 2. Substrate influence to the development rate of the shoots

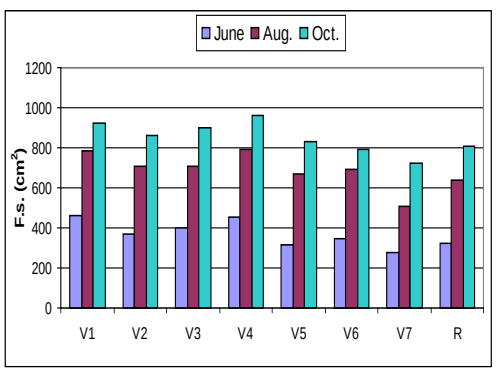

Fig. 3. Substrate influence to the development rate of the foliar surface

Fig. 4. Substrate influence to the development rate of root system

Significant differences regarding growth and developing parameters were observed among the variants as response of substrate supply with nutrients. Better conditions offered by substrates in variants V1, and V4 induced higher values of the shoots lengthiness, foliar surface and root system (figures 2-4).The differences between the variants were accentuated even more on the vegetation period and became maximum at the end of this period.

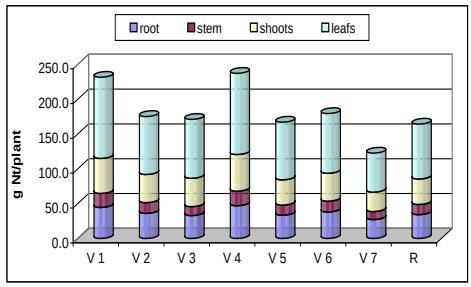

Fig. 5 Total nitrogen in grapevine organs

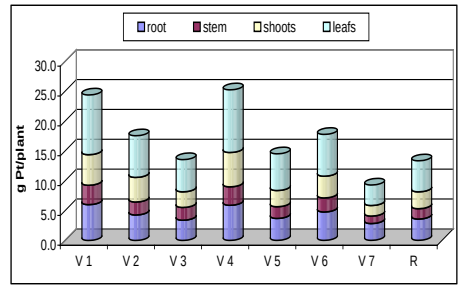

Fig. 6 Total phosphorus in grapevine organs

Fertility and structure components of nutritive mixtures affected the distribution of fresh and dry matter in the vegetative organs of the grapevine. As a result, significant differences regarding the quantities of nutrients accumulated in grapevine organs were recorded. There are evident the higher values registered for V1 and V4 at the end of vegetative period, especially for leafs and shoots (figure 4-9). The increases were of 41%-44% Nt/grapevine, 82%-91% Pt/grapevine, 86%-99% Kt/grapevine, 43%-49% Ca/grapevine and 69%-77% Mg/grapevine, comparatively with Vr. Opposite, the V7 variant presented the lowest levels of micronutrients, probably due to the weakly supply of the substrate.

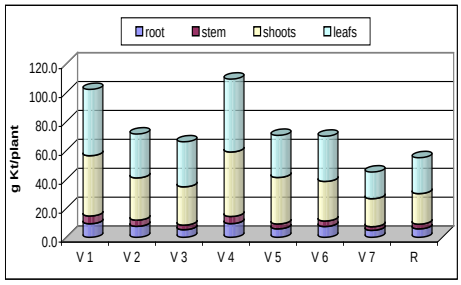

Fig. 7 Total potassium in grapevine organs

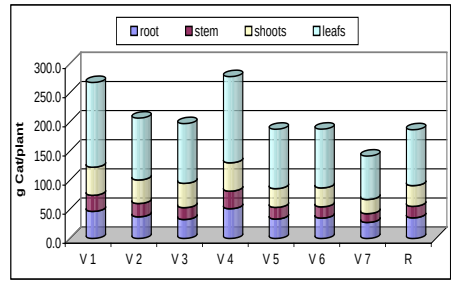

Fig. 8 Total calcium in grapevine organs

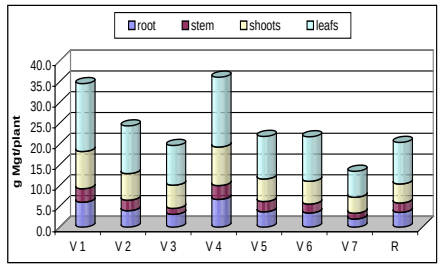

Fig. 9 Total magnesium in grapevine organs

Production of grafted grapevines was strongly affected by substrate composition (table 5). The vegetative start moment, and also the grapevine growth and developing were positively correlated with the nutrient level of the substrates. The biggest efficiency was recorded for V1, V2 and V4 with more than 70% grafted grapevine obtained. The highest percentages of good quality grapevine were obtained by using an active substrate based on GM (25%) and M (25%) with different levels of CS (25-50%). In this case the productivity has increase with 13-17% comparatively with the reference variant, usually used in research institutes as technological link for viticultural material production.

Table 5

The influence of the substrate on the productivity

Variant	Planted grapevines	With roots emission		Good for field transfer	
		Total number	%	Total number	%
V_1	220	180	82	163	74
V_2	220	171	78	160	73
V_3	220	194	88	147	67
V_4	220	167	76	156	71
V_5	220	183	83	131	60
V_6	220	189	86	144	66
V_7	220	155	70	110	50
V_8 (R)	220	174	79	139	63

CONCLUSIONS

The substrate composed by GM and M (25% +25%) with CS (50%) or CS and P (25% +25%) ensured the highest and most equilibrated values of nutrients and organic matter. For these variants, the increases of annual vegetative formations were: 27-35% for shoots length, 7-19% for foliar surface and 19-32% roots length, comparatively with the reference variant. For these variants the highest quantities of nutrients extracted and distributed in different organs were registered too. The best efficiencies of grapevine production were obtained for a culture substrate formed by Tc (25%) + M (25%) + Pt(50%) were the productivity increase with 17% comparatively with the reference variant. Generally, we can appreciate that the recycled organic material can be used to increase the sustainability of viticultural production systems. Use of compost can reduce crop stress and stimulate vine growth; supply nutrients; improve soil structure, water retention and drainage. We consider as a benefit to substitute the peat with grape marc compost in the substrates composition because it can reduce the management costs.

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THE HIDRIC AND THERMIC STRESS FROM THE AGRICULTURAL YEAR 2006-2007 AND THIS INFLUENCE ABOUT VITICULTURAL PLANTATIONS

STRESUL HIDRIC ŞI TERMIC DIN ANUL AGRICOL 2006 – 2007 ŞI INFLUENȚA ACESTUIA ASUPRA PLANTAȚIILOR VITICOLE

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Abstract*: In the temperate climate area, the pluviometric features registered are regular but certain periods are characterized by high or low atypical stages. (Berbecel O., et al. 1970) The drought period which started in September 2006 and ended in July 2007 triggered the growth of soil water deficit down to the deepest strata (100 – 150). The lack of humidity of soil and the high temperatures of 42,3°C (July 2007) brought about the diminishing of twig growing, photosynthesis reduction and implicitly the decrease of grapes yield.*

Rezumat: *În zona cu climat temperat este specifică înregistrarea unor perioade cu caracteristici pluviometrice normale, dar în anumite intervale se detaşează perioade excedentare sau deficitare care se abat de la normal (Berbecel O., ş.a., 1970). Perioada secetoasă care a început din luna septembrie a anului 2006 şi pînă în luna iulie 2007 a dus la creşterea deficitului de apă din sol, pînă în straturile profunde (100 -150 cm). Lipsa umidității din sol şi înregistrarea unor temperaturi maxime în aer de pînă la 42,3 °C (iulie 2007), a dus la diminuarea creşterii lăstarilor, reducerea fotosintezei şi implicit la scăderea producției cantitative de struguri.*

Vine is a big consumer of water. If during certain droughty years it does not bear the consequences due to the fact that it has a very deep root network reaching the extended areas of deep soil stratum where there are large water reserves. During long periods of drought (2 - 3 years) in which water reserves decrease even in the deep soil strata, vine is also affected just like annual plants.

The optimum soil humidity for vineyards is 50-80% from the whole available water capacity (AWC), higher levels favoring the growing of twigs and lower ones supporting seeds maturing (M. Motoc, 1968).

For the temperate climate area of our country the pluviometric features registered are regular but certain periods are characterized by high or low atypical stages. (Berbecel O., et al. 1970)

MATERIAL AND METHOD

For the study of precipitations and temperatures were used the data registered by the stations' weather centre, by the automatic registration station (Agroexpert) and by the Regional Meteorological Centre Moldova from Iasi.

In order to establish the soil humidity, monthly probes were taken during the vegetation period, down to a depth of 150 cm, each 10 cm of strata. The results were previously expressed in percentages of dry soil weight and afterwards in percentages of volume. Resorting to hydrophysical indices it was calculated the available soil water at a certain moment expressed in mm and the deficit in cubic meters/ha and % (Obreja Gr., 1964).To assess the degree of water availability for plants the momentary humidity was reported to the available water capacity (AWC), previously calculated for the viticulture centre Copou Iasi.

RESULTS AND DISCUSSIONS

Copou viticulture centre belongs to the continental climate at the junction between the steppe and the forest area, integrating in the category IIBpS: II - continental steppe climate; B- the centre of the hill climate; S- steppe climate district; p- forest climate district (Geographic monograph of Romanian Republic vol. I, 1960) characterized by low precipitations since the fall and until the beginning of spring.

According to the precipitation survey for a period of 27 years (1980-2006), in the Copou viticulture centre were recorded excessively rainy and very rainy years (1-2 years), excessively droughty and very droughty years (period of 1-2 years) intercalated with standard years. (table1)

Table 1

Precipitation regime and the characterization of years for the interval 1980 – 2006 in the viticulture centre Copou Iaşi (*according to the system used by N. Topor, 1964*)

Year	Precipitations, L/m^2		Type of year	Year	Precipitations, L/m^2		Type of year
	total	period vegetation			total	period vegetation	
1980	785,5	499,0	Excessively rainy	1994	427,8	378,3	A little droughty
1981	624,1	423,7	Very rainy	1995	709,4	543,0	Excessively rainy
1982	357,5	249,4	Excessively droughty	1996	818,3	563,0	Excessively rainy
1983	423,4	353,8	Very droughty	1997	619,7	428,2	Very rainy
1984	715,0	542,4	Excessively rainy	1998	653,5	358,8	Very rainy
1985	583,6	460,2	Rainy	1999	518,8	334,1	normal
1986	397,6	274,0	Very droughty	2000	399,7	269,2	Very droughty
1987	528,4	347,9	normal	2001	748,0	533,2	Excessively rainy
1988	628,5	462,2	Very rainy	2002	602,3	432,0	Rainy
1989	649,7	586,9	Very rainy	2003	485,4	293,5	A little droughty
1990	378,6	249,7	Excessively droughty	2004	593,5	386,1	Rainy
1991	829,5	693,3	Excessively rainy	2005	646,1	433,9	Very rainy
1992	488,0	348,8	A little droughty	2006	500,2	464,6	normal
1993	603,8	395,6	Rainy				

It was also observed that after long periods of rain 1-2 years, will follow 1-2 years of excessive drought or droughty. In the years when drought brought about significant damage, the lack of precipitations started in the previous year (in summer or autumn) and continued during the cold season and during the spring and summer of following year. Such was the case for the summer and winter of 2006 and continued for the spring and summer of 2007, the precipitation shortage being of 226,5 mm (table 2)

*Table **2***

Precipitations registered in the Copou viticulture centre from Iasi during the period September 2006 – July 2007

Precipitation, mm	Month											Sum, mm
	IX	X	XI	XII	I	II	III	IV	V	VI	VII	
Multiannual average	40,8	34,4	34,6	28,9	28,9	27,4	28,1	40,3	52,5	75,1	69,2	**460,2**
2006 - 2007	14,8	22,7	10,5	2,4	21,5	30,1	25,6	25,1	28,0	15,4	40,3	**236,4**
Deficit	26,0	11,7	24,1	26,5	7,4	-	2,5	15,2	24,5	59,7	28,9	**226,5**

In this context, the situation worsened, the water deficit increasing each month reaching in July 2007 70 % at a depth of 50-100 cm respectively 62 % at 100-150 cm (table 3).

Table 3

Water deficit during the vegetation period- year 2007

Depth, cm	Month											
	IV		V		VI		VII		VIII		IX	
	m^3/ha	%	m^3/ha	%	m^3/ha	%	m^3/ha	%	m^3/ha	%	m^3/ha	%
0 – 20	311	65	324	68	458	96	335	71	164	35	305	64
20 – 50	233	31	287	39	420	57	550	74	327	44	338	46
50 - 100	449	42	498	46	642	60	745	70	717	67	513	48
100 - 150	182	28	214	33	285	44	398	62	409	63	292	45

The values of humidity between 29-38 % characterized the hardly accessible water corresponding to the depth of 0-150cm, taking into consideration that the easily available level of water is 50-80% (fig.1).

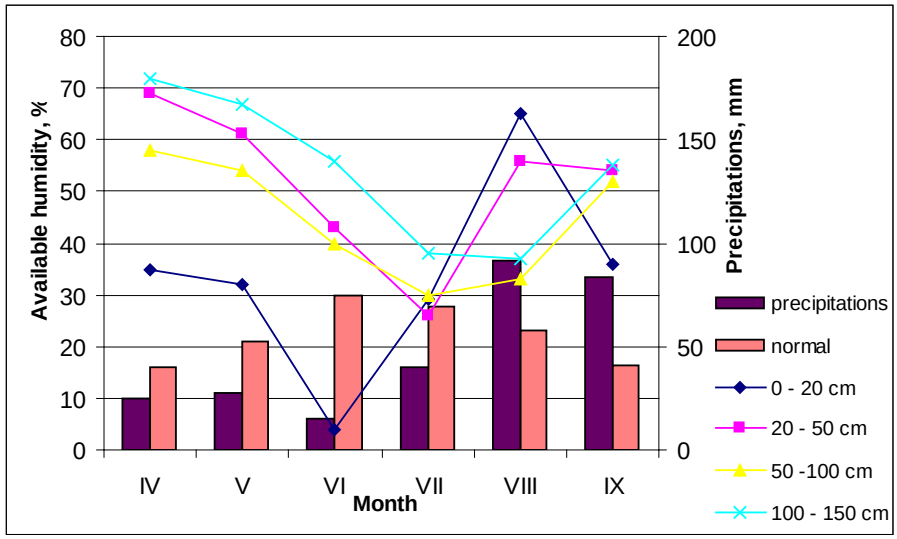

Fig. 1 – The evolution of precipitations and the degree of available soil water during the period of vegetation of 2007

Therefore we can say that the drought of 2007 affected not only annual plants but also vine (fig.2).

Fig. 1 – The evolution of precipitations and the degree of available soil water during the period of vegetation of 2007

In the following months (August, September) the humidity level improved due to the precipitations of 91,3 mm and respectively 83,5 mm, double values in comparison with the standards for these months.

By analyzing the temperatures of the studied period of time it can be stated that the winter of 2007 was warmer, the average temperatures of January and February were of 4,1°C and respectively 0,8°C compared to the multiannual values of these months which are of -3,6°C and -1,9°C, and the maximal ones of 16,9°C and 16,6°C (table 4).

Table 4

The values of temperatures for the agriculture year 2006 – 2007

Valori termice	Month											
	X	XI	XII	I	II	III	IV	V	VI	VII	VIII	IX
Average temperature multiannual values, °C	10,1	4,1	-0,8	-3,6	-1,9	3,3	10,1	16,1	19,4	21,3	20,6	16,3
Average temperature 2006 -2007, °C	11,4	6,4	2,5	4,1	0,8	7,3	10,2	18,9	22,8	25,0	22,0	15,3
Maximal temperatures 2006 -2007, °C	31,2	18,4	14,5	16,9	16,6	20,2	22,6	34,5	37,0	42,3	38,8	26,7
Minimal temperatures 2006 -2007, °C	-3,8	-4,5	-7,8	-10,5	-19,6	-0,8	1,6	0,5	11,6	11,0	11,6	4,8

Spring was also warmer than usual with monthly average temperatures of 7,3°C, 10,2°C and 18,9°C during the months of March, April, May and maximal

air temperatures of 20,2°C, 22,6°C and 34,5°C.

The elevated heat continued during the summer months when were registered for many days temperatures of 37°C, even 41,6°C and 42,3°C in July and an august peak of 38,8°C.

High temperature values corroborated with water shortage triggered the accentuation of air and pedologic drought with negative effects on the vegetation state of vine stocks by outrunning the phenophases of vegetation, diminishing the growing of shoots, the reduction of foliar area, of photosynthesis and the decrease of grapes yield.

Thus, the root system of vine stocks could not absorb in the spring of 2007 the water necessary for xylem sap, the phenophases being reduced.

Debudding was forwarded, taking place during the period April 24 – 28 with slight differences between varieties. Blossom took place almost simultaneously, in the first decade of June, 10 days earlier, and grapes ripening started in July.

Technological maturation took place three weeks earlier, namely during the period August 30- September 8. The drop of leaves occurred during the last decade of October, being a standard physiological fall.

As a consequence of the climatic conditions registered, grapes yield of 2007 was very low recording an average of 1893 kg/ha for the variety Fetească albă, and 7500 kg/ha for the variety Chardonnay (table 5). On the other hand large quantities of sugars were found in must- 200 g/L for Aligoté and 240 g/L for Fetească albă.

Table 5

Quantitative and Qualitative Yield for the main varieties cultivated, in 2007

Variety	Yield, kg/ha	Sugars, g/L	Acidity, g/L H_2SO_4	Weight 100 grapes, g
Aligoté	2080	200	5,0	136
Fetească regală	2564	220	3,3	128
Fetească albă	1893	240	3,1	130
Muscat Ottonel	3247	215	2,4	147
Sauvignon blanc	5081	210	4,0	90
Chardonnay	7500	230	3,8	130

CONCLUSIONS

1. Vine is a relatively drought resistant plant but when this phenomenon occurs for longer periods of time (1-2 years) it influences the repose period and continues for the vegetation months of the following year and significant damages may be recorded. The consequences are borne for 2-3 years.

2. The permanent rehabilitation of vine stocks after being affected by drought has to be a significant stage in the technology of vine cultivation.

3. The droughty period of 2006 – 2007 was the longest one of the last

years, starting in September 2006 and ending in July 2007 when a precipitation deficit occurred each month.

4. Water deficit for the stratum of 50 – 100 cm at the end of July 2007 was of 70 %, the highest for the last years.

5. Grapes yield, as a result of water and temperature stress was reduced with 36 % reaching a level of 81 %, according to the variety.

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ILLUSTRATION OF THE INFLUENCE OF ORGANIC FERTILIZERS ON WINE QUALITY IN THE VINEYARD STEFANESTI - ARGES (*VITIS VINIFERA* VAR. CABERNET SAUVIGNON AND ZWEIGELT)

ILUSTRAREA INFLUENȚEI FERTILIZĂRII ORGANICE ÎN PODGORIA ŞTEFĂNEŞTI – ARGEŞ ASUPRA CALITĂȚII VINULUI (*VITIS VINIFERA* VAR. CABERNET SAUVIGNON ŞI ZWEIGELT)

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Abstract. *The overall objective of this work is to illustrate the influence of organic matter(in the form of stable humus) from fertilized soil over the quality of wines produced in the vineyard Stefanesti-Arges. For each soil type there have been planned: V1 - a witness not fertilized; V2 - soil fertilized with grape marc; V3 - soil fertilized with green manure; V4 - soil fertilized with manure. The study covers 3 years of experimentation in Vitis vinifera vines var Cabernet Sauvignon and Zweigelt. The musts and wines were also analyzed after 6 months of clarification. The characteristics of musts (content in sugars, total acidity, anthocyanins and phenolic compounds), and then finite wines show that the red wines from fertilized plots are generally improved by qualitatively significant changes in the density of must, a decrease in the total acidity and increase of phenolic compounds in grape skins. Of the two reds studied, the most qualitatively changed compounds are polyphenols, especially anthocyanins. The wines from fertilized plots with green manure are better structured, more harmonious, with a higher phenolic potential.*

Rezumat. *Obiectivul general al acestei lucrări este acela de a ilustra influența materiei organice (sub formă de humus stabil) din parcelele fertilizate într-o plantație din podgoria Ştefăneşti – Argeş, asupra calității vinurilor obținute. Pentru fiecare parcelă experimentală au fost prevăzute mai multe variante: V_1 – martor nefertilizat; V_2 – sol fertilizat cu tescovină; V_3 – sol fertilizat cu îngrăşăminte verzi; V_4 – sol fertilizat cu gunoi de grajd. Studiul a avut loc pe 2 soiuri Vitis vinifera var. Cabernet Sauvignon şi Zweigelt, durata de experimentare fiind de 3 ani. A fost analizat mustul şi vinul obținut la 6 luni de la pritoc. Caracteristicile musturilor (conținutul în glucide, aciditatea totală, antocianii şi compuşii fenolici) şi apoi a vinurilor finite arată faptul că, vinurile roşii provenite din parcelele fertilizate organic sunt, în general, ameliorate calitativ prin modificarea semnificativă a densității mustului, reducerea acidității totale şi creşterea conținutului în compuşi fenolici din struguri. Pe cele două vinuri studiate compuşii cei mai modificați cantitativ sunt polifenolii şi, în special, antocianii totali. Vinurile obținute din parcelele fertilizate cu îngrăşăminte verzi sunt mai structurate, mai armonioase şi cu un potențial fenolic mai ridicat.*

The association between wine quality and environmental factors have called experienced research and attention and led to intense discussions and debates over many decades. However, in this debate, few disagree that soil properties and management play a role in the production of wine. In many regions, soil plays a very important role. *Seguin (1986)* attributed the quality of wine produced in the prime growing areas of Bordeaux wine and Médoc to soil factors. On the other hand, some have denied that the soil plays a role on the taste of wine. For example, *Charters (2000)* says that the soil has little effect on the taste of wine.

Wine growers have often associated quality of the grape and wine quality with the type of soil where the grapes are produced *(3, 4, 5, 1,)*. The effects of the type of soil over the quality of wine have been attributed to differences in mineral, thermal and physical soil properties. The most recent publications suggest that the effect of soil type on the quality of grapes is associated with the interaction between the force vine and soil retention properties of water *(6, 8)*.

MATERIAL AND METHODS

The study have been done on two wine varieties with the aim of obtaining high quality red wines – Cabernet Sauvignon şi Zweigelt – located in a plantation owned by I.N.C.D.B.H. Ştefăneşti – Argeş. The samples of grapes have been drawn from the plots organized in four experimental variants :

V_1 – non-fertilized witness;
V_2 – fertilization with grape marc superficially incorporated in the soil;
V_3 – fertilization with green manure;
V_4 – fertilization with farm manure.

Grapes from the varieties Cabernet Sauvignon si Zweigelt have been subjected to microvinification, harvested at their technological maturity and then processed according to the red grapes classical vinification technology, by maceration on husks. At the end of the alcoholic fermentation, the malolactic fermentation has been achieved and then the main decanting. The physical and chemical analyses have been performed on fresh must an on the wine, 6 months from decanting.

RESULTS AND DISCUSSIONS

Although the content in glucides is mainly influenced by the variety and the climatic conditions of the maturation period of the grapes, one can notice that within both studied varieties (*figure 1*), the applied system of fertilization constitutes an influential factor over the glucide accumulation in grapes; thus, at technological maturity, the concentration of sugars reached a maximum value in the plots fertilized with green manure (190 g/l at Cabernet Sauvignon variety şi 181 g/l at Zweigelt).

The phenolic maturity of the grapes does not replace the so called technological maturity which emphasizes the richness in glucides and organic acids and which contributes at settling the optimal moment of yielding. The phenolic maturity is interesting as it furnishes useful data to the wine makers on the moment when the content of anthocyans reaches the maximum value. On the whole, if climatic conditions are favourable, phenolic maturity superposes the technological one. The control of the phenolic maturity of grapes is based on two observations:

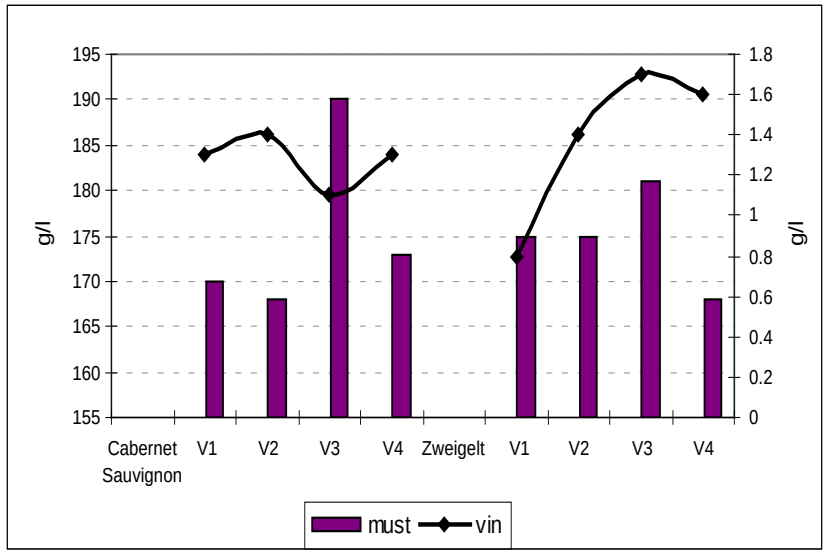

Fig. 1. Concentrtion in glucides of the must and wine at 6 months from decanting

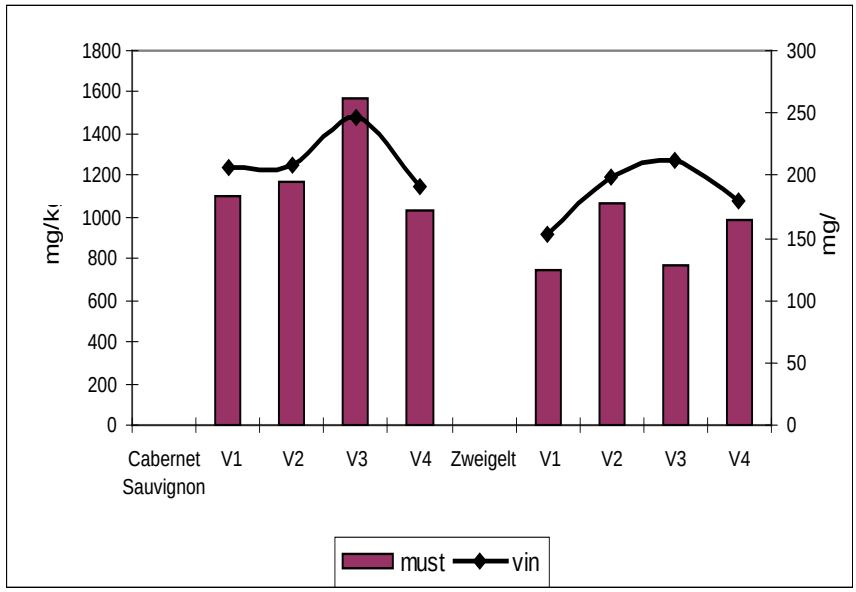

Fig. 2. The content in anthocyans of the must and wine 6 months from decanting

Analyzing the data obtained at the moment of yielding (*figure 2*), one can notice that, in the case of Cabernet Sauvignon variety, the phenolic maturity coincides with the technological maturity of the grapes; on the other hand,the applied system of fertilization influences both glucide accumulation and

anthocyanic biosynthesis positively , the grapes harvested from the plots fertilized with green manure having maximum values of concentration, in must as well as in the wine analyzed at 6 months from vinification.

As regards extractibility or grapes capacity of releasing the anthocyans – it resulted that, in the case of the studied varietieties, the anthocyans from the grape skins were easily extractible and apt to pass into wine in the course of vinification, the concentration in anthocyans of the wines analyzed 6 months from decanting is comparable to that of the must (*figure 2*).

The obtained wines have been analyzed at 90 days after malolactic fermentation ended, taking into acccount the phenolic criteria. The analysis of the wines underlined the same differences among experimental variants, the largest concentration in anthocyans and total polyphenols being recorded within the variant V_3 (*figures 3 and 4*).

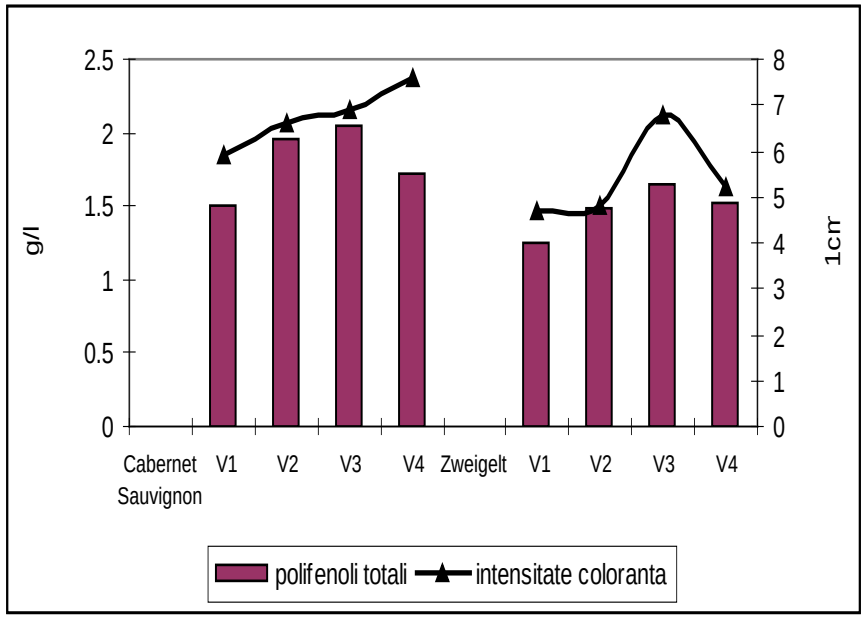

Fig. 3. The wine content in total polyphenols (9 months from decanting)

The colour of the wines does not depend only on its concentration in anthocyans, but also on the content in chlorophyllian and carotene pigments and on the tannin-anthocyan combinations. The colouring intensity of the wines quantified by the sum of the optic density at 420,520 and 620 nm, makes evident the superiority of the wines obtained on the organically fertilized plots from the non-fertilized witness (Cabernet Sauvignon variety). The variety Zweigelt variant V_3 records superior values of total polyphenol concentration and of the colouring intensity of the wines at 6 and 9 months from decanting – *figure 4.*

Fig. 4. The colouring intensity of the wine

The physical and chemical features of the wines analyzed at 6 months from vinification are shown in table 1.

Table 1.

The physical and chemical features of the obtained wines

Variety / Variant	Glucides g/l	Alcohol %	Total acidity g/l tartric ac.	Volatile acidity g/l aceticum ac.	Nonreducing extract g/l	Glycerol g/l	Ashes %
Cabernet Sauvignon							
V1	1,3	9,4	5,3	0,27	23,2	9,2	1,640
V2	1,4	9,6	5,2	0,05	24,4	9,9	1,680
V3	1,1	10,8	5,2	0,05	27,0	10,6	1,690
V4	1,3	10,1	5,1	0,12	25,3	11,3	1,690
Zweigelt							
V1	0,8	9,8	4,4	0,20	21,6	11,5	1,630
V2	1,4	10,3	4,2	0,17	22,1	9,2	1,400
V3	1,7	10,4	4,7	0,26	22,5	7,6	1,500
V4	1,6	9,3	4,6	0,13	21,1	8,3	1,620

CONCLUSIONS

► The use of green manure as organic fertilizer has a positive influence over glucide accumulation and over the anthocyanic biosynthesis in grapes.

► The state of technological maturity of the grapes conditions the content in anthocyans of the resulted wine.

► In the vineyard Ştefăneşti-Argeş the wines obtained from the varieties Cabernet Sauvignon şi Zweigelt organically fertilized, have been appreciated as being superior from the point of view of the the phenolic charasteristics as compared to the non-fertilized witness.

► Organic fertilization of the viticultural plantations has a beneficial influence not only on the amelioration of the physical and chemical properties of the soil but also on the improvement in the quality of the grape yielding.

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MOLECULAR IDENTIFICATION OF *SACCHAROMYCES CEREVISIAE* STRAINS IN WINE

IDENTIFICAREA MOLECULARĂ A SUŞELOR DE *SACCHAROMYCES CEREVISIAE* DIN VINURI

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Abstract: *The present study analyses the use of PCR method in determining yeast strains which lead to wine alcoholic fermentation. Determination of the strains is important in the vinification process by improving the alcoholic degree, emphasising varietal aromas, colour fixation, acidity maintaining. Strains selection was made by extracting samples from 4 fermentation tanks (Brestnik and Caedinie regions in southern Bulgaria) at three definite times (beginning, middle and end of fermentation). Molecular identification was realised according to the working protocol used by the researchers within the Vine and Wine Institute „Jules Guyot" Dijon- France. Extraction of the DNA from the yeast cells, its fragmentation and multiplication was made by PCR method while the emphasis of the specific DNA fragments in UV was obtained by using the UV transilluminator. The obtained results show a number of common yeast strains, strains which are responsible of the wines' tipicity from the two viticultural areas.*

Rezumat. *Studiul de fata evidentiaza aplicativitatea metodei PCR-ului (polymerase chain reaction) in evidentierea suselor de levuri ce determina si sustin procesul de fermentatie alcoolica a mustului. Cunoasterea acestor suse intereseaza in procesul de vinificatie prin contributiile pe care le pot aduce la imbunatatirea randamentului alcoolic, evidentierea aromelor varietale, fixarea culorii, mentinerea aciditatii, etc. Selectia suselor s-a facut prin prelevarea probelor din 4 vase de fermentatie (din 2 centre viticole Brestnik si Caedinie din zona viticola din Sudul Bulgariei) in trei momente ale fermentatiei alcoolice (inceputul fermentatiei, fermentatia propriu-zisa si finalul fermentatiei). Identificarea moleculara s-a realizat conform protocolului recomandat de cercetatorii din cadrul Institutului Viei si Vinului „Jules Guyot" Dijon- Franta. Ea consta in extragerea ADN-ului din celulele levuriene, fragmentarea si multiplicarea acestuia (prin PCR) si evidentierea fragmentelor specifice de ADN in mediu UV (transiluminatorul UV). Rezultatele obtinute evidentiaza un numar de suse de Saccharomyces cerevisiae comune celor doua centre viticole, suse ce dau specificitate vinurilor din cele doua centre viticole.*

The modern methods of yeast identification show a complex approach that includes modern techniques of microbial genetic, molecular biology and immunology. The taxonomy of different *Saccharomyces* yeast species develops at the same time with the development of the new techniques of microbial physiology or those of genetics. A complex research about the evolution of yeast taxonomy principles have been made by Ribereau- Gayon et al. (1998) and Kurtzman

(1998). Using this classification and the results of his own research Grossman M.K (1999) presents a study concerning the yeasts identification methods in general and of those from *Saccharomyces* species in particular.

The nucleic acid research, the hereditary holders of living beings, can determine the genetic relationship of yeasts species by the determination of the basic DNA segments (method known as DNA recombination). The obtaining of the DNA fragments by pulse field electrophoreses made possible the construction of the genetic map for eukaryotes. Thus appeared the electrophoretic karyotype using the pulse field electrophoreses, we can have direct dates on the *Saccharomyces cerevisiae* and *Candida albicans* karyotypes.

The purpose of this study is to identify the common strains of *Saccharomyces cerevisiae* yeasts, from two different viticulture centres from Bulgaria (Saedinie şi Bresnik), which are specific to Bulgarian Merlot wine, yeasts that could be selected for an industrial and commercial purpose.

MATERIAL AND METHOD

The molecular identification was made by prelevation of the must sample from 4 fermentation tanks (two for each enterprise) in three different moment of A. F. (alcoholic fermentation; A, B, C). We were especially interested in the strains that maintain and finish the A.F. that's why we did not use the strains from the beginning of the A.F. The drawing method of the yeast from the must sample uses the sterile filtration of the untreated must followed by the micro-organisms' incubation on a solid specific culture medium.

The identification process of the strains was made after the extraction of the DNA from the levurian cells. The steps of the molecular identification process are:

1. The DNA extraction and purification.

The cell membrane' breaking is done by a succession of physicochemical treatments and the DNA is liberated. The SDS detergent, the ice and the vortex helps in membrane breaking. The phenol/clorophorm/izoamilic alcohol solution eliminates the proteins and the unsolvable nucleic acids. Centrifugation permits the separation of the aqueous phase, a solution of nucleic acids, from the organic phase from the Ependorf vessel's bottom (phenol + lipids) and the interface between those is represented by the precipitate proteins.

The purified DNA is precipitated with alcohol 100%.

2. The DNA amplification by PCR

The PCR by Kary Mullis in 1985, is a technique of genetic amplification which permits the obtaining of important quantities of DNA's specific fragments, using a complex but quantitatively reduced sample. The PCR principle is repetitively use of a DNA polymerase properties of synthesize a complementary DNA chain from a primer. It's about a subsection of replication reaction of a double DNA matrix chain. Each reaction sets into action 2 primer oligonucleotidics whose 3' extremities reaching towards the other. The primers define the fragment for multiplication, bordering it. The multiplication grade will be of million copies in few hours, which is in general sufficient for the next step.

The key of the procces is using the products of each steps as a matrix for the next one, and reseparating them for reusing the original matrixs. The obtained amplification is exponential. A PCR reaction coresponds to 30 succesives cicles, with their 3 steps:

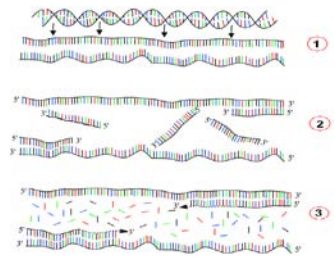

Fig. 1. The steps of the DNA chain multiplication procces through PCR method
1. Denaturation; 2. Hybridation; 3. Elongation

All the necessary elements for the reaction are introduced in an Ependorf tube that will be submitted to different temperatures, corresponding to each step; these temperatures cycles are automatically controlled by the thermocycler.

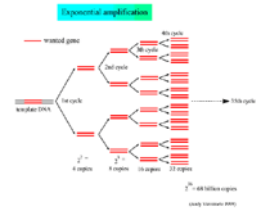

Fig. 2. Exponential amplification of a single chain of DNA

3. The electrophoresis of PCR products in an agarose gel electrophoresis (1, 5 concentration)

The electrophoresis is a technique of DNA separation fragments, based on the migration of the DNA fragments in an electric field. In a basic medium the DNA is negatively charged, but when submitted to an electric field it will move away to the positive pole; having the same electrical charge is its molecular weight that differentiates the speed of migration through the electrophoresis gel.

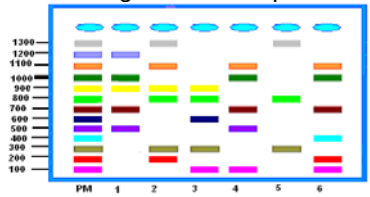

Fig. 3. The DNA fragments migration from the negative pole to the positive one

4. The profiles reading is made by the UV transilluminator

The last step is reading and comparing the strains profiles, and identification of common profiles

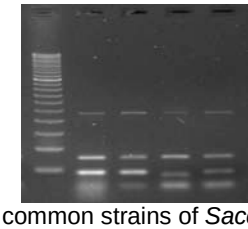

Fig. 4. The evidentiation of common strains of *Saccharomyces cerevisiae* profile

After the comparing of the profiles obtained, 8 common profiles were observed: A2, B2, C2, A3, C3, D4, E5, and A6. The others profiles are found only once.

RESULTS AND DISCUSSIONS

The results obtained by using the molecular method of yeasts strains identification, for *Saccharomyces cerevisiae* yeasts from the two viticulture centres Bresnik and Saedinie (Bulgaria), are presented in the tables 1 and 2.

Table. no. 1

No.	Saedinie enterprise The A.F. tank Year Selected strain number	The A.F. stage	Profile
1	C I 2041	B	A3
2	C I 2043	B	B3
3	C I 2052	B	A2
4	C I 2055	B	A6
5	C I 2101	C	D3
6	C I 2130	C	B4
7	C I 2109	C	B2
8	C I 2120	C	G3
9	C I 2112	C	B3
10	C I 2123	C	F5
11	C I 2124	C	F5
12	C I 2164	C	L3
13	C II 2060	B	A6
14	C II 2062	B	B5
15	C II 2069	B	A8
16	C II 2070	B	B8
17	C II 2130	C	E3
18	C II 2133	C	D4
19	C II 2139	C	E4
20	C II 2140	C	D2
21	C II 2144	C	D4
22	C II 2145	C	H3
23	C II 2148	C	G5
24	C II 2044	C	G4
25	C II 2126	C	H4

Table no. 2

No.	Bresnik enterprise The A.F. tank Year Selected strain number	The A.F. stage	Profile
26	Б I 2075	B	C5
27	Б I 2080	B	B2
28	Б I 2081	B	A4
29	Б I 2082	B	C3
30	Б I 2155	C	F3
31	Б I 2158	C	C2
32	Б I 2160	C	E5
33	Б I 2161	C	H5
34	Б I 2166	C	A2
35	Б I 2170	C	I3
36	Б I 2172	C	E2
37	Б I 2173	C	C2
38	Б II 2093	B	A3
39	Б II 2090	B	D5
40	Б II 2097	B	D3
41	Б II 2100	B	E5
42	Б II 2177	C	J3
43	Б II 2178	C	B2
44	Б II 2180	C	B3
45	Б II 2185	C	F4
46	Б II 2188	C	B3
47	Б II 2190	C	K3
48	Б II 2194	C	B3
49	Б II 2200	C	B2

From the initial 100 yeast strains which have been rigorously selected, only 49 remained by the end of the research; 21 strains have common profiles (8) after the

molecular identification. From these ones only 4 have the attributes required to be selected for preservation and lyophilization, as we can see in the table number 3.

The B2 and B3 profiles fulfil, but not completely, the conditions for selection for an eventual next step, because they have been found in the B moment of the A.F. but also at the end of the A.F. which proved that they have an important role in maintaining and ending of the spontaneous A.F. of the Bulgarian Merlot wine.

Another important characteristic is that B2 and B3 profiles were found in both enterprises' fermentation tanks (even if not in all four tanks). So we can conclude that somehow they are specific strains for that viticulture area, contributing at the preservation of the specific character of the Bulgarian wines; the B2 profile was found in both tanks from Bresnik enterprise and in both A.F. moments, but also in the first tank of Saedinie enterprise. The B3 profile was found only in the first tank from Saedinie winery, but in both moments of A. F. (B and C) and in the Bresnik firm only in the second tank in the final moment of the A. F.;

- the E5 profile performs only half of the required conditions; it was found in the two A. F moments but only in Bresnik enterprises tanks.

The other profiles have different characteristics as follows:

- the A3 profile is specific only for the B moment of the A. F. and only for one tank from each enterprise (C I and Б II);

- the C2 profile was found only in the first fermentation tank from Bresnik winery and only at the end of the A. F. which means that this strain can end the A. F. but it is not specific for this area, that's why it won't be selected for the step;

- the D4 profile is found only in the II tank of Saedinie enterprise and only in the C moment of A. F. (C II C);

- the A6 profile was found in both A. F. tanks from Saedinie firm but only in the B moment of the A. F. ;

- the A2 profile is a special case because it was found in both moments of the A. F. fermentation and in both enterprises but in a special distribution: for Saedinie enterprise only at the B moments of A. F of the first tank (C I B) and for Bresnik enterprise only at the C moment of A. F. of the first tank (Б I C).

The next table presents the 8 common strains distributed in the 4 tanks of the two Bulgarian enterprises:

Table 3

PROFILE	Strain yeasts number	Enterprise and A. F.'s tank	A. F.'s moment
A2	30	C I	B
	62	Б I	C
B2	37	Б I	B
	49	C I	C
	67	Б II	C
	74	Б II	C

PROFILE	Strain yeasts number	Enterprise and A. F.'s tank	A. F.'s moment
C2	47	Б I	C
	65	Б I	C
A3	28	C I	B
	40	Б II	B
B3	29	C I	B
	51	C I	C

CONCLUSIONS

The result of this *Saccharomyces cerevisiae* yeast strains study from the four A. F. tanks of the two Bulgarian enterprises (Saedinie and Bresnik) shows a considerable instable distribution of the strains during the A. F. process, none of these strains being found in all the 4 tanks from the two geographically close Bulgarian viticulture enterprises.

From the initial 100 strains which have been rigorously selected, only 49 remain by the end of the research; 21 strains have common profiles (8) after the molecular identification (with the profiles A2, B2, C2, A3, C3, D4, E5, A6). From these ones, only 4 have the characteristics to be selected for preservation, industrialisation / lyophilization and commercialisation.

The PCR method used according to the protocol recommended by the scientists from the Vineyard and Wine Universitary Institute of „Jules Guyot", Dijon-France, proved to be sufficiently sever in the differentiation of the yeasts strains profiles, this fact recommending it for all kinds of analyses in this domain.

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STUDIES REGARDING OPTIMISATION OF PRODUCTION TECHNOLOGIES OF FLAVOURED WINES IN IASI VINEYARD

STUDII PRIVIND OPTIMIZAREA TEHNOLOGIEI DE OBTINERE A VINURILOR AROMATE ÎN PODGORIA IAŞI

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Abstract. *This study has the following objectives: testing new production technologies and analyses and control techniques, determining flavour compounds in Romanian wines, minor technological corrections and their impact, online analysis and its influence on aroma evolution, identifying flavour substances in Muscat Ottonel wines and monitoring aroma evolution in wines. For this, three specific yeast types for flavoured wines were used, whereas the witness sample was spiked with yeast specific to non-aromatic wines. In the same way described, two types of enzymes were used. 7 samples were obtained. After a two week fermentation, at maximum 15°C, the wine samples were filtered and bottled. Gas-chromatography mass-spectrometry was used to determine individual terpenic compounds (linalool, geraniol, nerol, citronellol etc).*

Rezumat. *Studiul propus se refera la testarea unor noi tehnologii de productie si tehnici de analiza si control, determinarea unor compusi de aroma din vinurile romanesti, corectii tehnologice minore si impactul lor, analiza online si influenta asupra evolutiei aromei, identificarea substantelor aromate din vinurile de Muscat Ottonel si monitorizarea evolutiei aromelor din vin. Astfel, 100 litrii mustuială Muscat Ottonel au fost însămânțați cu 3 tipuri de levuri specifice vinurilor aromate iar proba martor a fost însămânțată cu levuri specifice vinurilor nearomate. În acelaşi fel, s-au folosit 2 tipuri de enzime specifice obtinerii vinurilor aromate. Astfel, au fost obținute 7 probe care sa sintetizeze tehnologia de macerație clasică. Probele au fermentat pe parcursul a doua săptămâni, la temperaturi scăzute, de maxim 15°C. După ce fermentația s-a încheiat, probele au fost filtrate prin hârtie de filtru şi îmbuteliate. Se utilizează cromatografia în fază gazoasă cuplată cu spectrometria de masa, prin care se determină aromele terpenice individuale (linalool, geraniol, nerol, citronelol etc) din vin.*

Wine's aromatic profile depends on the grape sort, maturity degree at harvest, yeast activity, prefermentative procedures and aging (Ebeler, 2001; Schreirer, 1979). In literature, about 800 aroma compounds in wine are found: alcohols, aldehides, cetones, esters, acids and monoterpenic compounds (Aznar, Lopez, Cacho şi Ferreira, 2001). The aroma compounds responsible for the special flavour of Muscat (Marais, 1983) and Tămâioasa come from the grape's skin, being monoterpenic substances.

MATERIAL AND METHOD

Romanian varieties of Muscat Ottonel from Copou vineyard have been used. Muscat Ottonel, a wine full of flavour, represents one of the attractions of Iasi wine center. Well known as a dry wine, or as demi dry-demi sweet even sweet in exceptional years, Muscat

Ottonel is fine, generous with a persistent remanence and incredibly agreeable. The experimental part of my paper is based on the study and comparison of different maceration techniques of Muscat grapes. The obtained wines will be analysed by gas-chromatography and the differentiated identification of aroma compounds, according to the maceration method applied, will be developed. 100 litres of Muscat Ottonel pomace was spiked with three specific yeast types for flavoured wines (Fermol Aromatic, Fermactive Muscat and Fermol Grand Rouge Nature) whereas the witness sample was spiked with yeast specific to non-aromatic wines (Fermactive AP). In the same way described, two types of enzymes, Zymarome G and Zymoclaire Muscat were used. 7 samples were obtained. The fermentation lasted for 2 weeks, at low temperatures of 15^{o}C. Enovit, a fermentation activator, was added in the beginning of the second week , to make sure that there was not sugar remaining in the wine, which would lead to a second fermentation. The wine samples were filtered and bottled, not before adding SO_2 protection 2-3 mL /bottle.

1) Headspace gas-chromatography method:

Gas chromatography coupled with mass-spectrometry is used to determine aroma compounds in wines (terpen compounds, alcohols, acids, esters, aldehides etc).

The wine sample is introduced in the specific vial; it is thermostated at constant temperature, until equilibrium between the two phases is reached. Part of the gas phase (headspace_ is injected into the column to be analysed. The transfer of the sample can be done manually or automatically. 1000 µL headspace gas is injected, splitless mode. Carrier gas flow (He) 1mL/min; temperature rising from 35^{o}C to 250^{o}C, 5^{o}C/min, 250^{o}C for 2 minutes. Injector temperature 220^{o}C, detector temperature 250^{o}C. Scan detection was done between 30 m/z – 200 m/z (detector sensibility 1,0 kv) and50m/z - 200m/z (detector sensibility 1,1 kV). Headspace working conditions: the sample vial is transferred to the heating compartment, temperature reaches 88^{o}C in 20 minutes. Meanwhile, the two phases (gas and liquid) reach equilibrium. A part of the headspace is transferred by means of an hermetic syringe, at 90^{o}C and injected into the GC. Syringe temperature is 130^{o}C, rotation speed of the container is 500 rpm. Injection speed 1000 µL/s.

2) SPE extraction gas chromatography method:

50 mL wine were passed through a LiChrolut RP-18 (40-63 µm) 200 mg cartridge and LiChrolut EN (40-120 µm) 100 mg, 6 mL cartridge. The bed was first conditioned by washing it with 10 mL dichloromethane, 10 mL methanol and 10 mL ethanol 13 % v/V solution. After being force dried for 20 minutes, the sample was passed through. The aroma compounds were recuperated by washing the bed with 1,5 mL dichloromethane. 1000 µL extract, splitless mode are injected into the GC. Carrier gas flow (He) 1mL/min; temperature rising from 35^{o}C to 250^{o}C, 5^{o}C/min, 250^{o}C for 27 minutes. Injector temperature 220^{o}C, detector temperature 250^{o}C. Scan detection was done between 30 m/z – 200 m/z (detector sensibility 1,0 kv) and50m/z - 200m/z (detector sensibility 1,1 kV)

RESULTS AND DISCUSSIONS

A Shimadzu GC-2010 gas chromatograph, coupled with a GCMS – QP 2010 Plus mass-spectrometer was used.

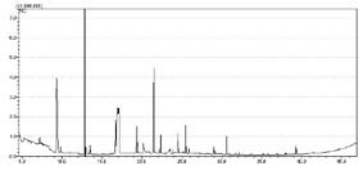

Fig.1. Chromatogram obtained by applying the headspace method

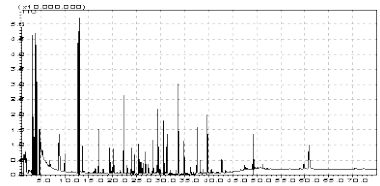

Fig.2. Chromatogram obtained by applying the SPE method

The aroma compounds were determined with the NIST05 spectrum library. An acceptable percentage of probability was considered higher than 70%.

Table 1.

Gas chromatographic analysis – Headspace extraction method

Sample	Mass range	Identified compound	Percentage	Retention time (min.)
M.O., e. G, l. Ro	50mz -200 mz	camfen	97%	7,7
		β-mircen	92%	11,2
		limonen	92%	12,0
		α-pinen	90%	14,03
		cis-2-pinanol	85%	16,10
		linalool	95%	22,34
		hotrienol	87%	23,8
M.O., e. M, l. Ro	50 mz -200 mz	camfen	92%	7,6
		β-mircen	86%	11.16
		limonen	80%	12,03
		α-pinen	85%	14,01
		4-caren	86%	14,80
		nerol	81%	21,35
		linalool	95%	22,35
		borneol	73%	25,16
M.O., e. M, l. Mo	50 mz -200 mz	camfen	85%	7,61
		β-mircen	85%	11,25
		limonen	91%	12,13
		α-pinen	89%	14,07
		β-cis-ocimen	94%	14,15
		cis-2- pinanol	85%	16,21
		nerol	76%	21,35
		linalool	97%	22,35
		isoborneol	73%	25,17

M.O,. e.G, l. Mo	50 mz -200 mz	camfen	98%	7,60
		β-mircen	87%	11,14
		limonen	91%	12,06
		α-pinen	79%	13,52
		cis-2- pinanol	84%	16,19
		linalool	96%	22,34
M.O,. e.M, l. Ar	50 mz -200 mz	camfen	92%	7,6
		β-mircen	78%	11,20
		limonen	88%	12,00
		β-cis-ocimen	91%	14,05
		ocimen	87%	14,85
		cis-Linalool Oxid	73%	19,63
		nerol	70%	21,35
		linalool	95%	22,35
		Bergamoten	72%	29,35
		pivalat limonen-6-ol	73%	34,4
M.O,. e.G, l. Ar	50 mz -200 mz	camfen	97%	7,63
		β-mircen	86%	11,07
		limonen	93%	11,98
		α-pinen	94%	13,98
		cis-2- pinanol	86%	16,17
		α-terpineol	74%	19,50
		nerol	83%	21,30
		linalool	97%	22,33
M.O,. e.M, l. Ap (Witness sample for enzymatic maceration)	50 mz -200 mz	camfen	94%	7,58
		β-mircen	70%	11,19
		limonen	81%	12,10
		α-pinen	84%	14,06
		4-caren	85%	14,85
		cis-2- pinanol	79%	16,21
		nerol	74%	21,36
		linalol	96%	22,33
		borneol	71%	25,16
M.O. Witness (spontaneous maceration, without maceration enzymes)	50-200	camfen	97%	7,62
		limonen	90%	12,12
		3-caren	93%	14,80
		linalol	96%	22,33

Table 2.

Gas chromatographic analysis – SPE extraction method

Sample	Mass range	Identified compound	Percentage	Retention time (min.)
M.O,. e.G, l. Ar	30 mz -200 mz	β-mircen	95%	11,45
		D-limonen	90%	12,35
		Ocimene	87%	14,20
		linalol	95%	21,95
		hotrienol	96%	23,9
		beta-Citronellol	95%	97,5
		Nerol	94%	28,23
M.O,. e.G, l. Ar	50 mz -200 mz	β-mircen	94%	11,43
		limonen	92%	12,42
		β-cis-ocimen	90%	14,18
		linalol	95%	21,93
		hotrienol	96%	23,90
		α - terpineol	94%	25,86
		β-Citronellol	94%	26,47
		nerol	92%	28,20
		Lemonol	95%	29,25

Alcohols: 2-amino-1,3-propandiol, 2-propil-1-heptanol,4-etil-1-octin-3-ol, β-fenoxiethyl alcohol, methanol, 1-butanol, 1-hexanol, 1-pentanol, 1-octanol, 1-octen-3-ol, 2-etil-1-hexanol, 2-etil-1-butanol, 3,7-dimetil-1,6-octadien-3-ol, 3-pentanol, 1-nonanol, 3,7-dimetil-2,6-octadien-1-ol, alcohol benzilic, phenyl ethyl alcohol, indol-3-ethanol, 3-methyl-1-pentanol, 3-hexen-1-ol, 2-Octen-1-ol, benzilic alcohol, 1-dodecanol, isohexil alcohol, 2,3-Butandiol, 1-metoxi-2-butanol.

Acids: nonanoic acid, enantic acid, acetic acid, formic acid, n-decanoic acid, neric acid, p-hidroximandelic acid, pentadecanoic acid, acetic acid, izobutiric acid, hexanoic acid, octanoic acid, butanoic acid, octadecanoic acid

Aldehides: acetaldehide, isovaleric aldehide, phenilglioxal, hidroximetilfurfural, furfural, 2- methyl propanal, 3 methyl butanal, 5-hidroxilmetil-2-furancarboxaldehide, 4-Hidroxi-2-metoxicinamaldehide

Alcans: hexadecane, nonadecane, 2,6,11-trimetildodecane,3-methil pentane

Esters: ester of the phtalic acid, methyl acetate, ethyl acetate, dipropil sulphite, ethyl butirate, acetate 3-methyl 1-butanol (banana flavour), butanoate ethyl, caproate ethyl, caprilate ethyl, isovalerate ethyl, decanoate ethyl, propanoat ethyl, ethyl isobutirate, octanoate ethyl, hexanoate ethyl, propaonate hexil, ethyl hexil benzoate, ethyl isovalerate, isoamil caproate

Cetones: butilacetone, isopropyl phenyl cetone, phenyl methyl cetone

CONCLUSIONS

The following conclusions have been drawn from the analysis of the obtained spectrums:

- Muscat Ottonel has intense aromatic properties, mainly given by terpenic compounds and esters, out of which, the most important is linalool
- Best mass range for identifying aroma compounds is 50mz -200mz
- The compounds identified in my study are confirmed by research done in the field
- Headspace method leads to identification of fewer compounds , with a lower probability percentage
- SPE method identifies more terpenic compounds than the headspace one: butirolactone, citronelol, lemonol
- The headspace method is very much influenced by the matrix, as well as repartition coefficients of the compounds during the liquid and gas phases.
- Zymoclaire Muscat enzyme, during the headspace method, accentuates the terpenic compounds borneol, nerol, bergamoten, pivalat limonen and cis linalol oxide.

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VALEA CALUGAREASCA RED WINES PRODUCED WITHIN AN INTEGRATED SYSTEM

PRODUCEREA VINURILOR ROŞII DE VALEA CALUGAREASCĂ ÎN SISTEM INTEGRAT

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Abstract. *The International Organization of Biological Control established a new systemic concept. This concept regards Integrated Production as an "agricultural system of high quality production which utilizes natural regulation resources and mechanisms, enabling a viable production for a longer period of time". Integrated Production implies reduced interventions on vine and wine making process, being favorable for the environmental protection and human health. At the Research and Development Institute for Viticulture and Enology, Valea Calugareasca, the effects of integrated production system have been studied on an experimental plot of Cabernet Sauvignon in comparison with a classical control plot and other three modules where different techniques were applied (soil maintenance and fertilization, vegetation structure, phytosanitary protection) representing intermediary steps for accomplishing the integrated production system. Determinations and observations have been made concerning the chemical composition of the soil, production per vine, attack level for the main grapevine diseases and pests, grape evolution during their maturation stage, chemical and mechanical composition of grapes at the harvesting moment and the physical and chemical composition of the wines obtained within the five experimental modules. Following the determinations and observations we could conclude that the current management shift toward that of integrated production was quite a success.*

Rezumat. *Organizatia Internationala a Luptei Biologice si Integrate defineste un nou concept sistemic, acela al productiei integrate ca fiind "sistemul agricol de productie de inalta calitate, care utilizeaza resurse si mecanisme de reglare naturala si care asigura pe o perioada lunga de timp o productie viabila ». Productia integrata înseamna interventii reduse la minim in vie si in crama, având in vedere protectia mediului si sanatatea consumatorului. La ICDVV Valea Calugareasca au fost studiate efectele introducerii sistemului de productie integrata pe o parcela de Cabernet Sauvignon, comparandu-se cu martorul clasic, precum si cu module in care s-au aplicat tehnici de: intretinerea solului si fertilizare, structura vegetatiei, protectie fitosanitara, care constituie etape intermediare pentru realizarea productiei integrate. S-au facut observatii si determinari referitoare la compozitia chimica a solului, productia pe butuc, gradul de atac pentru principalele boli şi daunatori, evolutia strugurilor la maturare, compozitia fizico-chimica si mecanica a strugurilor la recoltare, compozitia fizico-chimica a vinului obtinut din cele cinci module experimentale. In urma observatiilor si determinarilor a rezultat ca reconversia managementului actual la cel al productiei integrate a fost un succes.*

Consumers' expectations regarding the quality of the wines registered quite an evolution during the latest years. The demands concerning the organoleptical qualities

were added with the requirements concerning food security and environmental protection. The International Organization of Biological Control defines the Integrated Production as a new systemic concept consisting in an "agricultural system of high quality production which utilizes natural regulation resources and mechanisms, enabling a viable production for a longer period of time". The implementation of such a concept both in the vinegrowing plots and the wineries represents some kind of requirement for the present, but quite a necessity for the future. It is equally imposed by the legislation of the European Union, as well as by the restructuring of the enterprises according to the principles concerning the competing capacity of the products and the possibility of rendering natural and human resources more efficient, all these being the reason for which the present study has been accomplished.

MATERIAL AND METHOD

An experimental layout was conceived within the system of Integrated Production for Cabernet Sauvignon variety used for obtaining red wines of high quality, specific for Dealu Mare vineyard. The aspects studied at the level of demonstrative experimental module (MED) are s it follows:

MED 1 "Soil maintenance and fertilization" – diminution of the multitude of mechanized works, restrictioning of the integral application of herbicides, organic matter ratio by applying alterntive herbage on the intervals between the grapevine rows, mulching on the row, fertilization with grape marc compost.

MED 2 "Structure of the vegetation" – potential crop adapted for the specific requirements of the variety and for the natural conditions of the grapevine plantation, enabling the air flow which is necessary for the grapevine canopy;

MED 3 "Phytosanitary protection" – structural prophylactic and treatment programs based on the concept of "Integrated Protection", compliance with EU legislation concerning the security of the methods applied in the utilization of the phytosanitary products;

MED 4 "Integrated Production" represents a combination of MED 1~3 effects when put together;

MED 5 "Witness control" – technological works are applied in conformity with the conventional system.

Assessments were made for: soil humidity, vegetative development of the grapevines established to be checked for each module, quality and quantity of grape production, degree of attack in case of the main diseases, composition of the grapes and wines produced, including also analyses concerning the chromatic specific features and the phenolic composition.

RESULTS AND DISCUSSIONS

1. Effects of the actual management shift toward the Integrated Production inside the vinegrowing plots

Modern intensive viticulture of high productivity implies significant challenges concerning the structural and other physical characteristics of the soil. The soil humidity which is the best for the grapevine ranges in between 50-80% of IUA (absolute humidity index), the smallest values being favorable for the berry maturation, and the greatest values for the shoot growth. Comparing the results obtained, we noticed that inside MED 4 (Integrated Production), the water retention into the soil ranges within the

optimal interval during the whole period, even if the values registered are inferior to the witness control (Fig. 1.).

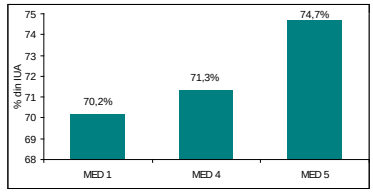

Fig. 1. Variation of the viticultural soil humidity

The chemical composition ratio reveals that total N, P and K supply is optimal for MED 1 and MED 4. As for MED 5 (Witness Control), it was noticeable that P_2O_5 level exceeds the optimal domain, whereas that of K_2O is lower (Table 1). The optimal values: 0,11-0,20 % total N, 10-20 mg P_2O_5 /100 g soil and 25-45 mg K_2O /100 g soil.

Table 1

Chemical composition of the viticultural soils

Module	Total N (%)	P_2O_5 (mg/100g soil)	K_2O (mg/100g soil)
MED 1	0,17	16,0	30,0
MED 4	0,16	16,0	30,0
MED 5	0,20	24,6	22,2

The potential fertility of the checked grapevines is different according to each MED (Fig. 2). In case of MED 1, the fertility of the winter buds increased by a higher percentage than in case of MED 4. In MED 2, the potential crop (buds retained at pruning) was attentively adjusted by considering both the requirements of the variety and the adequate airing of the canopy. With MED 4, the number of inflorescences was an average one, considered however as being optimal for obtaining appropriate grape productions in respect of their quality and quantity.

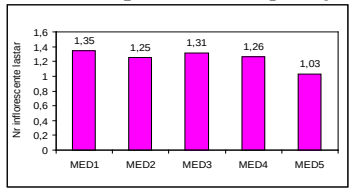

Fig. 2. Variation of potential fertility

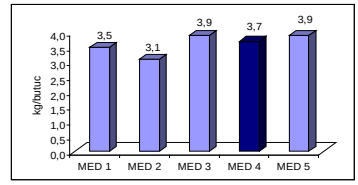

Fig. 3. Grape production for each MED

The grape production (kg/grapevine) was greater in case of MED 3 and MED 5; the difference between the Integrated Production and the Witness Control was of 0,200 kg/grapevine (Fig. 3). The integrated production has as a main objective to protect the vinegrowing plantations by rationally combining chemical, biological, physico-chemical and control methods, having as background specific grapevine technologies aiming at preventing and diminishing the strength of attacks. For MED 3 and MED 4, a phytosanitary "Control Program" was conceived by scheduling the treatments according to the growth and development stage of the grapevine and the strength of the already appeared infection. The active ingredients were those admitted by the Integrated Production, being therefore less toxic and less risky for the human health and for the

environment. For the other experimental modules, the "Control Program" was that practiced by the conventional system. When analyzing the influence of the experimented technological factors on the degree of attack in case of the main cryptogamic diseases, it was noticed that the treatments applied in the modules MED 3 and Med 4 enhanced good efficacy in controlling downy mildew (*Plasmopara viticola*), powdery mildew (*Uncinula necator*) and grey rot (*Botrytis cinerea*) on leaves and grapes. The results are quite significant in case of MED 3 and MED 4 in all the cases, in comparison with MED 5 (Witness Control), proving thus the right choice of the treatments and of the application moment. Quite relevant for the quality of the grapes is the diminution of grey rot attack from 47% in case of MED 5 (Witness Control), to 4,3% in case of MED 3 and MED 4, the results at veraison being mirrored also at harvesting Table 2.

Table 2

Degree of attack (GA%) for the pathogens of the grapevine during "Grape Veraison" (beginning of berry ripening)

Disease and pathogen	GA %		
	MED 3	MED 4	MED 5
Downy mildew (*Plasmopara viticola*)			
- leaves attacked	21,2	22,0	67
- grapes attacked	2,82	3,3	10
Powdery mildew (*Uncinula necator*)			
- leaves attacked	0	0	1,36
- grapes attacked	0,18	0,18	8,10
Grey rot (*Botrytis cinerea*)			
- grapes attacked	4,3	4,3	47

2. Characteristics of the raw material

The study of the grape composition evolution during their maturation process gives the possibility of establishing the optimal moment for harvesting. No significant differences were noticed regarding sugar accumulation, the accumulation of anthocyanins being however influenced by the treatments applied (Fig. 4).

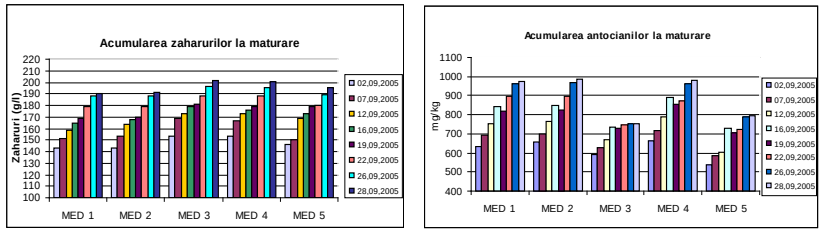

Fig. 4. Accumulation of sugars and anthocyanins in grapes at their maturation

The highest levels of anthocyanins were reached with MED 1, MED 2 and MED 4, outlining therefore the importance of soil maintenance and fertilization procedures and of the vegetation structure. All the experimental variants showed that Cabernet Sauvignon grapes reach their highest polyphenolic potential in about 10 days since their full maturation. Grape composition at harvesting is rendered in Table 3.

Table 3.

Physico-chemical and mechanical composition of grapes at harvesting

Component of quality	Parameters	MED 1	MED 2	MED 3	MED 4	MED 5
Basic composition	G 100 berries (g)	108	118	112	118	107
	Sugars (g/l)	199	199	207	202	196
	Acidity (g/l H_2SO_4)	6,29	6,38	6,20	6,24	6,41
Mechanical structure	Healthy berries (%)	89	89	91	90	81
	Damaged berries (%)	11	11	9	10	19
	G strugure (g)	193	177	175	167	115
	% skin	8,25	5,07	5,42	4,62	9,64
	% seeds	3,88	4,26	4,24	3,26	4,06
	% pulp	87,86	90,67	90,34	92,12	86,29
Polyphenolic composition	Anthocyanins (mg/kg grapes)	974,7	985,9	753,4	980,4	797,8

Differences are noticed in case of all the assessed parameters, but we outline a more reduced percentage of damaged berries in case of the experimental variants in comparison with the Witness Control, and a higher content in anthocyanins for MED 1, Med 2 and MED 4.

3. Physico-chemical composition of wines

The physico-chemical composition of the wines produced presents several differences depending on MED. We mention the higher content in alcohol for the wines produced within MED 3 and MED 4, the correlation with the higher level of the extract within MED 2 and MED 4 revealing the influence of the vegetation structure (Table 4).

Table 4

Basical composition of the wines

Physico-chemical parameters	MED 1	MED 2	MED 3	MED 4	MED 5
Acquired alcoholic strength (%vol)	11,6	11,6	11,9	11,8	11,4
pH	3,30	3,50	3,32	3,48	3,12
Total acidity (g/l H_2SO_4)	5,21	5,38	5,21	5,14	5,16
Volatile acidity (g/l acid acetic)	0,48	0,49	0,33	0,33	0,60
Non-reducing extract (g/l)	25,02	26,76	25,02	26,41	22,50

The phenolic composition is very important for the quality of the red wines. Cabernet Sauvignon wines are corpulent, rich in phenolic compounds and well balanced. High values of the color intensity are noticed in case of MED 2, where the structure of the grapevine vegetation gave the possibility of having an optimal exposure for the grapevine canopy (Table 5).

Table 5

Color and polyphenolic structure of the wines under experiment

Physico-chemical parameters	MED 1	MED 2	MED 3	MED 4	MED 5
Color intensity (1 cm)	0,66	0,74	0,72	0,68	0,58
Hue	0,784	0,786	0,736	0,615	0,639
Total polyphenols (IF)	28,7	27,1	24,1	25,3	23,5
Tannins (g/l)	2,96	2,56	2,19	2,43	2,03
Anthocyanins (mg/l)	421	391	445	455	546

The wines have an intense color, the red color being so intense due to the utmost presence of flavilium cation and of the blue color. The phenolic composition specific to the wines at MED level was estimated by considering the analytical parameters: Folin index, tannins and anthocyanins. Following the analyses, differences of the values between the modules are observed. In MED 4, Folin index and the content in tannins register a higher value comparatively with the Witness Control. The anthocyanin content of the wines is slightly lower in case of MED 4 when compared to the Witness Control to which the size of the berries is smaller, but higher when compared to the intermediary modules.

CONCLUSIONS

1. The agrotechnical management and the phytosanitary protection treatments applied in the demonstrative experimental modules influenced upon the composition of the soil, the vegetative development, the quality and quantity of the grape production.

2. N, K, P supply ranged in between the optimal domains in case of the Integrated Production, the variant taken as a Witness Control registering values not belonging to those intervals for P and K.

3. The potential fertility was higher in case of all the experimental variants when compared with the Witness Control. By reducing the potential crop (MED 2 and MED 4), in order to comply with the requirements of the variety, the grape production was lower in case of these modules comparatively with the Witness Control and MED 3. The modification of the potential crop without adequate phytosanitary protection (MED 2) engendered a more important decrease of the production by 0,8 kg/grapevine, but only 0,2 kg/grapevine in case of the Integrated Production.

4. The phytosanitary protection treatments (MED 3 and MED 4) significantly diminished the attacks of the main diseases (downy mildew, powdery mildew, grey rot), comparatively with the Witness Control, the effects being noticeable both at grape veraison and at harvesting. The treatment application schedule according to the grapevine development stages and the infection strength gave the best results.

5. The potential crop diminution had positive effects on the accumulation of anthocyanins (MED 2 and MED 4).

6. The wines produced within the experimental variants registered higher levels for their alcohol content, non-reducing extract and phenolic compounds than in case of the Witness Control, which consequently emphasized the positive influence of introducing the new concept.

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THE MAGNETICAL FIELD – NEW TECHNOLOGIE FOR WINE MICROBIOLOGICAL STABILIZATION

CÂMPUL MAGNETIC – O NOUĂ TEHNOLOGIE DE STABILIZARE MICROBIOLOGICĂ A VINULUI

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Abstract. *Because the classical methods for food sterilization (pasteurization, thermolization or sterile filtrations) decay the nutritive quality of food, the found of new non-thermal technologies is essential. The use of magnetic field for wine stabilization is valuable because is a friendly innovative technology based on non-heating procedures, without influencing on the savor, color and nutritional value of the products undergoing such treatment. The static magnetic field (the magnetic field intensity is constant with time) have been explored for their potential as microbial inactivation method. The SMF was applied for 5min, 10 min, 15 min and 20 min. It remarks that the static magnetic field inhibited microbial growth. The experiment was carried out on 2 wine batches (1 white wines and 1 red wines). The geometry for system was constant. The exposition times and the intensity for magnetically field are established by preliminary experiments. The results show that this method is very efficiently for food preservation.*

Rezumat. *Având in vedere deficiențele metodelor clasice de sterilizare utilizate in prezent (pasteurizare, termolizare sau imbuteliere la cald, filtrări sterilizante), cercetările pentru găsirea unei tehnologii alternative sunt total justificate. Printre soluțiile nontermale actuale (iradiere, câmp electric pulsatoriu, presiuni înalte, UV, ultrasunete), aplicarea câmpului magnetic static/oscilator poate conferi o siguranță microbiană a produselor alimentare lichide, fără a le altera calitatea nutritivă***.**

Wine can be defined as the alcoholic product resulting from the fermentation of fresh grape juice obtained from grapes with the genotypes of *Vitis vinifera* that have been propagated over the ages (Țardea, 2007). Wines can be produced with compositional characteristics (changes in aroma and flavours) that differ from year to year, depending on the grape type, microbial species predominating at the time.

In traditional winemaking the grape juice, after the grape pressing, is put into vats where fermentation take place, spontaneously transforming the must into wine. The fermentation of the juice can involve many types of yeast, like Saccharomyces. There are advantages to not leaving the must to its destiny and no allowing the free growth of wild undesired yeasty, it is best to guide the fermentation and to favour the elliptical morphological yeast of the species S.cerevisiae.

Traditional winemaking presupposes several prefermentative treatments during which wild microbiota are controlled through the addition of SO_2 (Romano and Suzzi, 1993). The antiseptic function of SO_2 is an important

determinant for the yeast population, having been revealed selective especially towards lactic and acetic bacteria. The necessary sulphide amounts must be kept to the minimum, above all for health and organoleptic reasons.

For this reason, the use of alternative nonthermal methods (like magnetical field) in food processing has been under intense study (Frankel, 1995, Barbosa et al., 2000, Tudorache et al, 2007). Innovative non-thermal processing technologies can deliver a range of product and process benefits depending on the product application. Often these technologies may deliver fresher tasting, minimally processed food products at a level of safety equivalent to, or better than, traditional approaches.

MATERIAL AND METHODS

The experiment was carried out at the laboratory scale. The equipment for the SMF treatment consists in a pulse generator and an electromagnet. The intensity was read on a multimeter and the samples were placed inside the electromagnet, in centrum, where the intensity of magnetic field is constant and maximum (10^{-2} T in our experiment).

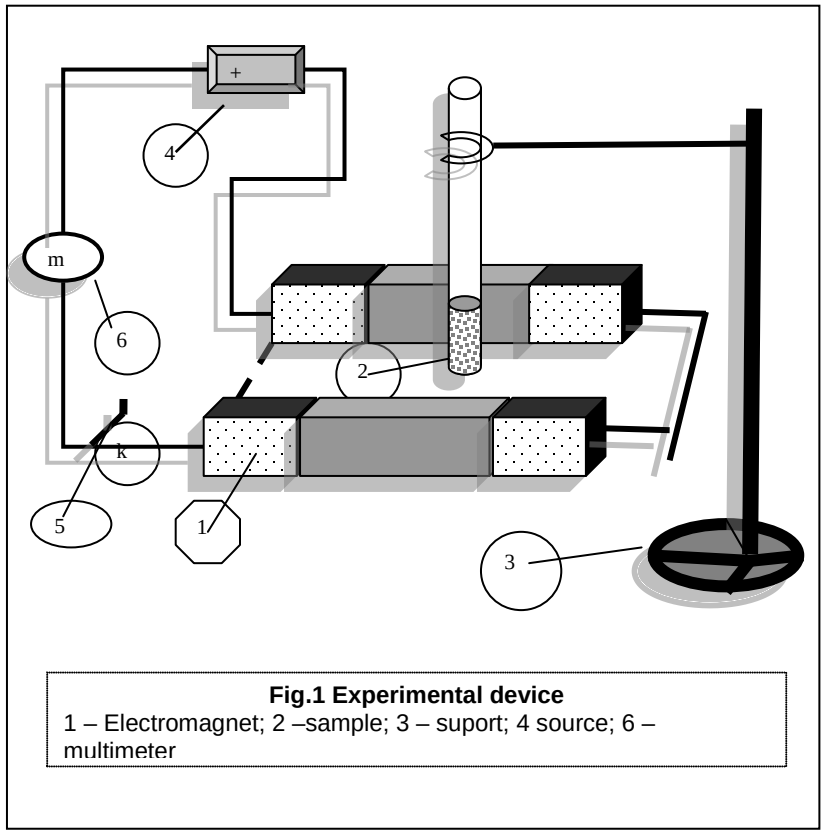

Fig.1 Experimental device
1 – Electromagnet; 2 –sample; 3 – suport; 4 source; 6 – multimeter

We used cell suspension with yeast isolated from white wine (Sauvignon Odobesti) and from red wine (Merlot Cotesti) in YPG liquid medium.

The experimental variants were different by the treatment period. A 24 hours suspension was treated in static magnetic field for 5, 10, 15 and 20 minutes. It was a control sample (witness lot – the must that did not undergo SMF treatment).

For the detection of viable yeast cells number, after 24 hours from exposure we diluted cell suspensions in sterile physiological water and we inoculated the 10^{-4}, 10^{-5} and 10^{-6} dilution in YPG solid medium (three repetitions for each dilution from exposed samples). The Petri dishes were incubated 72 hours at 30ºC and the colonies were estimated with Funke Gerber device. We calculated the number of viable cells per ml for each exposed sample and for witness sample.

RESULTS AND DISCUSSIONS

The results represent an indirect estimation of viable yeast cells number, by average number of colonies, at the same dilution (10^{-6}), for yeast cells suspension treated in static magnetic field 5, 10, 15 and 20 minutes and for witness sample. In figure 2 and 3 was presented the growing on the solid medium, for different experimental variants.

Fig.2 Yeast colonies derived from white wine, 5 min SMF, 10^{-7} dilution

Fig.3. Yeast colonies derived from red wine, 5 min SMF, 10^{-5} dilution

From figure 4 it remarks that the number of viable yeast cells derived from white wine decreases after 5, 10 or 15 minutes of exposure in magnetic field, comparative with the control.

After 20 minutes of exposure in static magnetic field, the numbers of viable cells are higher than sample treated for 5, 10 or 15 minutes, but smaller than the control sample.

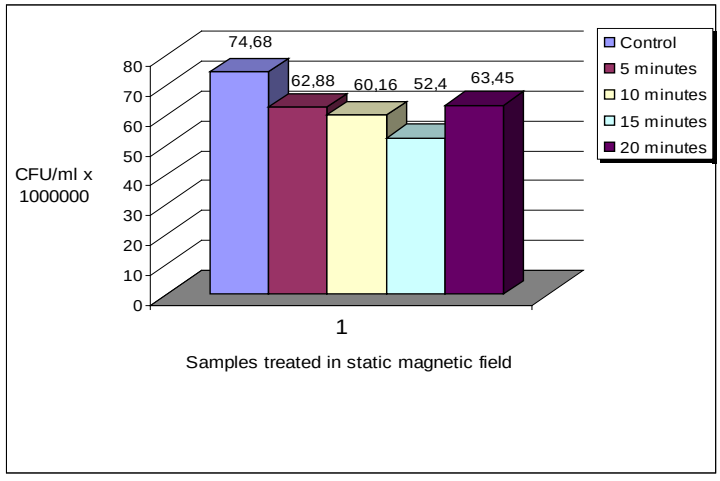

Fig. 4. Number of viable cells from red wine

For yeast cells, suspension derived from red wine the number of viable cells is show in figure 5. It remarks that the number of viable yeast cells decreases after 5, 10, 15 or 20 minutes of exposure in magnetic field comparative with the control, but more than the samples derived from white wine.

The number of viable cells for sample treated 15 or 20 minutes are higher than the number for sample treated 5 or 10 minutes.

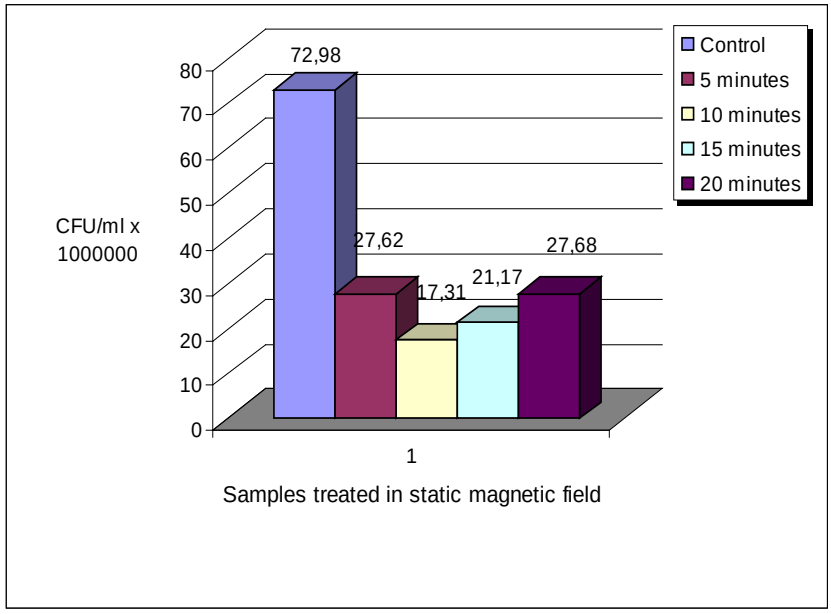

Fig. 5. Number of viable cells from white wine

CONCLUSIONS

It remarks that the SMF effect is different for the yeast colonies derived from white wine and red wine; on the red wine, the SMF action is powerful. The number of viable cells for samples from red wine was smaller than the number of viable cells for samples from white wine at the same exposure time (the initially number of cells are approximately the same, for control lot).

From our experiments, it cannot remarks a direct correlation between the exposure time and the decrease of viable cells number. Other authors observed a similar behavior of yeast cells, in static magnetic field.

Exposure to a magnetic field may stimulate or inhibit the growth and the reproduction of yeast. Inhibition or stimulation of the growth of microorganisms exposed to magnetic fields may be a result of the magnetic fields themselves or the induced electric fields.

The effect of magnetic fields on the microbial population of liquid foods (like wine) may depend on the magnetic field intensity, the microbial growth stage or the property of food (resistivity, electrical conductivity).

The mechanisms of microbial inactivation by static magnetic field are not very well known, so we will continue the experiment with more variants (different intensity magnetic field, time of exposure, microbial growth stage etc.).

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STUDIES REGARDING THE TOTAL POLYPHENOLS CONTENT FROM SEVERAL RED GRAPE VARIETIES

STUDII PRIVIND CONȚINUTUL TOTAL DE POLIFENOLI DIN CÂTEVA SOIURI DE STRUGURI ROŞII

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Abstract: *The latest studies outlined the important role of polyphenols from grapes and wines, especially from red variety. The polyphenols are those antioxidants compound who favouring the biochemical reactions which protect the cardiovascular system and also have an antiviral and bactericidal effect. The aim of this paper was to determinate the variations of polyphenols content in different parts of grapes. The grapes varieties taken for study are*: *Cabernet Sauvignon, Merlot, Burgund mare and Muscat Hamburg.*

Rezumat: *Ultimele studii au evidențiat rolul important al polifenolilor din struguri şi vin, mai ales din soiurile roşii. Polifenolii sunt compuşii antioxidanți care favorizează reacțiile biochimice ce protejează sistemul cardiovascular, având de asemenea şi efect bactericid .Scopul acestei lucrări a fost de a determina variația conținutului în polifenoli din diferitele părți ale strugurilor. Soiurile luate în studiu sunt: Cabernet Sauvignon, Merlot, Burgund mare and Muscat Hamburg.*

Polyphenols are antioxidant compounds found in grapes, especially in skin, seeds and rachis of grapes. Antioxidants are substances that protect cells from oxidative damage caused by molecules called free radicals. In grapes and wine the polyphenols include: catechins, epicatechins, gallic acid, anthocyans, flavones, resveratrol

When wine is made the alcohol produced by the fermentation process dissolves cells membranes and the polyphenols contain in the skin and seeds pass in wine. So, for this reason, the red wine contains more polyphenols than white wine because the making of white wine requires the removal of the skins after the grapes are crushed. The last years the interest in these components has increase due to their relationship to human health. Several studies have proved that antioxidants such as polyphenols help the body to protect against deteriorative reactions and diseases. [1] Gutiérrez (2002) demonstrated that polyphenols may have a protective effect against cardiovascular diseases or even some kinds of cancer. Polyphenols extract from grape help the body to protect against damage produced by sun shines, to improve vision and blood circulation, to reduce LDL (Low Density Lipoproteins) oxidation and the occurrence of coronary diseases.[5] Medina et al. (2002) indicated that polyphenolic extracts of grape and apple present a high antioxidant of natural fats and oils. Beyond the benefits for human health, polyphenols have a wide range of applications in the food industry as

colorants, functional additives in beverages, dairy products, candies, bakery and cereals. Natural antioxidants for example can be used to increase shelf life of food by preventing lipid peroxidation and protecting oxidative damage. [4]

MATERIALS AND METHODS

Polyphenolic content of grape varies with: variety, soil composition, climate, geographic origin, and cultivation practices. Total phenolic content is higher in red varieties due almost entirely to anthocyanin density in red grape skin compared to absence of anthocyanins in white grape skin. [7]

For this motive we have been studied four red grape varieties harvested from two viticulture areas: West Carpathian Area (Timiş vineyard, Recaş wine-growing centre) and South Carpathian Area (Dealul Mare vineyard, Merei wine-growing centre). We took in study three grape wine varieties: Cabernet Sauvignon, Merlot, Burgund mare and one table grape variety: Muscat Hamburg.

The grapes were harvested at the stage of complete maturity. The sample size, used for the mechanically analyze, was one kilo for each grape variety. The pulp berries, skins (peels), seeds and rachis of grapes were separated from fresh grapes.

The peels, seeds and rachis were dried at 60-70°C, made powder and stocked at 25°C. The must was filtrated and kept in the freezer at -20°C. The samples used further for analysis was prepared in AGRIAL (Biomedical and Agroalimentary Expertise Laboratory) from USAMV Cluj-Napoca. The polyphenolic constituents were extracted from the plant material by a series of successive extraction [6].

For extraction, 0,5 ml must samples (**M)** were mixed up with 4,5 ml solvent (ethanol 40%). Samples were exposed to ultrasound at a constant frequency 15min. After that, samples were taken out of ultrasound bath and for measurement was used 2 ml.

100 mg of dried samples **(**peels-**P**, seeds-**S** and rachis-**R)** were added by 15ml of solvent (ethanol 40%), shaken until to homogenizes and exposed, in an ultrasound bath, to ultrasound treatments at a constant frequency over 30 min. The extract obtained was filtered through filter paper and then was measured by spectrophotometer. Total polyphenols content of extracts was determined as catechol and galoil equivalents by using a calibration curve of catechol solutions of known concentration.

The total polyphenols were determinate by spectrophotometry method with Folin-Cicâlteu reagent. After the reaction with $[FeNH_4(SO_4)_2]$ reagent, we have been determinate the absorption at 578 nm for catechil groups and at 680 nm for galoil groups. The measurement was made as against gallic acid standard curve (in 4 different concentrations). Standard curve ecuation is:

$$Abs = A + B \times c$$

where: A = 0,0571
B = 0,4886

$$c = \frac{Abs - A}{B}$$

Regarding samples dilutions formula is:

$$Conc(\ mg/100\ g\ sample\ s) = \frac{c \times 10^5 \times V_1}{m \times V_2}$$

where: V_1= 25 ml; V_2= 4 ml
m – mass of peels (**P**); seeds (**S**); rachis (**R**) must (**M**)

For must dilutions final formula is: $$Conc(\ mg/100\ g\ samples\ ) = \frac{c \times 100 \times V_1}{V_2 \times V_0}$$

where: V_0= 1 ml; V_1= 10 ml; V_2= 8 ml

RESULTS AND DISCUSSIONS

The results regarding total polyphenols content after determination and measurements made of samples are present in table 1.

Table 1.

Total polyphenols content of peels (P); seeds (S); rachis (R) must (M) samples

Grape variety	Total polyphenols			
	(mg./100g. sample)			(mg./100 ml. sample)
	P	S	R	M
Cabernet Sauvignon Recaş	1000	16250	7750	8,75
Burgund mare Recaş	1187,5	19500	12500	12,50
Merlot Recaş	562,5	15250	17750	16,25
Merlot Dealu Mare	1125	18750	5750	32,50
Muscat Hamburg Recaş	1062,5	14750	11500	27,50

In 100 grammas of samples of seeds, the biggest quantities of total polyphenols were found at Burgund mare variety (19500 mg) and Merlot-Dealu Mare (18750mg). Also in rachis samples of Merlot-Recaş, it was found the higher level of total polyphenols (17750mg). In all skins samples the polyphenols content are lowest comparative to seeds and rachis, but the higher value was obtain Burgund mare variety (1187,5 mg). To all grapes variety, polyphenols content of must has the lowest values between 8.75 mg (Cabernet Sauvignon) to 32.5 mg. (Merlot- Dealu Mare).

The catechil and galoil groups were evaluated in units of absorption (UA) determinate at 578nm for catechil groups and at 680nm for galoil groups.(Table 2). The catechil group (578nm) has the higher value in seeds of Burgund mare variety (0,7381 UA) and little lower in rachis at Merlot- Recaş variety (0,6794 UA). The bigger values at the galoil group (680nm) were determinate at the same varieties: in seeds of Burgund mare (0.6107 UA) and in rachis of Merlot (0.5050 UA). The quantity of total polyphenols in skin grapes (P) and in must (M) was smaller at all varieties as against in seeds and in rachis. In the skin grape the catechil and galoil groups were found in very small quantity and in must there were only traces. For determination we used must obtained whiteout maceration-fermentation process.

Table 2

Units of absorption (UA) of catechil and galoil groups

Grape variety	catechils (c) and galoils (g) groups (units of absorption, UA)					
	P		S		R	
	c 578	g 680	c 578	g 680	c 578	g 680
Cabernet Sauvignon Recaş	0,0721	0,052	0,5685	0,4942	0,1855	0,1717
Burgund mare Recaş	0,0070	0,055	0,7381	0,6107	0,4502	0,3732
Merlot Recaş	0,0070	0,055	0,5228	0,4036	0,6794	0,5050
Merlot Dealu Mare	0,0090	0,060	0,4660	0,3763	0,2081	0,1763
Muscat Hamburg Recaş	0,0800	0,050	0,4507	0,3941	0,3021	0,2774

CONCLUSIONS

To the grape varieties taken for study, the biggest quantity of total polyphenols and were found in seeds and rachis of Burgund mare variety (19500 mg) and Merlot-Dealu Mare (18750mg). The smaller values were in skin grape and must for all varieties.

The catechil (578nm) and galoil group (680nm) have the higher value in seeds samples of Burgund mare variety (0,7381 UA, 0,6107 UA). In skin grape the catechil and galoil groups were found in very small quantity and in must there were only traces.

Polyphenolic content of grape varies with: variety and vineyard eco-climate.

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RESEARCHES CONCERNING THE DELIMITATION OF THE VINEGROWING AREAS OF HIGH QUALITY (TERROIRS VITICOLES) IN VALEA CALUGAREASCA VITICULTURAL CENTER

CERCETĂRI PRIVIND DELIMITAREA AREALELOR VITICOLE DE CALITATE (TERROIRS VITICOLES) ÎN CENTRUL VITICOL VALEA CALUGAREASCA

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Abstract. *Within the context of the ever increasing competing challenge on the wine market, of the over production of the wines and of the evolution of the consumers' taste shifting toward highly typical and authentic wines, it has become more than necessary to identify the vinegrowing areas suitable for obtaining typical wines of high quality. The optimal exploitation of the natural potential (i.e. ecopedoclimatic) of the different vinegrowing areas from Valea Calugareasca center, the high quality vitivinicultural products are expected to be obtained, their capacity of competing on the domestic and foreign markets being quite high. The research works developed within 2002-2006 showed that grape and wine quality compulsorily depends on genetic, ecological and technological factors, that dependence being highly complex and variable when the quality is represented not only by the sugar content in grapes (i.e. wine alcoholic strength), but also by other grape and wine compounds contributing as well to defining the quality concept. The management of the vitivinicultural products with denomination of origin will ensure the rational exploitation of the vinegrowing areas, complying with the sustainable agriculture principles. The wine consumers will have therefore the guarantee that the products they consume are safe for their health.*

Rezumat. *În contextul creşterii concurenţei pe piaţa vinurilor, al supraproducţiei de vinuri şi al evoluţiei gustului consumatorilor către vinuri de mare tipicitate şi autenticitate, este resimţită necesitatea identificării arealelor adaptate obţinerii unor producţii de vinuri de mare calitate şi tipicitate. Prin valorificarea optimă a potenţialului natural (ecopedoclimatic) al diferitelor areale viticole din centrul viticol Valea Călugărească, se estimează obţinerea unor produse viti-vinicole de înaltă calitate, cu un potenţial concurenţial ridicat pe piaţa internă şi externă. Cercetările efectuate în perioada 2002-2006 au demonstrat că dependenţa calităţii strugurilor şi vinului de factorii genetici, ecologici şi tehnologici care o condiţionează, este deosebit de complexă şi variabilă, în situaţia în care calitatea nu este asimilată numai cu conţinutul în zahăr al strugurilor, respectiv cu tăria alcoolică a vinului, ci şi cu alti compuşi ai strugurilor şi vinurilor, care contribuie în mod nemijlocit la definirea noţiunii de calitate. Realizarea managementului produselor vitivinicole cu denumire de origine va asigura o exploatare raţională a arealelor viticole în concordanţă cu principiile agriculturii durabile. Consumatorii de vin vor avea garanţia că produsele pe care le consumă sunt sigure pentru sănătatea lor.*

MATERIAL AND METHOD

In the Valea Călugărească wine-growing centre, the researches have focused on identification, delimitation and characterization of 10 homogenous geopedological sequences and it was quantified the impact of ecopedological factors on the vine-bearing/parent stock bio-systems within the ecopedological constants delimited according to the following criteria:

- Local relief (geomorphology) and elevation as associated landscape;
- Terrain geology and lithology, as: rock type, structure and stratification;
- Pedological nature of the terrain, as: soil type or soils complex;
- Pedoclimate of the area, as: soil and subsoil, vine/soil interface, development of the radicular system of the vines;
- Mesoclimate of the area, as: environment and vine-soil-climate relation;
- Reputation of the owner, as human factor, who by the observance of the technological requirements for vine and cellar ensures the getting of products (grapes, wines) of remarkable quality and typicality.

The ecological constants, as basic natural units, chosen according to the aforementioned criteria, imprint the finite product characteristics of "uniqueness", non-reproducible in other conditions.

RESULTS AND DISCUSSIONS

Within the delimited eco-geo-pedological sequences were identified 4 soil classes, in which 11 types and subtypes of soils were individualized (table 1).

Table 1

Types of soil with DCO (Denomination of Controlled Origin) and DCOQL (Denomination of Controlled Origin with Quality Levels) capability identified at the Valea Călugărească wine-growing centre within the eco-geo-pedological sequences

Soil class	Soil type	Symbol	Field
Iluvi-argillaceous soils	*Iluvi-argillaceous brown, vertic*	*BD (vs)*	*Chițorani*
	Brown-red, molic, vertic	*BR mo-vs*	*Valea Mieilor*
	Iluvi-argillaceous brown-red molic, vertic, pseudo-glazed	*BR mo-vs-pz*	*Valea Mantei*
Cambi-soils	*Eumesobasic brown, vertic*	*BM mo-vs*	*Chițorani*
Vertisoils	*Chromic vertisoil, lightly eroded*	*Vs cr-(e)*	*Valea Săracă*
Undeveloped truncated or cleared soils	*Coluvi-soil typical*	*CO ti*	*Wine-growing Highschool*
	Alluvial soil typical	*SA ti*	*Chițorani*
	Cleared anthropic soil, argillaceous, reddish, pseudo-glazed	*AD ar-r-pz*	*Valea Nicovani*
	Cleared anthropic soil, argillaceous, vertic, pseudo-glazed	*ADar-vs-pz*	*Valea Mantei*
	Cleared anthropic regosoil	*ADrs*	*Valea Săracă*
	Cleared anthropic regosoil, pseudo-rendzinic, vertic, pseudo-glazed	*ADrs-pr-vs-pz*	*Valea Mantei*

These types and subtypes of soils represent entities different morphologically and agro-chemically, but approximately identical inside the eco-geo-pedological sequence. The predominant soils are: Royal „Fetească", Italian Riesling, Grand Burgund, Black „Fetească", Merlot and Cabernet Sauvignon

engrafted onto various parent stocks), soils representative for the Valea Călugărească wine-growing centre.

As to texture a very significant variation is observable, the argil (< 0.002 mm) is between 15-60%, with dominance of the heavy texture (clay-argillaceous, argillaceous-clayish).

Soils have a light acid-neutral-light alkaline *reaction*, the latter category having a greater diffusion, as a result of $CaCO_3$ presence in most soils. A light acid reaction (pH values between 6.2-6.8) is detectable in the brown-reddish soils, in the light pseudo-glazed coluvi-soils, in the eumesobasic brown soils and vertisoils, and the light alkaline reaction (pH values between 7.5-8.4) can be detected in most of the coluvi-soils and anthropic soils where $CaCO_3$ is present starting from the soil surface.

The $CaCO_3$ content varies between large margins. In the brown-reddish soils (except for the brown-reddish molic light pseudo-glazed soil) the basic profile presents $CaCO_3$ contents of 7.8-8.4%; in coluvi-soils $CaCO_3$ is present starting from the surface in a ratio of 3.5-9.0%; the anthropic soils are generally carbonated from the surface, the $CaCO_3$ content oscillating between 3.0-29.1%; vertisoils demonstrate a content generally reduced between 1.3-3.5%.

The humus content in the brown-reddish soils is (0.96-3.31%), in vertisoils (1.23-3.15%), in coluvi-soils (1.33-2.85%), in brown-eumesobasic soils (1.85-2.50%) and it is reduced in anthropic soils (0.36-0.95%).

Humus content is correlated with *the total nitrogen*, which demonstrates in the cleared horizon the biggest values in brown-reddish soils (0.135-0.182%) and the smallest values in carbonaceous anthropic soils (0.051-0.070%).

Regarding the supply of *free phosphorous (P_2O_5)*, its content in the cleared horizon is low to the environment oscillating between 3.5-10.4 mg/100 g of soil in the brown-reddish soils; 10.0-12.0 mg/100 g of soil in the brown-eumesobasic soils and between 3.9-4.6 mg/100 g in vertisoils.

The supply of *free K_2O* in the cleared horizon is characterized by values varying between 8.8-24.7 mg/100 g of soil in the brown-reddish soils, between 17.4-28.4 mg/100 g of soil in the brown-eumesobasic soils and between 11.1-18.6 mg/100 g of soils for vertisoils.

The Architectonics of the Radicular System. By analyzing the distribution of the radicular system of the vine-bearing/parent stock combinations within the studied soils we can observe modifications of this distribution, depending on the soil type, on the argil content, on the mineralogical nature of the argil and on the total and active lime carbonate content.

It was observed that the brown-reddish soils provide the most even development of the radicular system (figure 1), being followed by the brown iluvi-argillaceous soils, while the vertisoils present immediately below the surface a minimum number of roots, these ones developing in the cleared horizon, where the A and By horizons display a modified structure, cracks and more significant possibilities of ingression. In the un-cleared horizons, the number of roots decreases almost to extinction.

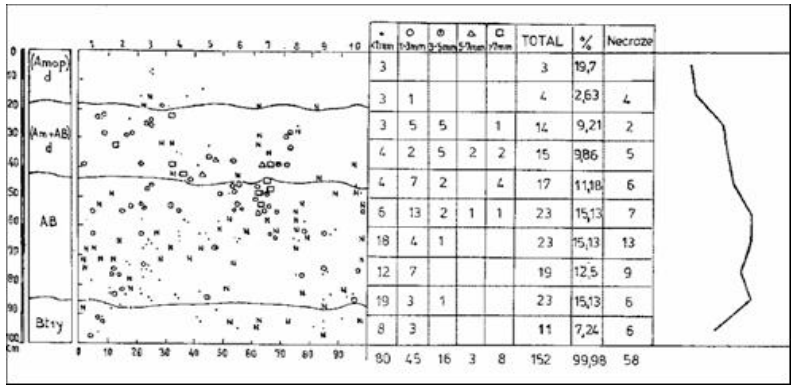

Fig. 1 – Diagram of the radicular system distribution for the Cabernet Sauvignon/Ruggeri 140 variety on brown-reddish molic, vertic, pseudo-glazed soil (BR mo-vs-pz)

Regarding the grape production and its quality, it can be observed that the soils with a higher fertility (high contents of humus and free nutritive elements) and which had a larger capacity for water storage, have provided the highest vintage. The Great Burgund variety has recorded the highest output for the following soils: eroded chromic vertisoil (4.69 kg/vine stock), coluvi-soil typical (3.67 kg/vine stock) and cleared anthropic regosoil (2.64 kg/vine stock); the Merlot variety on iluvi-argillaceous brown, vertic soil had 1.61 kg/vine stock). Still the highest accumulations of sugars and anthocyans in the grapes were recorded in the case of anthropic regosoils, poorer in humus and nutritive elements, but richer in carbonates.

The variation amplitude of the multiannual average of total acidity is lower, spanning between 4.5 g/l H_2SO_4 (brown-reddish molic, vertic soil) and 4.7 g/l H_2SO_4 (cleared anthropic regosoil) in the case of Cabernet Sauvignon; between 5.3 g/l H_2SO_4 (coluvi-soil typical) and 5.2 g/l H_2SO_4 (eroded chromic vertisoil) in the case of Grand Burgund.

The physical-chemical and organoleptic analysis of the wines obtained within each geo-pedological sequence.

The quality gain of the wines is due to their organoleptic value, alcoholic proof and sugar.

The highest alcoholic potential (13.8% alcohol/volume) was recorded in the case of the Merlot variety (high quality superior red wine), corresponding to a maximum level of the variety. The Cabernet Sauvignon variety demonstrated an alcoholic potential of 13.0% /volume). Alcohol (figure 2). The Cabernet Sauvignon wines are difficult to label, since the wine from UNTB 2 has a superior physical-chemical composition and the wine from UNTB 9 has a better organoleptic value. Overall, the wine from UNTB 9 has surpassed the qualitative level of the wine from UNTB 6 by 9%.

The values regarding the content of anthocyans (figure 3) have oscillated between 299 mg/l in the Cabernet Sauvignon variety (high content of poly-phenols – D_{280}=67), 291 mg/l in the Grand Burgund variety and 173 mg/l in the

Merlot variety (the latter had an IC/D_{280} ratio with a super-unitary value of 1.37, favorable to a good evolution under baric pressure).

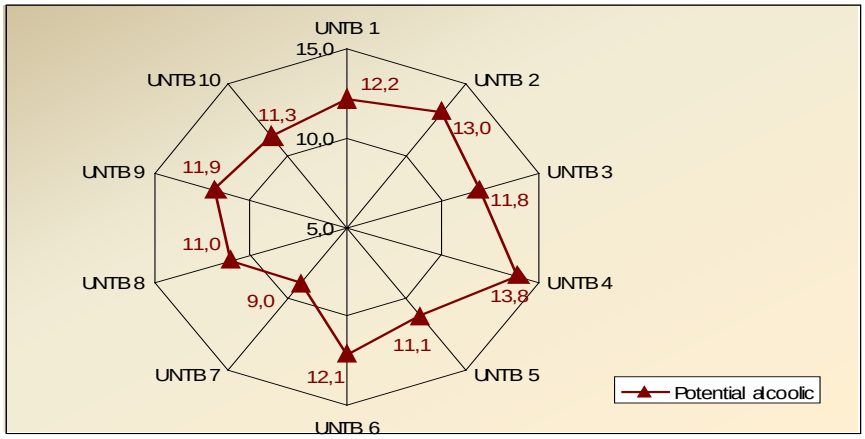

Fig. 2 – Impact of UNTB on the alcoholic potential of the obtained wines

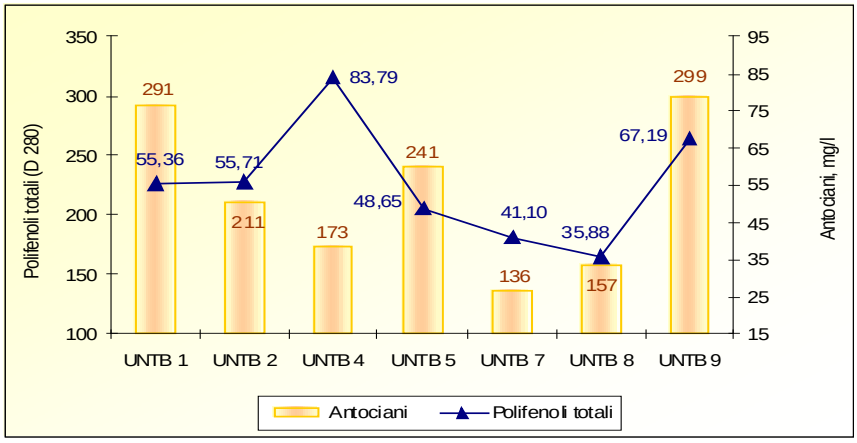

Fig. 3 – Impact of UNTB on the content of anthocyans and total poly-phenols

The tannin content was higher in the Merlot variety (3.866 g/l), Cabernet Sauvignon (2.207 g/l – UNTB 9 and 1.395 g/l – UNTB 2) and lower in the Grand Burgund variety – UNTB 8, 0.365 g/l respectively (figure 4).

Worthy to note that the obtained red wines can be labeled in the DCO-GL (Designation of Controlled Origin – Gathered Late) since they have showed values of the non-reducer extract between 29.36 g/l in Merlot and 26.28 g/l in the Cabernet Sauvignon variety (figure 5).

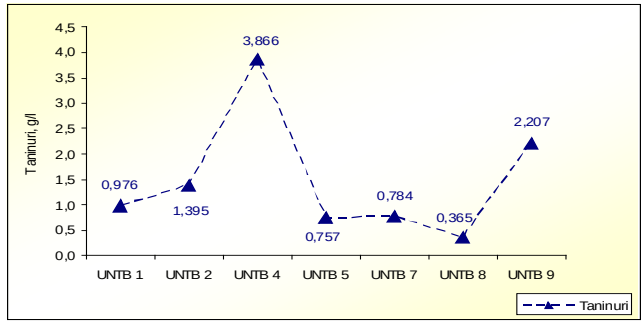

Fig. 4 – Impact of UNTB on the tannin content of the obtained wines

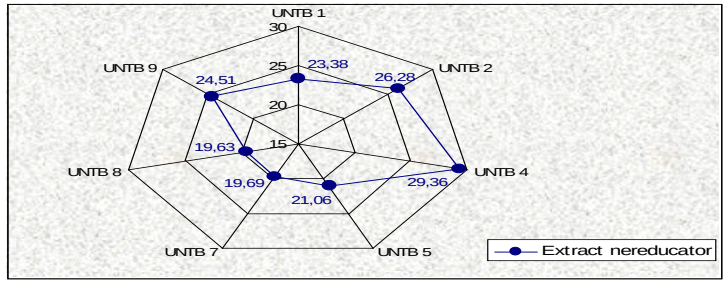

Fig. 5 – Impact of UNTB on the non-reducer extract content of the obtained wines

CONCLUSIONS

By the optimum exploitation of the natural potential (eco-pedoclimatic) of the various wine-growing areas from the Valea Călugărească vine centre, the production of high quality vine-wine products is anticipated, with a high competitive potential on the internal and external market.

By the correct zoning of the wine-growing and parent stock soils in the territory, the natural resources of the vine centre are capitalized in optimum conditions, fact which contributes to the preservation of the wine-growing land fund and the regional protection of the wine-growing ecosystem.

The researches conducted have demonstrated that the dependence of grapes and wine quality on the genetic, ecologic and technologic factors which condition it, is particularly complex and variable, taking into account that quality is not only assimilated with the sugar content of grapes, with the alcoholic proof of the wine respectively, but also with other compounds of grapes and wines which directly contribute in defining the notion of quality.

The management of the vine-wine products with designation of origin will ensure a rational exploitation of the wine-growing areas according to the sustainable agriculture principles.

PROBING DATA BASE INCLUDING VITICULTURAL AND OENOLOGICAL INFORMATION IN VALEA CALUGAREASCA VITICULTURAL CENTRE

BAZĂ DE DATE INTEROGATIVĂ CU INFORMAȚII DE ORDIN VITICOL ŞI OENOLOGIC ÎN CENTRUL VITICOL VALEA CĂLUGĂREASCĂ

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Abstract. *The probing data base was accomplished in ARCVIEW layout, and it allows to obtain pedogenetic, viticultural and enological information about the grapevine plantations in Valea Călugărească viticultural centre. The measurement of the detail tips of the grapevine plots of the viticultural area was performed by means of the Global Positioning System (GPS) whose basic system consists in using satellites as reference points for determining the positions on the Earth by triangulation. After identifying the coordinates obtained in STEREO 70 on the digital layer resulting from the digitalization of the surfaces on the orthophotogrammetric image, the identification of the coordinates in ARCVIEW program followed. All the information transposed under the form of maps concerning the cadastral layer at the level of the plot and of the maps including pedogenetic factors was superposed in GIS system, this allowing to obtain some quite useful information at the level of the vine growing area of Valea Călugărească. The background of the data base consisted in the information concerning the imagistic and cadastral support, as well as concerning the edaphic factors obtained during the studies carried out in the field.*

Rezumat. *Baza de date interogativă a fost realizată în format ARCVIEW şi permite obținerea de informații de ordin pedogenetic, viticol şi oenologic referitoare la plantațiile din centrul viticol Valea Călugărească. Măsurarea punctelor de detaliu al parcelelor de viță de vie din arealul viticol s-a realizat cu ajutorul sistemului GPS (Global Positioning System), al cărui principiu de bază constă în utilizarea sateliților ca puncte de referință pentru determinarea prin triangulație a pozițiilor de pe Pământ. După identificarea coordonatelor obținute în STEREO 70 pe stratul digital rezultat din digitizarea suprafețelor de pe imaginea ortofotogrametrică se trece la identificarea coordonatelor în programul ARCVIEW. Aceste informații transpuse sub forma hărților privind stratul cadastral la nivel de parcelă şi a hărților cu factorii pedogenetici au fost suprapuse în sistem GIS, fapt ce a permis obținerea unor informații deosebit de utile la nivelul arealul viticol Valea Călugărească. Fundamentul bazei de date l-a constituit informațiile privind suportul imagistic, cadastral şi factorii edafici obținuți în urma studiilor efectuate în teren.*

MATERIAL AND METHOD

The background of the database consists in the information regarding the imagistic and cadastral support as well as the edaphic factors obtained during the studies carried out in the field.

The correlation and supplementation of the information from the pedologic and agro-chemical studies necessary for the achievement of the soil-land monitoring system for viticulture should be created with the information from the fund monitoring (e.g. number of plantations concentrated in a certain moment on certain pieces of land, climate, mainly quantity of precipitations, their distribution during the vegetation period, agro-techniques features of the existing plantations) allowing the elaboration of the database.

All the information transposed under the form of maps concerning the land use method (the cadastral layer of the plot) and the maps with pedogenetic factors was superposed in the GIS system, obtaining very useful information.

RESULTS AND DISCUSSIONS

The GPS system basis principle consists in using the satellites as reference points in order to determine the positions on Earth by triangulation. These positions are determined using the distances to the reference satellites, given by the speed and time result.

Dynamic measuring implies the stationary of the antenna in points, for a short period of time, in order to take over data from the satellites, while data processing (vector determination) is performed in real time. After processing a vector can be practically determined from the reference receiver (known coordination point) for each stationed point by the mobile receiver.

The land phase includes the following steps:

- Establish the spatiality index: area coordinates related to the known objects.
- Setting the receiver on latitude – longitude system
- GPS reference system (Stereo 70)
- Activating the mapping application MAP SYS PDA (image 1).

Image 1-MapSys PDA

MapSys is a GIS system enabling the efficient generation of the digital plan and the preparation, use and interrogation of the spatial reference data, using some specialized functions included in the software, for the purpose of creating a relational data model loaded with topologically validated information. That enables their use in MapSys or GIS system or any alpha-numeric data management application.

Picking up field points - the area to be measures is established on the orthophotomap, the image is plotted with the coordinates marked on it for a better field orientation. This operation has a simple methodology and cannot be made randomly. The GPS is placed at the ends of the lot and in all its geometric split points in order to represent the lot size as precisely as possible.

The laboratory phase, points identification in ARCVIEW software

In the land phase, a partial identification of the property has been performed on the printed draft and now the area is placed on the screen following up the points coordinates with the cursor. The coordinates downloaded from the GPS identify on the digital layer resulted from the digitalization of the surfaces on the orthophotogrammetric image.

Identifying the points measured in the land, it results a control layer that shall be placed over the land polygons one.

The orhtophoto image (image 2) is displayed; the orthophoto image and the GPS points (image 3); orthophoto image, GPS points and the polygons layer (image 4).

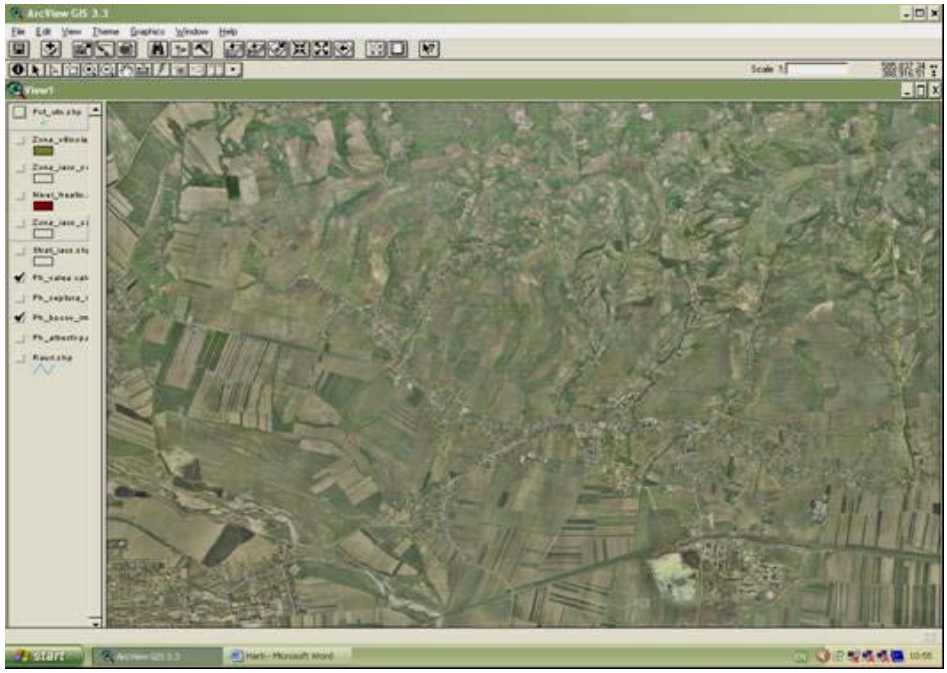


Image 2 – Orthophotogrammetric image of Valea Călugărească viticultural centre

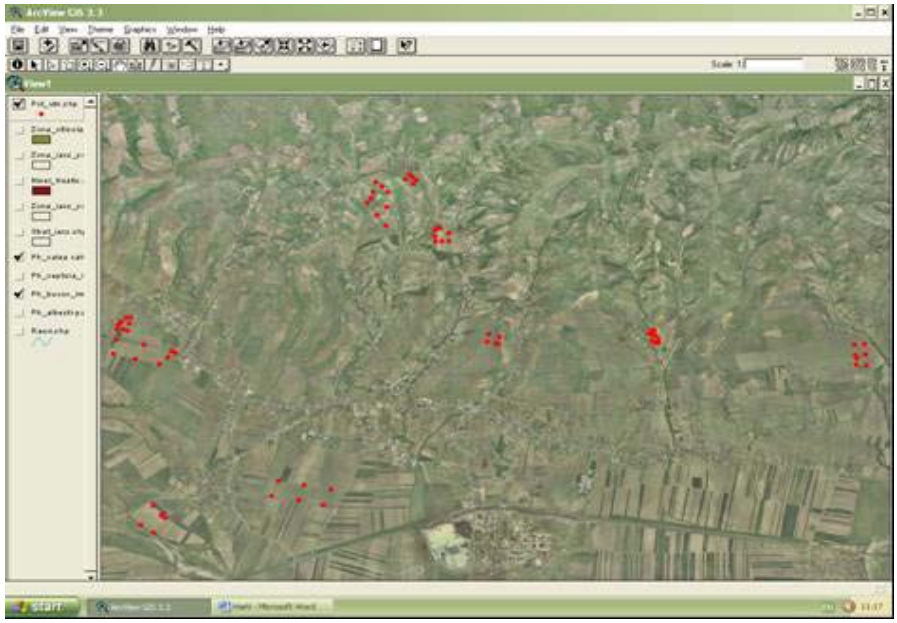


Image 3 – Orthophoto image, GPS points

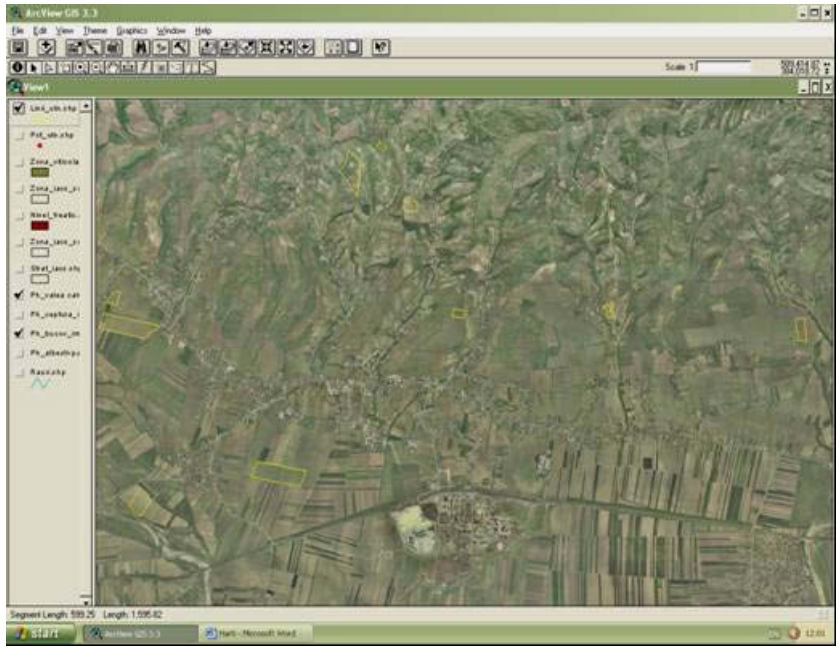
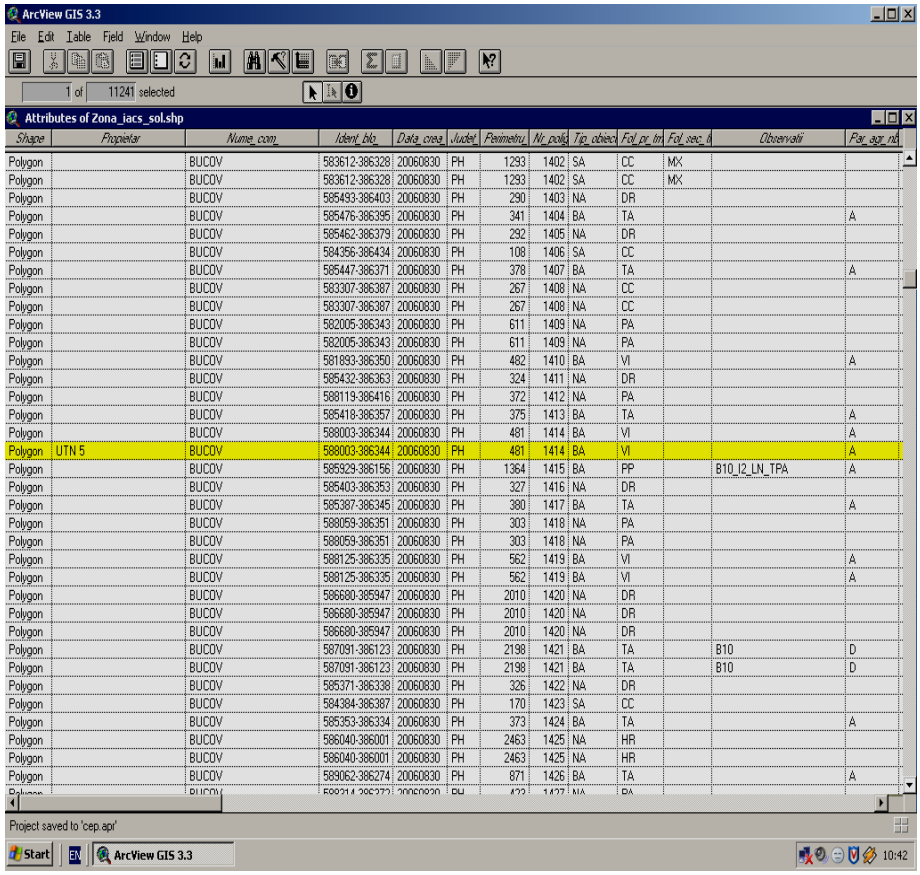


Image 4 - Orthophotogrammetric image, GPS points and polygons layer

The attributes table is elaborated including data regarding the topographic lot, the surface measured, all soil and plant specific characteristics and attributes of the viticultural plantations (Image 5).



Shape	Proprietar	Nume_com_	Ident_blo_	Data_crea	Judet_	Perimetru_	Nr_poli	Tip_obiect	Fol_pr_tin	Fol_sec_t	Observatii	Par_agr_nd
Polygon		BUCOV	583612-386328	20060830	PH	1293	1402	SA	CC	MX		
Polygon		BUCOV	583612-386328	20060830	PH	1293	1402	SA	CC	MX		
Polygon		BUCOV	585493-386403	20060830	PH	290	1403	NA	DR			
Polygon		BUCOV	585476-386395	20060830	PH	341	1404	BA	TA			A
Polygon		BUCOV	585462-386379	20060830	PH	292	1405	NA	DR			
Polygon		BUCOV	584356-386434	20060830	PH	108	1406	SA	CC			
Polygon		BUCOV	585447-386371	20060830	PH	378	1407	BA	TA			A
Polygon		BUCOV	583307-386387	20060830	PH	267	1408	NA	CC			
Polygon		BUCOV	583307-386387	20060830	PH	267	1408	NA	CC			
Polygon		BUCOV	582005-386343	20060830	PH	611	1409	NA	PA			
Polygon		BUCOV	582005-386343	20060830	PH	611	1409	NA	PA			
Polygon		BUCOV	581893-386350	20060830	PH	482	1410	BA	VI			A
Polygon		BUCOV	585432-386363	20060830	PH	324	1411	NA	DR			
Polygon		BUCOV	588119-386416	20060830	PH	372	1412	NA	PA			
Polygon		BUCOV	585418-386357	20060830	PH	375	1413	BA	TA			A
Polygon		BUCOV	588003-386344	20060830	PH	481	1414	BA	VI			A
Polygon	UTN 5	BUCOV	588003-386344	20060830	PH	481	1414	BA	VI			A
Polygon		BUCOV	585929-386156	20060830	PH	1364	1415	BA	PP		B10_I2_LN_TPA	A
Polygon		BUCOV	585403-386353	20060830	PH	327	1416	NA	DR			
Polygon		BUCOV	585387-386345	20060830	PH	380	1417	BA	TA			A
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Polygon		BUCOV	588059-386351	20060830	PH	303	1418	NA	PA			
Polygon		BUCOV	588125-386335	20060830	PH	562	1419	BA	VI			A
Polygon		BUCOV	588125-386335	20060830	PH	562	1419	BA	VI			A
Polygon		BUCOV	586680-385947	20060830	PH	2010	1420	NA	DR			
Polygon		BUCOV	586680-385947	20060830	PH	2010	1420	NA	DR			
Polygon		BUCOV	586680-385947	20060830	PH	2010	1420	NA	DR			
Polygon		BUCOV	587091-386123	20060830	PH	2198	1421	BA	TA		B10	D
Polygon		BUCOV	587091-386123	20060830	PH	2198	1421	BA	TA		B10	D
Polygon		BUCOV	585371-386338	20060830	PH	326	1422	NA	DR			
Polygon		BUCOV	584384-386387	20060830	PH	170	1423	SA	CC			
Polygon		BUCOV	585353-386334	20060830	PH	373	1424	BA	TA			A
Polygon		BUCOV	586040-386001	20060830	PH	2463	1425	NA	HR			
Polygon		BUCOV	586040-386001	20060830	PH	2463	1425	NA	HR			
Polygon		BUCOV	589062-386274	20060830	PH	871	1426	BA	TA			A

Image 5 – Attributes table

A GIS system data access is performed by superposing the layers, following the information interest order, checking the layers from the main menu.

The information is used through the **Identify results** identifier that will open the attributes table from the selected layer (*Image 6*).

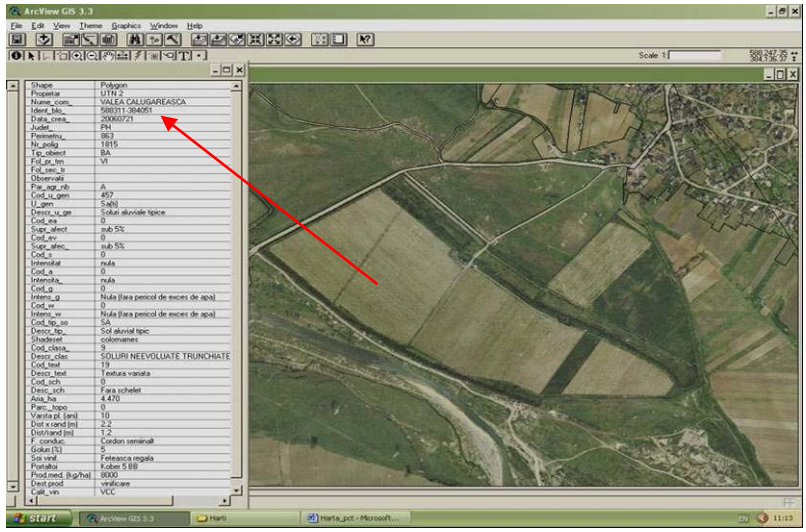

Image 6 –"Identify results" identifier and the attributes table

Thus, we will be able to follow up all information regarding the use and the soil specific characteristics of the ***selected polygon***.

CONCLUSIONS

The ARCVIEW database created as an interrogative database enables the obtaining of pedologic, viticultural and oenological information regarding the terroir units delimited within Valea Călugărească viticultural centre.

The development of GIS databases is deemed to select, organize and store viticultural and oenological, CFTE (telluric – edaphic) and viticultural environment information

Consulting the ARCVIEW database enables us to obtain the data about the delimited terroir units directly and also to see data about cadastral lots, soils, vine varieties, plantation age, plantation density, production destination

The *ArcView* database is interactive by definition with the possibility of bringing in permanent modifications and supplementations according to the interest benchmarks.

REFERENCES

1. Aronoff S., 1993 – *Geographic information systems - a management perspective*. WDL Publications, Ottawa

OENOLOGICAL INCIDENCE ON TANGENTIAL MICROFILTRATION IMPROVE THE QUALITY OF VINE FROM FETEASCA REGALA CULTIVAR

INCIDENȚA OENOLOGICĂ A MICROFILTRĂRII TANGENȚIALE ASUPRA CALITĂȚII VINURILOR OBȚINUTE DIN SOIUL FETEASCĂ REGALĂ

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Abstract. *This research was realized in the framework of the National Research Institute for Horticulture Biotechnologies, Stefanesti Arges, Romania.*

The quality of wine is very important for the customers. By this study I tried to improve the quality of wine using the tangential micro filtration. Micro filtration is a good method to have a good quality of wine. For clarify and stabilization of wine micro filtration is a good way in this sense.

Rezumat. *Cercetarile s-au realizat in colaborare cu Institutul National de Cercetare pentru Biotehnologii Horticole, Stefanesti Arges, Romania. Calitatea vinului este un aspect foarte important pentru consumatori. Prin acest studiu am incercat sa imbunatatim calitatea vinului folosind microfiltrarea tangentiala. Microfiltrarea este o metoda de clarificare si stabilizare a vinului.*

Elaboration and implementation of this research tracks follow scientific reasons and problems in oenology: increase of the consumer's exigency about wine quality on the intern and extern market; necessity alignment of Romanian wines and oenology technology to international standards; necessity reducing of oenology time and cost.

MATERIAL AND METHODS

The aim of our studies is effect of microfiltration and ultrafiltration on physic-chemic structure of wine in laboratory and production conditions, the impact of these methods on elaboration, conditioning and stabilization of the wine.

In tangential microfiltration technique are used NITOR 120 PADOVAN filter, with automat system PLC Siemens S5 95U. Filter are equipped with 12 modules mounted vertically and parallel, couples facultative. The modules are made from tubular fascicles with symmetric propylene membrane with cut-off 0,2 mm. The filter is equipped also with automat washing system of membrane in time of filtration (back-wash).

Technical data:

- filtration debit (l/h): 5000-6000
- maxim temperature: 40^0C
- maxim transmembranare pressure: 1,5 bar
- mean duration of filtration cicle: 10-20 h

Filtration product can not contain bentonite or other foreign compounds.
The duration of functionality of alimentation pump: 3-5 min.

Functionality parameters:
P_I = 2,0 bar;
P_E = 0,95 bar;
P_{TM} = 0,90 bar;
T = 17 – 18^oC ;
Back – wash = 5/240 seconds.

Experimental variants: Feteasca Regala brut wine, Feteasca Regala must obtained without pressing the grapes, Feteasca Regala press wine, Feteasca Regala must obtained without pressing the grapes + Feteasca Regala press wine.

RESULTS AND DISCUSSIONS

Regarding oenological incidence on physic-chemic structure of Feteasca Regala brut wine and on polysaccharide, gums, polyphenols and proteins we study the impact of alluvial filtration and of tangential microfiltration on these. We calculated the value of main macromolecular compounds obtained in witness variant.

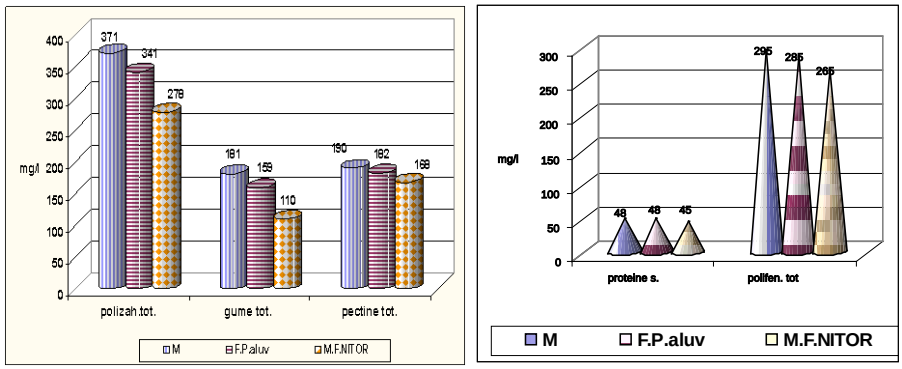

Fig. 1. The influence on Feteasca Regala brut wine
M- Witness*; FP aluv.– alluvial filtrate wine ; MF – Tangential microfiltration wine*

Feteasca Regala brut wine clarification process by alluvial filtrate and by tangential microfiltration (NITOR) shows significant differences between these two techniques (figure 1). By compare the two filtrating methods, we observed that the results are favourable for tangential microfiltration. So, total phenolic compounds registered decreasing between 10 and 12%, comparative 3-4% for alluvial filtration. The most significant effect of microfiltration is for compounds with great molecule, the main responsible for wine clearly. In rapport with alluvial filtration, we obtain a decreasing of total and fractional polysaccharides (38-40%).

Alluvial filtration determined a minor reduced of protein quantity, compare microfiltration.

For alluvial filtrate wine clogging are after 245 ml, and for wine with microfiltration are possible filtration through membrane with 1 μm diameter (table 1).

Table 1.

Clogging indicator

	Witness wine	F. P. alluvial wine	Permeate MF-NITOR wine
Clogging indicator	Clogged to 20 ml	Clogged to 245 ml	14,6

The influence of tangential microfiltration for must obtained without pressing the grapes and press wine was made with laboratory filter equipped with 0,1 m^2 MICROSART modules, with asymmetric polysulfone membrane with cut-off 0,2 μm or poliolefinic membrane with cut-off de 0,1 μm. For wine resulted by filtrating remain constant: alcohol, total acidity and SO_2. Important modifying are for: polysaccharides, polyphenols, proteins (figure 2), and for turbidity, clogging indicator and microbiologic loading.

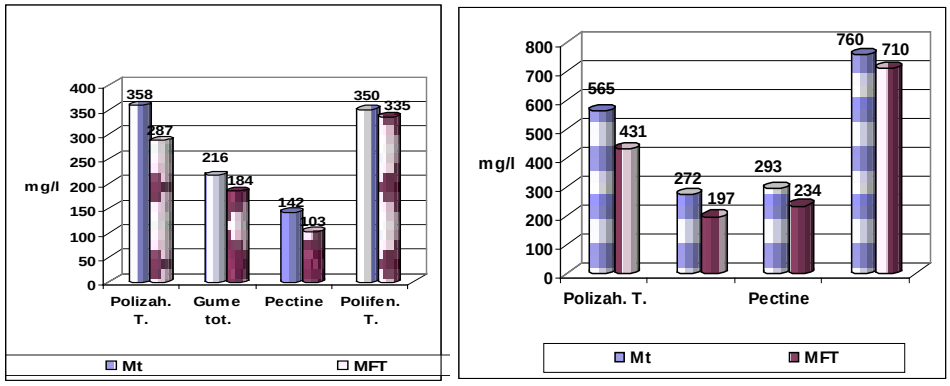

Fig. 2. The influence of tangential microfiltration on must obtained without pressing the grapes Feteasca Regala (left) and on press wine Feteasca Regala (right)
M- Witness; MFT – Tangential microfiltration wine

Wine obtained by tangential microfiltration present small values of turbidity, a reduced of active germs (table 2).

Table 2.

Sterilized effect of micro filtration

Characteristics	Witness	Tangential microfiltration
Must obtained without pressing the grapes		
Clogging indicator	11 ml. in 37 s	ICM=10,5
Turbidity NTU	256	2
Number of active germs / ml.	1,85x 10^6	0,53
Press wine		
Clogging indicator	9,5 ml. in 37 s	320 ml. in 300 s
Turbidity NTU	395	43

CONCLUSIONS

For clarification and stabilization of neconditionate wines, tangential microfiltration represent superior method comparative classic treatments.

The smaller value of clogging indicator for resulted wines permit the utilization of membrane with 1 μm diameter pores to follow filtrations.

This technique creates the premise to obtain wine with normal physic-chemic structure, comparative classic witness, but with a higher value of filterability and turbidity, and with eliminating of great number of dregs from wine.

Tangential microfiltration permit obtain by only one passage through membrane a stabile and clear products.

Wines obtained by microfiltration present good stability and clearly and after 90 and 120 days from filtrating.

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EXTRACTION OF BIOACTIVE COMPOUNDS IN GRAPE SEEDS

EXTRACȚIA COMPUȘILOR BIOACTIVI DIN SEMINȚELE DE STRUGURI

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Abstract. *The study of the bioactive compounds from the grape seed extracts represents an ever increasing preoccupation for the industry of food supplements and tonic drinks, as well as for the industry of pharmaceutical products and cosmetics. This scientific paper presents a practical method for extracting the proanthocyanidins from the grape seeds by using a hydroalcoholic solution. The method consists in autoclaving the mixture between the solid stuff and hydroalcoholic solution under temperature and pressure controlled conditions. The extraction itself is followed by the separation of the solids from the liquid fractions and thereafter the concentration of the extract rich in proanthocyanidins. The polyphenolic extracts are therefore easily obtained by applying this uncomplicated procedure, presenting the advantage that no toxic or polluting solvent is used during the stages of the technological process. Consequently, the product obtained is safe and secure for the human organism, complying also with the new regulations enforced for the food industry and for the pharmaceutical and cosmetic industries, too. The control concerning the quality of the extracts obtained was performed by assessing a range of analytical parameters (colorimetric measurement for DO 420 and 280 nm, evaluation of the amount of catechins, oligoproanthocyanidins and leucoanthocyanins, as well as the content in total polyphenols by practicing Folin Ciocalteu method).*

Rezumat. *Studiul compusilor bioactivi din extractele de seminte de struguri reprezinta o preocupare tot mai mare pentru industria suplimentelor alimentare, a bauturilor tonice, industria farmaceutica si a cosmeticelor. In lucrarea de fata este prezentata o metoda de extractie a proantocianidinelor din semintele de struguri utilizand o solutie hidroalcoolica. Metoda implica autoclavarea amestecului de material solid si solutie hidroalcoolica in conditii controlate de temperatura si presiune. Extractia propriu-zisa este urmata de o separare a fractiunilor solide de cele lichide si concentrarea extractului bogat in proantocianidine. Obtinerea extractelor polifenolice prin aceasta metoda este simpla si prezinta avantajul ca in nici o etapa a procesului tehnologic nu sunt utilizati solventi toxici sau poluanti, produsul fiind sigur pentru organismul uman si in conformitate cu noile reglementari impuse in industria alimentara, farmaceutica si cosmetica. Controlul calitatii extractelor obtinute s-a determinat prin evaluarea catorva parametrii analitici (masurarea colorimetrica la DO 420 si 280 nm, dozarea cantitatii de catechine si oligoproantocianidine si a cantitatii de leucoantociani, continutul de polifenoli totali prin metoda Folin Ciocalteu).*

Oligoproanthocyanidins (OPC) are molecules with pronounced anti-oxidizing properties, forming a family of flavanolic compounds with paler hues, included in a wide variety of plants.

Phenolic fraction grape seeds consists almost entirely of flavanols, mainly catechins (catechin and epicatechin, simple and galloilated) and their polymers also known as procyanidines, respectively proantocyanidines when the B nucleus includes monomer units differently substituted. By the HPLC technique (Fig. 1) there have been identified mainly monomers, dimers (B1,B2,B3,B4,B5) (Weinges and Piretti,1971; Piretti et al.,1976; Czochanska et al.,1979; Bourzeix et al.,1986) and trimers (C1,C2) (Lea et al.,1979; Romeyer et al.1986). The proantocyanidins with molecules including up to 10 monomer units each are designated as oligoproanthocyanidins (OPC).

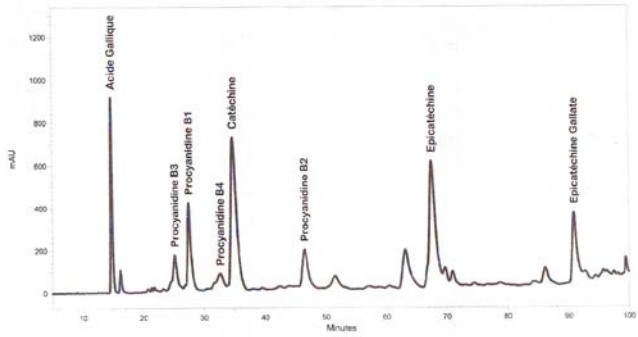


Fig.1 OPC in grape seeds, Nutrinov Laboratories, 2006

The studies revealed that 59% of the oligomeric proanthocyanidines (dimers, trimers, tetramers, pentamers) are found in seeds, 19-21% in stalks and skins and 1% in pulp.

The beneficial effects of the polyphenols included in grape seeds are related both to their anti-oxidizing properties and their affinity to proteins. The ability of this category of polyphenols to capture free radicals is higher than that of other well known anti-oxidizers, such as the C and E vitamins and beta-carotene.

The aims of this paper are the following:

1. to define the extraction mode by using non-toxic solvents and the raw material's characteristics
2. to appraise the bioactive potential of the extracts obtained from seeds of white and red grape varietees.

The results were obtained under the CEEX Project No. 33/2005.

MATERIAL AND METHOD

1. Defining the extraction mode and raw material characteristics

The extraction of bioactive compounds from grape seeds was performed in accordance with the pre-established schedule, during the 4th stage of the Project. This operation includes the following steps: extraction of C+OPC in 20% alcoholic solution

by autoclaving at 1 atmosphere for 1 hour, separation of the liquid fraction rich in C+OPC, clarifying the liquid fraction by centrifugal action and concentration (fig.2).

The seeds used as raw material were taken from red and white marc, resulted after the pressing of the destemmed mash resulted during the harvest years in 2005, 2006 and 2007. The seeds were further separated, sorted and dried for storage. Preparation of the seeds before extraction included the separation of organic or mineral foreign materials and washing in warm water to eliminate the pectic and protein substances and sugars.

The physical and chemical parameters of the raw seeds were examined in accordance with STAS 1069-77 and STAS 6124/1-73. Information was processed by statistical mathematical methods and by graphs.

The method for determining the catechine and oligoproanthocyanidines proportion in the seeds was based on the vanillin reaction (FV 829/1623-220589- as modified by ICDVV).

2. Appraisal of the bioactive potential for extracts taken from white and dark grapes

The bioactive potential of extracts was evaluated by the following parameters: total dry extract, DO 420 nm, DO 280 nm, Catech + OPC, tannins.

The method for determining the catechine and oligoproanthocyanidines proportion in the extracts was based on the vanillin reaction and colour measurement at 510 nm (FV 829/1623-220589- as modified by ICDVV). The total proportion of polyphenols was determined by the Folin Ciocalteu method (Singleton and Rossi, 1965), tannin by the MP-VT-PF-02.01-TAN spectrophotometric method and color structure by the MP-VC-07.03-CUL spectrophotometer method.

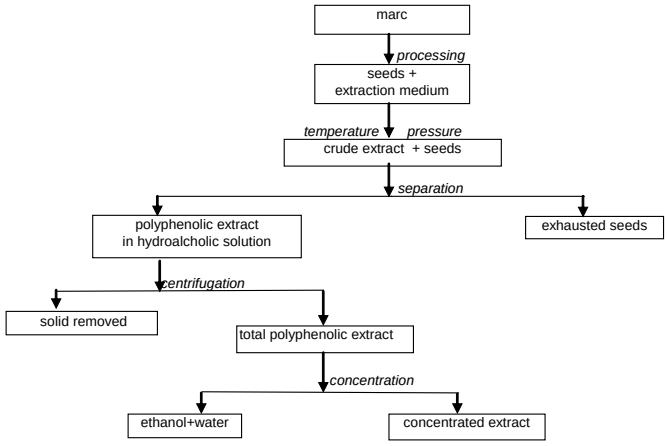


Fig.2 Flow diagram for obtaining polyphenolic extracts

RESULTS AND DISCUSSIONS

The organoleptic characteristics of the seeds were in compliance with the acceptance requirements defined in the professional standard 40-92.

The seeds were characterized by: aspect, color and odor.

- *Aspect*- full grown, mature, healthy
- *Color* – reddish brown, free of mould stains
- *Odor*- specific, without traces of scalding, molding or souring.

Table 1

Quality Parameters for Seeds

Analyzed material	Foreign material (%)			Humidity (%)	Hectoliter Weight (kg)
	mineral	organic	total		
White seeds	0,52	3,54	4,06	9,5	60,1
Red seeds	0,55	2,66	3,21	8,7	59,8

Seed quality was evaluated by determining the proportion of catechins and oligoproanthocyanidins, as well as by the absorption of polyphenolic compounds at 280 nm after 1:100 dilution (table 2).

Table 2

Catechin and OPC Quantities in White and Red Seeds

Analyzed Parameters	Seeds	
	White Grapes	Red Grapes
Catechins and oligoproanthocyanidins g/kg	12,19	24,99
DO 280 nm	25,81	51,89

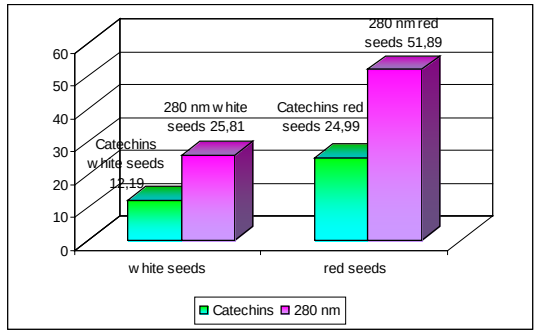


Fig.3 Comparison of analyzed parameters for white and red grape seeds

The seeds of black grapes are approximately 2 times richer in monomer and oligomer proanthocyanidins as those from white varieties. The same applies to the absorption of total phenolic compounds at 280 nm, where higher values were recorded for red grape seeds (fig.3). Quality control for extracts was carried out by determining the analytical parameters and by organoleptic examination (table 3).

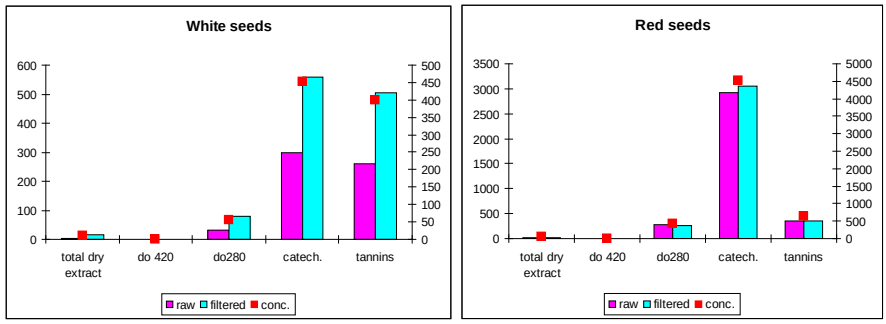
Table 3

Comparison Between White and Red Grape Seed Extracts during Technological Flow

Analyzed Parameters	White Seed Extracts			Red Seed Extracts		
	raw	filtered	conc.	raw	filtered	conc.
Total dry extract g/l	4,04	16,35	9,67	22,77	21,63	41,04
DO 420 nm	0,686	1,448	0,976	3,44	3,32	4,49
DO 280 nm	32,42	79,68	56,61	274,25	259,75	424,02
Catech + OPC mg/l	299	558	452	2930	3058	4523
Tannins mg/l	260	505	400	360	360	640

The results of the comparative examination of parameters during the technological flow indicated that the red grape seed extracts are richer than those obtained from white grape seeds. The parameters examined for white seed extracts indicated maximum values for the extracts taken after centrifuging, during the filtering operation, as compared with the raw and concentrated extracts (fig.4.a). Color intensity also diminishes after concentration, thus confirming the occurrence of certain condensation and insolubilization reactions.

The parameters examined for red seed extracts indicated a phenol content enrichment during the technological flow, from the raw extracts up to the concentrated ones (fig.4.b).



a. **b.**

Fig.4 Variation of Analyzed Parameters for White and Red Grape Seed Extracts

Red seed extracts are about 10 richer in catechins-OPC after autoclaving than white seed extracts. The same can be noticed for concentrated extracts from red seeds (4523 mg/l against 452 mg/l).

In the red seed extracts the catechins and OPC's are predominant in comparison with the tannin content of the same extract.

Determination of the total polyhpenol proportion in white seed extracts of the Feteasca Regala variety by the Folin Ciocalteu method, in comparison with the red seeds of the Merlot variety indicated that the latter are richer in polyphenolic compounds (fig.5).

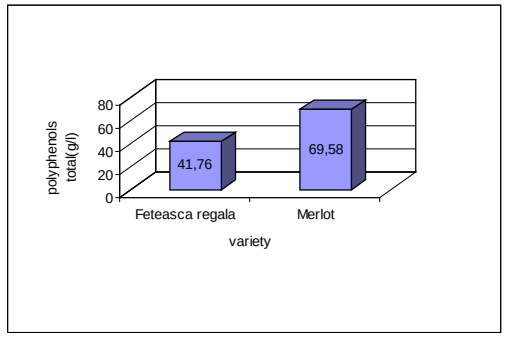


Fig.5 Comparison of Concentrated Extracts

CONCLUSIONS

▪ Hydro alcoholic extraction by autoclaving is a simple method for obtaining catechin and OPC rich extracts.

▪ Extraction was achieved by the diffusion of polyphenolic compounds in hydro alcoholic solution, without the destruction of the vacuolar seed walls.

▪ Extraction was performed under controlled conditions, without any modification of the resulted phenolic compounds.

▪ The extraction method uses non-polluting organic solvents which render the obtained products safety for use in cosmetics, pharmaceutical and food industry.

▪ Seeds taken from black grape varieties remain an important source for bioactive compounds extraction even after wine production.

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THE TECHNOLOGICAL ELEMENTS FOR ELABORATION OF RED AROMATIC WINE FROM VINEYARD „ BUJORU'S HILL"

ELEMENTE TEHNOLOGICE PRIVIND ELABORAREA VINULUI ROŞU AROMAT DIN PODGORIA DEALU BUJORULUI

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Abstract. *For obtaining of flavorons red wine, one of the main problem which must to be resolve from tehnological point of view is extraction of coloring substances and of the flavorons substances from the okin of the grapes. The technological realization of this flavorons red wine, implicate the quality of the varieties which are processed as well as the influence of participate proportion of the partener varieties upon of the main composition characteristics. This work present results obtainned from the researches efectuaded upon the flavorons red wine obtained from different proportion of the mixture of Muscat Ottonel and Merlot varieties.*

Rezumat. *Pentru obținerea vinului roşu aromat, una din probleme principale ce trebuie rezolvata din punct de vedere tehnologic este extracția substanțelor colorante si a substanțelor aromate din pielita boabelor de struguri. Realizarea tehnologica a acestui vin roşu aromat, implica calitatea soiurilor vinificate precum si influenta proporției de participare a soiurilor partenere asupra principalelor caracteristici de compoziție. In lucrare se prezintă rezultatele obținute din cercetările efectuate asupra vinului roşu aromat obținut din cupajarea in proporții diferite a soiurilor Muscat Ottonel si Merlot.*

MATERIAL AND METHOD

As first matter were used grapes from Merlot and Muscat Ottonel kinds. For to produce of the flavorous red wine it used the method of maceration on marcs for 24 hours with addition of enzime pectolitice (Extrazyme and Pecarone) in proportion of 4 g / hl and hand-picked lees (IOC BR 8000 and IOC B 2000) in proportion of 10 g/hl. The maceration it achieved in tubs of wood with the capacity of 100 liters.

He applied following technological scheme: filling receptacle of maceration fermentation with must according to cupajelor proposed in different proportion of Merlot and Muscat Ottonel kinds (1: 1; 1: 2; 1: 3; 1: 4; 1: 5; 1: 6), the sulphitation of the must with 50 mg/kg SO2, the homogenization of the fractions. The acidity of the musts was reclaimed with 2, 5g/l tartric acid. After 24 hours the musts have pressed, and the must have fermented feather to a remainder of sugar contents between 20 - 30 g/l, after that followed the cessation of the fermentation with 250 mg/l SO2 and of a treatment with bentonite in measure of 1 g/l. The pritocurile accomplished and then the bottler.

RESULTS AND DISCUSSIONS

The characteristics of the grapes in the moment of the ingathering are of 218 g/l sugarr and the acidity of 2, 6g/l sulfuric acid to the Muscat Ottonel kind, and to the Merlot kind 202 g/l sugar and the acidity of 3,4 g/l. The temperature at maceration was contented between 16-21 ^{0} C, therefore the extraction of the compound of aroma and color was different quantitatively.

The values of principal indexs of composition of the wines that are arised from those 6 technological variants of maceration – fermentation and of control variants are processed in the table nr1.

The alcoholic degree to all variants, had the values contained between 11, 0, - 11,2 % vol. The entire acidity of wines presents values in normal limits from 3, 6-4, 5 g/l sulfuric acid. After of castigation acidity of the must, the acidity of the wine is higher. That is due of the mature acids in the time process of maceration – fermentation, acids that compensated the irretrievable acidity through the a precipitation of a quantity from tartric salts.

The values of the volatile acidity of the wines oscillate the in normal limit, between 0, 30-0, 53 g/l acetic acid. The content of the wines in extract has the values contained between 25, 3-29, 9 g/l. The values of the extract were higher with the increase of the proportion of Merlot kind. The wines accomplished in those 6 variants register a remainder of sugar contained between 20-25 g/l, and control variants a content in sugar of 9,7- 28 g/l.

The compounds of color have register values decreased from the variant V1(80 mg/l) to variant V6(24mg/l), the lower quantity to variants where the proportion Muscat Ottonel kind was higher.

The content of the wines in total polifenols presents the some attitude as to the colored intensity and the antociani, a decrease a values in accordance with, the proportion of those two kinds. From sensory viewpoint the wines elaborated are expressive, with gustatory characteristic better outlined, fruitful, with richly aroma many appreciated of community for gustation.

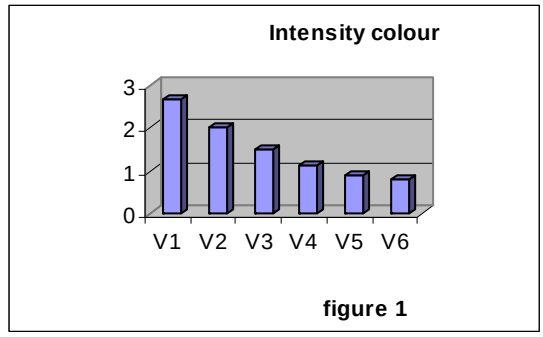

figure 1

Table 1

Characteristics physico-chemical of wine

Variant	Alcohol % vol.	Total acidity g/l H_2SO_4	Volatile acidity g/l CH_3COOH	Extract g/l	Sugar g/l	Anthocyanins mg/l	Intensity 420+520+620 1 cm	Polyphenols totali g/l	Free SO_2 mg/l	Total SO_2 mg/l	Organoleptic apreciation
Merlot - martor	11,2	4,5	0,51	29,9	9,7	164	5,56	1,17	24	166	Very good
Muscat Ottonel- martor	11,0	3,6	0,30	26	28	-	-	0,26	26	160	Very good
V1 1:1	11,0	3,5	0,53	25,3	20,0	80	2,68	0,72	25	240	Very good
V2 1:2	11,1	3,7	0,45	29,0	23,0	55	2,00	0,60	27	235	Very good
V3 1:3	11,2	3,7	0,54	29,1	21,0	41	1,50	0,50	28	240	Very good
V4 1:4	11,2	3,7	0,53	29,3	22,0	33	1,13	0,45	27	240	Very good
V5 1:5	11,1	3,6	0,51	29,6	25,0	28	0,89	0,41	29	250	Very good
V6 1:6	11,2	3,8	0,53	29,7	22,0	24	0,79	0,38	31	250	Very good

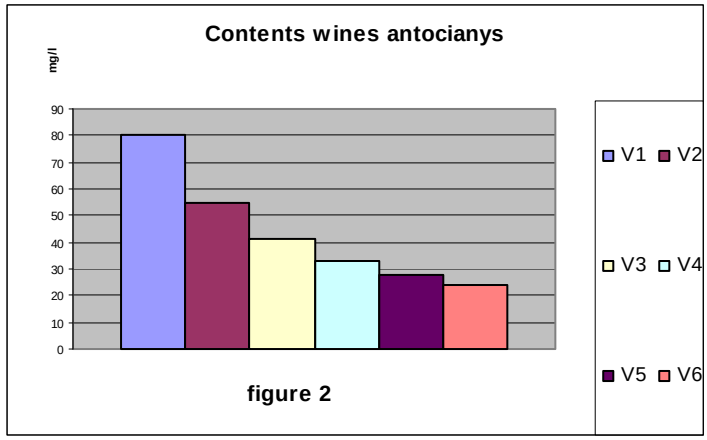

figure 2

CONCLUSIONS

The maceration-fermentation process is an important tehnological operation for the production of red flavorous wine, in view of flavor extraction from the skin of the grapes.

Because flavors were not quantitative determinad, from gustatiom point of view were observed differences at the flavor compounds on variants, obtaining flavorous wines with red colour of very good quality.

The winws evidentiated by sweet and acid compounds, hawing a strong flavor of flavorous grapes.

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TEST APPLIED TO SEVERAL ROMANIAN MICROFILTERING COMPOSITES IN THE TECHNOLOGICAL FLOW OF WINE STERILE FILTRATION

TESTAREA UNOR COMPOZITE MICROFILTRANTE ROMANESTI PE FLUXUL TEHNOLOGIC DE FILTRARE STERILA A VINULUI

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Abstract. *The wine sterile filtration represents a very important process of the winemaking technology. The microbiologic stability and its availability during the whole period of wine storage depend on the filtration quality. There are lots of sterile filtration techniques, and the filtration through sterile plates represents one of them. At the national level, the filtering plates are produced by CEPROHART Braila, which, within 2006-2008 accomplished valuable variants of microfiltering composites for wine sterile filtration. Such materials were tested at IC-DVV Valea Calugareasca. The Romanian microfiltering composites were tested by applying an original technology elaborated on that purpose. Its background was a laboratory technology for wine sterile filtration and analysis methods for the technical parameters of the filtration and for the wine quality parameters, associated with filterability and quality. Tests were made for assessing the filtration efficacy, by considering the capacity of retaining the main microorganisms in wine, the filtering characteristics and the filtration effects on wine composition and organoleptical features. The results obtained with the Romanian microfiltering composites were compared to those of the similar products on the market. Considering their efficacy, it was concluded that several variants of Romanian microfiltering composites are quite comparable to the products made in EU.*

Rezumat. *Filtrarea sterila a vinurilor reprezinta o veriga importanta a tehnologiei de producere a vinurilor. Stabilitatea microbiologica a vinului si conservarea ei pe toata perioada de pastrare depind de capabilitarea operatiei de filtrare . Tehnicile de filtrare sterila sunt multiple iar filtrarea prin placi sterile este una dintre ele. La nivel national, placile filtrante se produc la CEPROHART Braila. Aceasta societate a realizat in perioada anilor 2006-2008 variante de compozite microfiltrante performante destinate filtrarii sterile a vinurilor. Aceste materiale au fost testate la IC-DVV Valea Calugareasca. Compozitele microfiltrante romanesti au fost testate dupa o metodologie proprie, elaborata pentru acest scop. Ea are la baza o tehnologie de laborator pentru filtrarea sterila a vinurilor si metode de analiza a parametrilor tehnici ai filtrarii si a parametrilor calitativi ai vinurilor, asociati filtrabilitatii si calitatii. S-au realizat teste pentru evaluarea eficacitatii operatiei de filtrare pe baza capacitatii de retinere a principalelor microorganisme din vin, a caracteristicilor filtrante si a efectelor filtrarii asupra compozitiei si insusirilor senzoriale a vinurilor. Performantele compozitelor microfiltrante romanesti au fost comparate cu performantele produselor similare de pe piata. Rezultatele obtinute au aratat ca unele variante de compozite microfiltrante romanesti prezinta performante apropiate de cele ale produselor similare fabricate in UE.*

The sterile filtration of the wines is an important link of the wine production technology. The microbiological stability of the wine and its conservation during the whole preservation period depends on the capability of the filtration operation and on the wine composition. The proteins, the polysaccharides, the mucilage, the gums and the colloidal coloring substances are the particles in the wine that have clogging power (Gaitier B., 1984).

Numerous studies regarding the sterile wine filtration were performed abroad (Bruetschy A. Si col., 1997; Gautier B., 1984; Neff J., 1999; Vacariuc L. Si col., 2001) and in our country (I.C-D.V.V. Valea Calugareasca). The studies referred to formulas for filter layers, sterile filtration techniques, sterile filtration optimization, and evaluation of the sterile filtration efficiency and to the effects of this operation on the genuineness of the wine.

There are multiple techniques of sterile filtration, and the filtration through sterile plates is one of them. The main manufacturers of sterile plates are: Begerow, Saitz, Schenck, Filtrox. At national level, the filter plates are manufactured by CEPROHART Braila.

The purpose of this study is to evaluate the technical performances of the sterile plate manufactured by CEPROHART Braila in order to identify the non-compliant features and to test newly created microfiltering composites within the wine sterile filtration process. The results were obtained in the frame of the Project no. M1-C2-303/CEEX Program, performed between 2006 and 2008.

MATERIAL AND METHOD

The evaluation of the M110 filter sheet technical performances within the wine sterile filtration process

The M110 filter sheet technical performances were established within the white and red wines sterile filtration process applied at the level of the pilot station from I.C-D.V.V. Valea Calugareasca. Two batches of wines were used, a white and a red one from the 2006 harvest. The wine has undergone proteic and tartaric stabilization. The filtration was performed through the plate filter Minus 10P/Manufatured by Fratelli Marchisio, Italy. The characteristics of the filter were the following: filtering surface of the plate 0.04 m^2, number of plates 11. The filter features a manometer.

The characteristics of the filtration were determined (average flow, duration of one cycle, extension of one cycle and weeping volume) and the efficiency of the sterile filtration through the M110 plate was evaluated. The study established, also, the influence of the sterile filtration through the M110 plate over the general and colloidal composition of the wines. The characteristics of the filtration were established by a procedure specially elaborated by I.C-D.V.V. Valea Calugareasca for this objective. The general wine composition characteristics were determined by standardized methods. The tannins, the colloidal polysaccharides and the proteins were evaluated by the following personalized methods: MP-VT-PF-02.01-TAN (tannin), MP-VCT-F-O1-COLGL (colloidal polysaccharides) and MP-VCT-F-02-PROT (proteins).

The primary data analysis was performed by comparison and graphically. The comparison was performed with the Steril 40 plate manufactured by the Begerow Company.

Testing of newly created types of microfiltering composites within the wine sterile filtration process

7 types of newly created microfiltering composites were tested, types that have the following codes: P1, P2, P3, P4, A, F and L. The sterilizing effect of these microfiltering composites was evaluated in the laboratory, using a Sartorius filter, with a 3 l capacity. The test was performed for the main contamination germs of the wine, yeasts, lactic bacteria and acetic bacteria. For yeasts the *Saccharomyces rozei* species for lactic bacteria, *Leuconostoc oenos* and for acetic bacteria, *Acetobacter vini* were used. Suspensions of the above mentioned germs were performed in conditions of maximum microbial load (10^3 UFC/ml). The sterilizing effect was evaluated based on the microbial load of the filtered liquid and on the retention rate of the microorganisms, determined through personalized methods by I.C-D.V.V. Valea Calugareasca.

The primary data analysis was performed graphically and by comparison. The comparison was performed with the Steril 40 plate.

RESULTS AND DISCUSSIONS

Evaluation of the technical performances of the M110 filter plate within the wine sterile filtration process

The latest type of sterile filter sheet manufactured by CEPROHART Braila is M110. This sheet does not fully comply with the quality criteria. In order to identify the weaknesses of this plate, the technical performances of the sheet were evaluated during a red wine and a white wine sterile filtration process. The results achieved are presented in Table 1.

Table 1

Characteristics of the wine sterile filtration through two types of sheets

Filtration characteristics	Plate M110	Plate Steril 40
White wine, 2006 crop		
Average flow (l/m^{2}min)	50,44	55,29
Duration of one cycle (min)	235	440
Filtred volum per cycle (l)	2519	5170
Weeping volume (l/l filtered wine)	0,023	0,002
Red wine		
Average flow (l/m^{2}min)	27,15	28,86
Duration of one cycle (min)	215	270
Filtred volum per cycle (l)	2041	2435
Weeping volume (l/l filtered wine)	0,019	0,008

The analysis of the sterile filtration characteristics showed that the M110 sheet is inferior to the Steril 40 sheet. The filtration through the M110 sheet is performed at a flow with 6-9% lower, and the weeping losses are very large. The losses are triple for the red wine and 10 times larger for the white wine. The duration and extension of a filtration cycle are, also, much lower.

The sterilizing effects of the two types of sterilizing plates are different (Table 2).

Table 2

Microbial load (UFC/ml) of the wines filtered through various sheets

No.	Parameter	Wine before filtration	Wine after filtration through	
			Plate M110	Plate Steril 40
White wine, 2006				
1.	Yeasts	0.07	0.002	0
2.	Lactic bacteria	0.11	0.006	0
3.	Acetic bacteria	0	0	0
Red wine, 2006				
1.	Yeasts	6.3	0.02	0
2.	Lactic bacteria	9.66	0.04	0
3.	Acetic bacteria	0	0	0

The M110 sheet did not entirely retain the yeasts and the lactic bacteria. The wine did not contain acetic bacteria. The yeasts retention rate in the white and red wine was 1.54, respectively 2.50. The lactic bacteria retention rate was approximately the same. The influence of the wine sterile filtration on the wine composition should be minimal. The values of the physical-chemical parameters specific to the general and colloidal composition of the wines are presented in Table 3.

Table 3

General and colloidal composition of the wines sterile filtrated through various filter sheets

Physical-chemical characteristics of the wine	White		Red	
	M110 sheet	Steril 40 sheet	M110 sheet	Steril 40 sheet
Achieved level of alcohol %	11,9	11,9	12,5	12,5
pH	3,46	3,46	3,88	3,90
Total acidity (g/l tartaric acid)	6,42	6,42	4,97	4,97
T 625	25,50	25,88	2,45	2,45
Total extract (g/l)	20,66	20,64	27,45	27,41
Cinder (g/l)	1,88	1,91	2,37	2,38
Cinder alkalinity (g/l K_2CO_3)	2,11	2,07	2,49	2,28
Tannins (g/l)	6,64	6,65	3,07	3,05
Glucidic colloids (mg/l glucose)	75	92	102	116
Proteins (mg/l)	63	65	100	128

Fig. 1. The deviation from the control (wine sterile filtered through Steril 40) of the physical-chemical parameters of the wine sterile filtered through M110

The sterile plate type significantly influenced the alkalinity of the red wine cinder and the glucidic colloids and proteins of the white and red wine (Figure 1)

This deviation is a result of the different por size and porosity of the two tested sheets.

Testing of several newly created types of microfiltering composites within the wine sterile filtration process

The wine specific micro-flora consists of yeasts, lactic bacteria and acetic bacteria. The microbial load of the sterile filtered liquids depends on the filter composite used (table 4).

Table 4

Microbial load of the liquids after sterile filtration with various filter sheets

Sheet type	Group of microorganisms	Microbial load (UFC/ml)
Steril 40	Yeasts	0
	Lactic bacteria	0
	Acetic bacteria	0.007×10^3
P1 Composite	Yeasts	0
	Lactic bacteria	0.03×10^3
	Acetic bacteria	0.09×10^3
P2 Composite	Yeasts	0
	Lactic bacteria	0.02×10^3
	Acetic bacteria	0.09×10^2
P3 Composite	Yeasts	0
	Lactic bacteria	0.02×10^3
	Acetic bacteria	0.85×10^3
P4 Composite	Yeasts	0
	Lactic bacteria	0.04×10^2
	Acetic bacteria	0.02×10^3
A Composite	Yeasts	0
	Lactic bacteria	1.7×10^3
	Acetic bacteria	1.3×10^3
F Composite	Yeasts	0
	Lactic bacteria	1.2×10^3
	Acetic bacteria	1.2×10^3
L Composite	Yeasts	0
	Lactic bacteria	1.1×10^3
	Acetic bacteria	1.0×10^3

The study showed that the “Steril 40” plate can retain entirely the yeasts and the lactic bacteria and partially the acetic bacteria. The sheets manufactured by CEPROHART Braila have a wine specific microorganism retention capacity inferior to “Steril 40”. The respective sheets retained entirely the yeasts and partially the lactic and acetic bacteria.

The microorganism retention rate is specific for each filtering sheet type (Figure no. 2).

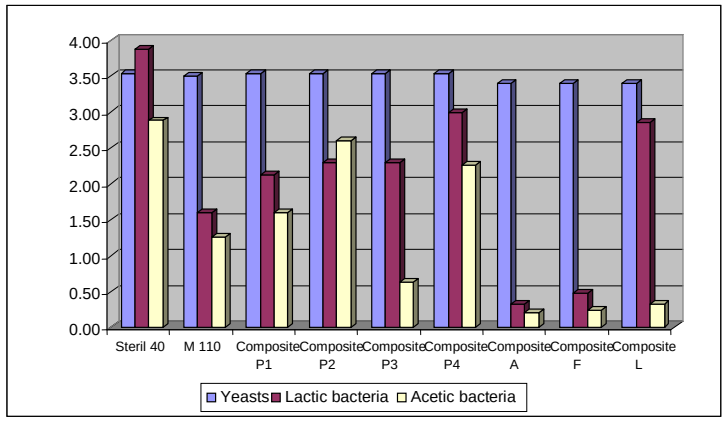

Fig.2 The microorganisme retention rate

The best sterilizing effect among the newly created plates was recorded by Composites P4 and P2, the first one retaining better the lactic bacteria and the second one, the acetic bacteria. It is necessary to continue the study in order to create plates that have the same sterilized effect as the similar imported plates.

CONCLUSIONS

The M110 filter plate manufactured by CEPROHART Braila does not have the capacity to entirely retain the bacteria, the glucidic colloids and proteins in the wine. It is necessary to manufacture other microfiltering composites to entirely retain the contamination germs and the wine particles with colmation power.

7 new types of microfiltering composites were created, composites that have the following codes: P1, P2, P3, P4, A, F and L. The best sterilizing effect was recorded by Composites P4 and P2, the first one retaining better the lactic bacteria and the second one, the acetic bacteria. It is necessary to continue the study in order to create sheets that have the same sterilizing effect as the similar imported sheets.

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PRELIMINARY DATA AND ANALYTICAL TESTS OF SOME FOOD OILS FROM THE COMMERCIAL NETWORK OF TOWN IAŞI

DATE PRELIMINARE ŞI TESTĂRI ANALITICE ALE UNOR ULEIURI ALIMENTARE PROVENITE DIN REŢEAUA COMERCIALĂ A MUNICIPIULUI IAŞI

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Abstract. *The commercial units from Iaşi from where come the samples studied are Carrefour, Gimma, Kaufland, Sellgros. In the vegetal oils, the contents of phosphatides and colouring substances vary between 1 and 2%. The contents of phosphatides from the crude oils vary depending on the nature of the raw material and technology (press oil or extraction oil). From the crude oils, phosphatides may be recovered by the process of hydration under the form of a mixture improperly called "lecithin". Among the colouring substances, the most frequently met in vegetal oils are: chlorophyll (oil olive, pumpkin oil, mixed oil), gossypol (cotton oil), sesamol (sesame oil), carotene (corn oil), xanthophyll etc. Among the substances always accompanying the glycerides (triacil glycerols) from the crude oils, we can also find the free fat acids that are extracted from oil by alkaline neutralization. Through the refining process, they remove all those accompanying substances to make oil able to be used in alimentation or to insure the organoleptic features required by the standards within the validity terms.*

Rezumat. *Unităţile comerciale din Iaşi din care provin probele studiate sunt Carrefour, Gimma, Kaufland, Sellgros. În uleiurile vegetale, conţinutul de fosfatide şi substanţe colorante variază între 1 şi 2%. Conţinutul de fosfatide din uleiurile brute variază în funcţie de natura materiei prime şi de tehnologie (ulei de presă sau ulei de extracţie). Din uleiurile brute, fosfatidele se pot recupera prin procesul de hidratare, sub forma unui amestec impropriu numit „lecitină". Dintre substanţele colorante, cele mai răspândite în uleiurile vegetale sunt: clorofila (uleiul de măsline, uleiul de dovleac, uleiul amestec), gosipolul (uleiul de bumbac), sesamolul (uleiul de susan), carotenul (uleiul de porumb), xantofila etc. Între substanţele care însoţesc permanent gliceridele (triacil glicerolii) din uleiurile brute se găsesc şi acizi graşi liberi, care se îndepărtează din ulei prin neutralizare alcalină. În urma procesului de rafinare se îndepărtează toate aceste substanţe de însoţire, pentru a face uleiurile apte de a fi folosite în scopuri alimentare sau pentru a asigura caracteristicile organoleptice cerute de standarde în cadrul termenelor de garanţie şi de valabilitate.*

MATERIAL AND METHODS

We effectuated the analyses in the interval February-March 2008. The material used was taken from shops having different origins and manufacturing methods depending on the producer. The oils analyzed were the following: pumpkin oil, peanut oil,

Through the analyses effectuated, according to the existing standards, we determined acidity (% oleic acid) in accordance with STAS 145/67 part 16, alkalinity (mg sodium oleate /kg) in accordance with SR EN ISO 10539, the phosphor contents (mg/kg, after our own method), the iodine colour (%) in accordance with STAS 145/2-78, the chlorophyl contents (mg/kg), according to AOCS Cc 13d-55 and the caroten contents (mg/kg).

The free acidity of the oil under study was determined in accordance with STAS 145-67 part 16. The free acidity is the percentage of fat acids found in the oil analyzed and is expressed conventionally in the most representative fat acid. For the common oils from soy, sunflower, peanuts, pumpkin they express it in oleic acid; for the coconut and palmist oil they express it in lauric acid; for the palm oil they express it in palmitic acid; for the castor oil they express it in ricinoleic acid; for the rapeseed they express it in erucic acid. The work method consists in dissolving a quantity of oil in a mixture of alcohol-ether, afterwards it is titrated with a solution of sodium or potassium hydroxide in the presence of the indicator phenolphthalein. The appearance of the pink coloration indicates that all free fat acids were neutralized. By acidity index we understand the quantity in mg of potassium hydroxide necessary to neutralize the free fat acids from a gram of fat matter.

Oils may contain natural alkaline constituents (calcium soaps from bones) or accidental (sodium soaps from the improperly refined oils). The method principle (in accordance with SR EN ISO 10.539) to determine the contents of soaps from a sample consists in dissolving it in a warm mixture of acetone-water and its titration with chlorine hydride. Alkalinity may be expressed as a percentage of sodium hydroxide or in mg of sodium oleate per keg of sample.

The method principle to determine the contents of phosphor relies on the destruction of the organic matter by mineralization in the presence of magnesium oxide. The dissolving of ash and the formation among the phosphoric ions and molybdenum and vanadium ions of the complex ammonium phospho-vanado-molybdate gives a stable yellow coloration. The intensity of coloration is measured by spectrophotometer for a wave length of 390 nm as against a blank test obtained from distilled water and nitro-vanado-molybdenic reagent.

The iodine colour was determined by spectrophotometer measurement of light absorbance through oil for a wave length of 420 nm, on a UV/VIS spectrophotometer, as against an approval solution where the sample was replaced by water.

In the presence of the atmospheric oxygen, fat acids from the composition of fats may oxidize partially forming peroxides or hydro-peroxides. The determination of the peroxide index relies on the property of the fat peroxide to react in an acid environment with potassium iodide freeing iodine that is afterwards titrated with tiosulphate.

The method to determine the contents of chlorophyl relies on spectrophotometer measurement of monochromatic light absorbance through oil between 600-750 nm. The readings were effectuated for a wave lenght of: 630-670-710 nm, on a UV/VIS spectrophotometer, as against an approval solution where the sample was replaced by hexan. The contents of chlorophyl found in the oil analyzed is expressed in mg/kg oil (ppm).

The contents of caroten pigments in oil was determined by spectrophotometer measurement of light absorbance through oil for a wave length of 420 nm, the rezults was expressed in mg/kg oil (ppm).

The oils we analyzed are presented in table 1.

Table 1

Oils assortments under study

No. crt.	Oil	Producer	Using	Other indications according to label
1	Pumpkin oil Pepon 250ml	S.C. Parapharm S.R.L., Romania	terapeutical purpose	rich in polyunsaturated fat acids, Se, vitamin E. obtained by cold pressing
2	Pumpkin oil Emi 200ml	S.C. 2E-Prod S.R.L., Romania	terapeutical purpose	rich in vitamines: A, D, E, K; polyunsaturated fat acids, Zn, Fe, Mg, caroten. obtained by cold pressing
3	Peanut oil 1000ml	Carrefour, France	ideal for salads, frying, cooking	contain peanut oil temperature recommended for frying 180ºC.
4	Unrefined maize oil Capitano 1000ml	S.C. Man Ro S.R.L., Romania	ideal for culinary purpose	contain: polyunsaturated fat acids, high level of tocopherol and vitamin E, carotenoides nutritional factors for 100 ml: fats 100 g, out of which monounsaturated 33g, polyunsaturated 55g, saturated 12 g. temperature recommended for keeping 10-25ºC.
5	Mixt oil Olivero 500ml	Costa d Oro, Italy	ideal for salads and cooking	ingredientes: grape seed oil, rape seed oil, rice oil, maize oil, sesame oil source of vitamin E, omega 3, omega 6, gamma oryzanol, sesamol, sesaminol, sesamin nutritional factors for 100 ml: fats 92 g, out of which monounsaturated 33g, polyunsaturated 46g, saturated 13 g. temperature recommended for keeping 10-25ºC.
6	Sun flower oil Unisol 1000ml	Interoil S.A. Oradea pentru Bunge Romania	ideal for culinary purpose	refined sunflower oil keep in cool and dark places
7	Sesame oil 150ml	Costa şi Co Ltd. Aylesford, Great Britain	used in eastern kitchen, gives a nutty taste to salads, sauces, macaroni, even fryingt	nutritional factors for 100 ml: proteins 4,1g, carbohydrates 32g, out of which glucides 25,g; fats 92 g, out of which saturated 14,7 g.

RESULTS AND DISCUSSIONS

The unrefined oils have a higher free acidity than the refined ones (tab. 1 and tab 2). Thus, the maise oil has an acidity of 1,78% expressed in oleic acid.

Through the determination of the oil alkalinity (tab. 2 and tab.3) we identified low value for the pumpkin oil Pepon (soap 1 mg/kg).

Table 2

Determination of acidity, alkalinity and phosphor contents from the unrefined oils

Oil	Acidity% oleic acid	Alcalinity mg/kg	Phosphor mg/kg
Pumpkin oil Pepon	0,61	1,0	6,25
Pumpkin oil Emi	0,70	absence	6,97
Maize oil Capitano	1,78	absence	0,5
Sesame oil	1,81	absence	30,86

Table 3

Determination of acidity, alkalinity and phosphor contents from the refined oils

Oil	Acidity% oleic acid	Alcalinity mg/kg	Phosphor mg/kg
Peanut oil	0,05	absence	0,02
Sun flower oil Unisol	0,08	absence	2,15
Mixt oil Olivero	0,11	absence	0,4

Higher values of the phosphor contents were registered for the unrefined nut oil, such as in sesame oil- 30,86 mg/kg. The unrefined peanut oil presentes a low content of phosphor-0,02.

Table 4

The content in coloured substances (us=unsignificantly)

Oil	Iodine colour %	Caroten mg/kg	Chlorophyl mg/kg
Pumpkin oil Pepon	Correspond	17,4	3,61
Pumpkin oil Emi	Correspond	20,05	US
Peanut oil	80,7	NS	US
Maize oil	Correspond	17,0	US
Sun flower oil	74,0	NS	US
Mixt oil	Correspond	NS	1,81
Sesame oil	Correspond	7,08	US

After determining the iodine colour (tab. 4) we could notice that the arachis oil and the sunflower oil had the most favourable index (80,7% and 74%), their hue insuring superior organoleptic characteristics.

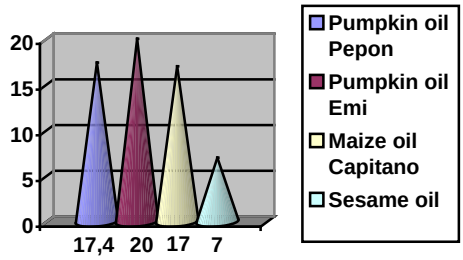

Fig.1 – The content in carotene (%)

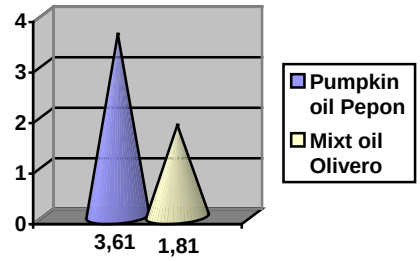

Fig.1 – The content in chlorophyl(%)

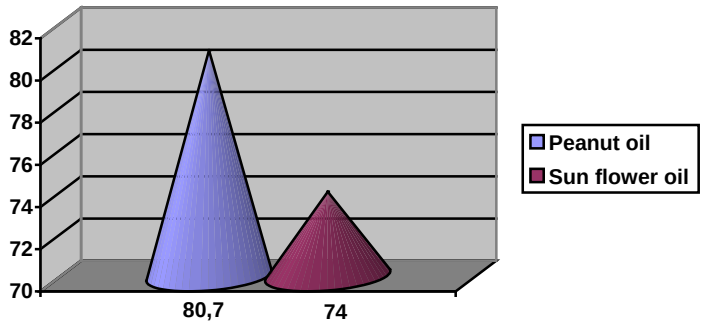

Fig.1 – The content in iodine colour (%)

As for the content in colouriung substances (tab. 4), the pumpkin oil and the maise oil have a high content of carotenes: 20,05 mg/kg (pumpkin oil Pepon) and 17 mg/kg (maize oil).

Pumpkin oil Pepon has, also, the highest content of chlorophyl (3,61mg/kg) of all oils analized. A low content of chlorophyl we determined in the mixt oil (1,81 mg/kg).

CONCLUSIONS

1. The free acidity of the unrefined oils are higher than those of the refines oils. The maize oil has an acidity of 1,78% expressed in oleic acid. These oils may be kept for a shorter period of time (up to 12 months), at low temperatures and in dark places.

2. Alkalinity registers low value for the pumpkin oil Pepon (soap 1mg/kg). The unrefined oils do not register soap traces because the technology of obtaining these oils doesn't suppose chemical treatment.

3. The unrefined sesame oil registers a high level of phosphor. The refined peanut oil registers low phosphor level, as we already expected.

4. The peanut oil and the sunflower oil had the most favourable index for the iodine colour and their hue insures superior organoleptic characteristics.

5. The unrefined pumpkin and maize oils had the highest content in caroten, in correlation with the raw material content, therefore increase their nutritive values.

6. The pumpkin oil registered the highest content in chlorophyl of all oils.

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STUDIES ON THE QUALITY OF SOME COMPOTE ASSORTMENTS EXISTING IN THE COMMERCIAL NETWORK OF TOWN IAŞI

STUDII PRIVIND CALITATEA UNOR SORTIMENTE DE COMPOTURI EXISTENTE ÎN OFERTA COMERCIALĂ A MUNICIPIULUI IAŞI

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Abstract. *Compotes are made from all known fruits but also from melons or assorted fruits. The assortment homologated according to STAS 3164 mentions 17 species besides the assorted assortment. Calibration of fruits after peeling is very important. For the cover liquid they prepare sugar syrup. Regardless of method, this has a specific composition depending on the fruit canned. For example the concentration is minimal for apples, cherries, pears, water melons, peaches and grapes. The concentration is maximal for sour cherries and gooseberries. In some countries, instead of saccharose one may use glucose, fructose, maltose or isosyrup. The food acids are necessary for apricots, peaches, plums as well as for the sliced fruits. In some countries, fruit colour is artificially coloured. Dosage involved adding the solid phase and pouring the warm syrup. The fruit proportion in measured according to STAS between at least 45% (whole peaches, whole plums, whole wax cherries and whole apricots) and 57% for halves or quarters of pears. Sterilization is generally effectuated at 100^{0}C, a variable time depending on the assortment and the container size. For cherries the time varies between 65 minutes for the 420 ml jars and 70 minutes for the 820 ml jars. For metallic containers the values are 50 minutes for ½ boxes and 55 minutes for the 1/1 boxes. To increase preservability for the assorted compotes, they add a quantity of potassium sorbate of 0,04% at most.*

Rezumat. *Compoturile se fabrică din toate fructele cunoscute dar şi din pepeni galbeni sau din fructe asortate. Sortimentul omologat conform STAS 3164 menţionează 17 specii, în afară de sortimentul asortat. Calibrarea fructelor după curăţare este foarte importantă. Ca lichid de acoperire se prepară un sirop de zahăr. Indiferent de metodă, acesta are o compoziţie specifică în funcţie de fructul conservat. De exemplu la mere, cireşe, pere, pepeni, piersici şi struguri, concentraţia este minimă . La vişine şi agrişe, concentraţia este maximă. În unele ţări, în loc de zaharoză se pot folosi şi glucoza, fructoza, maltoza sau izosiropul. Acizii alimentari sunt necesari la caise, piersici, prune, precum şi la fructele tăiate. În unele ţări, culoarea fructelor se nuanţează artificial. Dozarea implică adăugarea fazei solide şi turnarea siropului la cald. Proporţia de fructe este normată conform STAS, între minim 45% (piersici întregi, prune întregi, corcoduşe întregi, caise întregi) şi 57% la pere jumătăţi sau sferturi. Sterilizarea se execută de regulă la 100^{0}C, un timp variabil în funcţie de sortiment şi mărimea ambalajului. La cireşe, durata variază între 65 minute la borcane de 420 ml şi 70 minute la borcane de 820 ml. Pentru ambalaje metalice valorile sunt de 50 minute la cutii de 1/2 şi de 55 minute la cutii de 1/1. La compoturile asortate, pentru mărirea conservabilităţii, se asigură un conţinut de sorbat de potasiu de maximum 0,04%.*

MATERIAL AND METHOD

The study begun in 2005 focused on the analysis of the fruit compotes from the commercial network of the town Iaşi (more precisely Metro, Selgros, Billa, Kaufland, Gima).

Researches on the compote quality were effectuated on the following assortments: grapes compote, (yellow) cherry compote, apricot compote, peach compote, sour cherry compote, plum compote, (red) cherry compote, apple compote, pineapple pieces in syrup, papaya compote, tangerine compote, strawberry compote, blackberry compote, and kiwi compote.(table 1).

The sensorial analysis focused on the aspect of containers (on the exterior and in the interior), the fruit aspect, the fruit consistency, the fruit colour, taste and smell.

RESULTS AND DISCUSSIONS

The chemical determinations made took into consideration: the soluble dry substance (for fruit and syrup ^{o}Bx), total dry substance, total humidity, establishing the contents of vitamin C (for liquid and fruit), titrating acidity (g % apple acid), and the contents in glucides.

As for the soluble dry substance (^{o}Bx) in fruits, we may notice that the highest value was determined for the grapes compote – 19,8 ^{o}Bx, and the lowest value of 0,8 ^{o}Bx was determined for the pineapple pieces in syrup (tab. 2).

As for the total dry substance, from the tables above we may notice that its value ranged between 11,68 % for the pineapple pieces in syrup and 26,42 % for the kiwi compote (tab. 2).

The data obtained in terms of the humidity contents show that it varied from the lowest value of 73,58 % for the kiwi compote to 88,31 % a value determined for the pineapple pieces in syrup (tab. 3).

Table 1

Compote assortments under study

No. crt.	Product	Commercial name	Producer	Other indications according to label
1	Apricot compote	Buftea	S.C. Conserv Buftea S.A.	Keep it in a dry and cool place away from sun rays and frost. Pasteurized product
2	Cherry compote	Cegusto	CONSERVFRUCT S.R.L., Bălțătesti, Neamț,	Made from fresh fruit. Storage at 4 – 20 ^{o}C
3	Plum compote	Olimpya	Contec Foods, Tecuci	Keep it in a dry and cool place. Keep in cool after opening
4	Peach compote	Olimpya	Contec Foods, Tecuci	Addition of vit. C. Keep it in a dry and cool place. Keep in cool after opening
5	Grapes compote	Râureni	Oltchim S.A. Rm. Vâlcea	Best before: see the date on the lid
6	Cherry compote	Cegusto	CONSERVFRUCT S.R.L., Bălțătesti, Neamț,	Traditional recipe
7	Papaya pieces in syrup	Iska Qualität	Importator S.C. MATERINT S.R.L., Bucureşti	Nutritive value for 100g: energy 175 kl/41kal, protein 0,3 g, carbohydrates 10,0 g, fat 0 g
8	Strawberries in syrup	Iska Qualität	Importator S.C. MATERINT S.R.L., Bucureşti	Nutritive value for 100g: energy 268 kl/63kal, protein 0,4 g, carbohydrates 15,0 g, fat 0,0 g
9	Kiwi slices in syrup	Iska Qualität	Importator S.C. MATERINT S.R.L., Bucureşti	Nutritive value for 100g: energy 271 kl/64kal, protein 0,3 g, carbohydrates 15,4 g, fat 0,1 g
10	Blackberry compote	Naturavit	Produs în Ungaria, Ditribuitor S.C. ASTRAL IMPEX S.R.L Arad	It does not contain preservatives. Pasteurized product
11	Apple compote	Cegusto	CONSERVFRUCT S.R.L., Bălțătesti, Neamț,	Made from fresh fruits. Storage temperature: 4 – 20 ^{o}C
12	Pineapple pieces in syrup	Paradais	Produced in Bulgaria	Ingredients: pineapple 36 %, syrup 64 %
13	Pear compote	Vivtzrz Brand Taste	Produced in China, Importer: Ses Victory Impex S.R.L Bucureţti	Ingredients: pears, sugar syrup
14	Tangerine compote	EODY ®	Importer and distributor Matra Int. S.R.L, Bucureşti,	The product will be kept in clean, aired rooms away from sun light or frost at a storage temperature of maximum 20 ^{0}C and relative humidity of maximum 80 %

Table 2

Physical-chemical determinations effectuated

Compote name	SUS ^{0}Bx		SUT%	U%	Ascorbic acid (mg/100 g product)	Titrating acidity (g% apple acid)
	Syrup	Fruit				
Grapes compote	19,8	19,8	18,76	81,24	1,58	0,34
Cherry compote	20,4	18,2	20	80	1,23	0,27
Apricot compote	19	16,2	18,16	81,84	1,05	0,54
Peach compote with addition of ascorbic acid	13,8	13,8	13,87	86,13	14,6	0,34
Apple compote	16,8	16,4	16,93	83,06	1,76	0.13

Table 3

Physical-chemical determinations effectuated

Compote name	SUS ^{0}Bx		SUT%	U%	Titrating acidity (g% apple acid)
	Syrup	Fruit			
Pear compote	12,4	12,4	17,68	82,32	0.18
Tangerine compote	13,8	13,8	14	86	0.52
Papaya compote	15,2	15,2	20,23	79,77	0,27
Strawberry compote	14,8	14,8	21,69	78,31	0,55
Blackberry compote	16,4	16,4	14,06	85,94	0,97
Kiwi compote	19,4	19,4	26,42	73,58	0,62
Pineapple pieces in syrup	10,8	10,8	11,68	88,31	0.27
Sour cherry compote	19,4	18,8	17,69	82,29	0,78
Plum compote	17,4	15,2	16,59	83,40	0,59

As for the ascorbic acid, following the analyses effectuated, we got the lowest value of 1,05 mg/100g for the apricot compote and the highest value was obtained by the peach compote – 14,6 that had on its label mentioned the addition of vitamin C (tab. 2).

The titrating acidity expressed in g % apple acid registered increases from 0,13 % the value obtained by the apple compote up to 0,97 % belonging to the apple compote (tab. 2).

The sensorial analysis focused on: fruit aspect (shape, size, uniformity), colour (uniformity in fruit pulp), taste and smell (specificity, eventual presence of a taste or strange smell) consistency (firmness, elasticity) (tab. 4).

Table 4

Organoleptic analysis of the assortments under study

Compote name	Fruit aspect	Syrup aspect	Fruit consistency
Grapes compote	Fruits covered by syrup, fruits with stains, torn 20%, close sizes	Clear with fine particles in suspension	Fruits too boiled but untorn in proportion of max. 20%
Cherry compote	Fruits covered by syrup, fruits with stains, torn 17%, close sizes	Clear with fine particles in suspension	Medium hard non-over boiled
Apricot compote	Fruits covered by syrup, untorn, close sizes, whole, soft consistency of fruit	Clear	Medium hard non-over boiled
Peach compote	Halves of fruits covered by syrup, untorn, without stones, peeled	Clear with fine particles in suspension	Medium hard non-over boiled
Sour cherry compote	Fruits covered by syrup, fruits with stains, torn 20%, close sizes	Weakly opalescent	Fruits too boiled but untorn in proportion of max. 20%
Plum compote	Fruits covered by syrup, untorn, whole	Weakly opalescent	Fruits too boiled but untorn in proportion of max. 20%
Apple compote	Pieces of fruits covered by syrup, untorn, without stones, peeled	Clear with fine particles in suspension	Medium hard non-over boiled
Pear compote	Halves of fruits covered by syrup, untorn, without stones, peeled	Clear with fine particles in suspension	Medium hard non-over boiled
Blackberry compote	Fruits covered by syrup, fruits with stains, torn 20%, close sizes	Clear with fine particles in suspension	Fruits too boiled but untorn in proportion of max. 20%
Pineapple pieces in syrup	Pieces of fruits covered by syrup, untorn, without stones, peeled	Clear	Hard non-over boiled
Tangerine compote	Whole slices and also halves of slices, peeled	Clear	Fruits too boiled but untorn in proportion of max. 20%
Papaya compote	Fruits covered by syrup, untorn, whole, peeled	Clear	Hard non-over boiled
Strawberry compote	Fruits covered by syrup, untorn, whole, of close sizes	Clear	Medium hard non-over boiled
Kiwi compote	Fruits covered by syrup, peeled	Clear with fine particles in suspension	Medium hard non-over boiled

CONCLUSIONS

The soluble dry substance determined for the compote syrups registers high values for the yellow cherry assortment, and low values for the pineapple compote.

High contents of soluble dry substance in fruits are present in the grapes compote whereas the pineapple compote registers low contents of soluble dry substance.

Compotes have different values of the titrating acidity, depending on the assortment. The apple compote is the most acid.

By determining the ascorbic acid we noticed that in syrup there are higher contents than in fruits. For the peach compote we noticed the highest value due to the correction with ascorbic acid (a thing also mentioned on the label).

The total dry substance and the total humidity register adequate parameters. Most compotes have values over 80% of total humidity.

We noticed that for some samples there was a diffusion of the syrup in the fruit so that they reached a homogenous product in terms of soluble sugars.

As for the contents on fruits, we notice that almost all the assortments analyzed register values required by STAS, except the apple compote.

We did not identify disorders in terms of container aspect, fruit colour and humidity, taste and smell for all 14 products. The organoleptic analysis identified a number of four products without any flaw.

11 products had flaws mainly consisting in the aspect of the cover liquid (syrup with particles in suspension or even opalescent) and the existence of a too soft (too boiled, torn) fruit percentage.

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ANTIOXIDIZING PROPERTIES OF FRUITS AND VEGETABLES

PROPRIETĂȚI ANTIOXIDANTE LA FRUCTE ŞI LA LEGUME

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Abstract. *The horticultural products contain numerous principles that have bioactive properties among which a remarkable antioxidizing activity. This property is owed to a series of compounds having a presence and a more or less important level and also a specific evolution during the life of fruits and vegetables (flavones, phenolic acids, tocopherols, ascorbic acid, carotenoids etc). The traditional antioxidants were vitamins (C, E, pro-vitamin A/ β carotene, lycopene etc). More recently they studied the antioxidizing properties of flavones and other phenolic compounds. Gradually there appeared the idea of evolution of these values depending on the stage of maturity. At the moment of maturity of the coloured fruits they made some thorough studies on the contents of anthocianines, flavonols proanthocianidines, hydroxicinamates, β carotene, ascorbic acid and tocopherols. They may speak of an antioxidizing activity specific to Pomaceae fruits, drupaceous fruits, bushes, citric fruits, grapes and for vegetables the crucifers from all the technological groups followed by the radiculaceae and the bulbous ones. Vegetables contain however much lower levels of antioxidizing compounds among which we must mention the green peppers at their physiological maturity, the Brussels sprouts and broccoli besides the species rich in vitamins/provitamins with antioxidants properties.*

Rezumat. *Produsele horticole conţin numeroase principii care au proprietăţi bioactive, între care şi o remarcabilă activitate antioxidantă. Această proprietate se datorează unei serii de compuşi care au o prezenţă şi un nivel mai mult sau mai puţin important, dar şi o evoluţie specifică pe parcursul vieţii legumelor şi fructelor (flavonoide, acizi fenolici, tocoferoli, acid ascorbic, carotenoizi etc). Antioxidanţii tradiţional studiaţi au fost vitaminele (C, E, provitamina A – carotenii). Mai recent au fost studiate şi proprietăţile antioxidante ale flavonoizilor şi altor compuşi fenolici. Treptat s-a conturat ideea de evoluţie a acestor valori, în funcţie de stadiul de maturitate. La maturitatea de consum a fructelor colorate s-au realizat studii amănunţite privind conţinutul în antocianine, flavanoli, proantocianidine, hidroxicinamaţi, β caroten, acid ascorbic şi tocoferoli. Se poate vorbi despre o activitate antioxidantă tipică fructelor pomacee, drupacee, arbuşti, nucifere, citrice, struguri, iar la legume, cruciferele din toate grupele tehnologice, urmate de rădăcinoase, bulboase etc. Legumele conţin totuşi niveluri mult mai scăzute de compuşi antioxidanţi, remarcându-se doar ardeii graşi la maturiltatea fiziologică, varza de Bruxelles şi broccoli, alături de speciile bogate în vitaminele specifice.*

The interest for the antioxidizing activity manifesting at the horticultural products is an actual trend that has appeared gradually due to the nutrition studies and food security from the last decades (6, 9).The researchers' attention focused on some groups of specific compounds or some species with significant antioxidizing properties, some species more cultivated respectively, and consequently more available for the daily consumption (2, 8, 13). The main molecules that may

have antioxidizing action are vitamin A (retinol), β carotene, vitamins of the B complex, vitamins C and E, coenzyme Q_{10} and the lipoic acid, beside some minerals component of enzymes with antiradical action (manganese, molybdenum, copper selenium, zinc), some vegetal pigments such as flavonols and chlorophyll, some amino acids etc. The more important antioxidizing components from fruits and vegetables are vitamins C and E, phenolic substances, flavonols and anthocyans. (11)

Antioxidants come in a wide range and an unequal capacity to manifest these properties, depending on numerous factors (species, cultivar, technologies of production and keeping, the capitalization channel etc). TAC (total antioxidizing capacity) constitutes a more and more studied characteristic.

Vrhovsek Urska and colab (2004) notice that the occidental diet includes a daily consumption of about 1 g poly-phenols, made from 2/3 flavonols and 1/3 phenolic acids. Poly-phenols from apples constitute the most important antioxidant exceeding vitamin C as importance. They affirm that a regular consumption of apples may ensure a significant part of the necessary poly-phenols especially from the category of flavonols and glycoside flavonols. A recent study estimates that in the American diet, apples are the main source of pro-anthocyanins. Andreotti C. and colab. (2006) notice the impressing diversity of the phenolic compounds associated to a considerable number of representatives (only flavonols are estimated at 6000 molecular forms). The interest caused does not refer only to the colouring properties (related to pigmentation) but also focus on their dietetic and even medicinal features since they reduce the incidence of some specific cancer forms or some cardiovascular diseases. Besides certain vitamins, fibres, phyto-estrogens, they are considered among the most important fruit antioxidants.

MATERIAL, METHOD AND RESULTS OBTAINED

Are published a series of analytical data referring to the chemical composition of the main wood fruits (7 species) harvested from the spontaneous flora of county Neamț (Romania), where one may also find determinations tightly correlated to their antioxidant properties.

The limits of the contents in phenolic compounds range between the maximal values of 0,636 g/100 g analyzed product (bilberries) and 0,071 g/100 g analyzed product (box thorn). Important values are also signaled for blackberries (0,471 g/100 g product) and the wild cherries (0,435 g/100 g product). As for the contents in anthocyans, expressed in g/100 g product, the variation limits range between 0,58 (bilberries) and 0,01 (sea-buckthorns). We generally notice the keeping of the size order from the contents in total phenolic compounds. There is only one exception; the wild cherries exceed the blackberries in terms of the contents in anthocyans situating themselves on the second place.

Table 1

Total contents in phenolic compounds for some species of wood fruits from county Neamț (Romania)

Species	Time of harvest	D 280	Total phenolic compounds (g/100 g fruits)
Bilberries	1-10.08	157.5	0.636
Blackberries	20-30.08	117.4	0.471
Wild cherries	20.06-10.07	107.5	0.435
Rose-hips	1-10.09	50.3	0.205
Raspberry	20.06-10.08	30.1	0.123
Sea-buckthorns	1-10.09	17.5	0.071

Blackberries largely contain a major pigment (cyanide 3 glycoside), in proportion of 90% from the total of anthocyans present in the fruit. In wild

cherries, are three major characteristic pigments. Peonidine 3 rutinoside are in the largest proportion followed by cyanide 3 glycoside, and peonidine 3 glycoside is in the lowest quantity.In raspberry the major pigment is cyanide 3 sophorozide, in proportion of about 50%, cyanide 3 glycoside rutinoside and cyanide 3 rutinoside. For bilberries are more than 14 such pigments as different peaks, none of these being major. One of the most important is cyanide - 3 glycoside. (4)

Table 2

Total contents in anthocyans for some species of wood fruits from county Neamț (Romania)

Species	Time of harvest	Total phenolic compounds (g/100 g fruits)
Bilberries	1-10.08	0.58
Wild cherries	20.06-10.07	0.41
Blackberries	20-30.08	0.33
Rose-hips	1-10.09	0.12
Raspberry	20.06-10.08	0.09
Sea-buckthorns	1-10.09	0.01

For most species, the maximal and minimal values of the contents in vitamin C were relatively closed, except the sea-buckthorns samples where a single variant registered double values as compared to the average. The wild cherries and partially the raspberry registered a decrease of the contents within the one month interval. (5)

Table 3

Total contents in anthocyans for some species of wood fruits from county Neamț (Romania)

Species	Time of harvest	Ascorbic acid (vitamin C) (mg/100g fresh product)
Bilberries	I/August	45,10 - 61,12
Raspberry	III/ July	46,84 - 59,40
	I/August	38,92 - 51,75
Sea-buckthorns	I/ July	47,1 - 111,53, media 58,60
Wild strawberry	III/ July	*55,13*
Rose-hips	I/ July	51,07 - 53,69
Wild cherries	III/ June	34,51 - 37,14
	I/ July	21,14 - 29,54
Blackberries	III/ August	10 - 15

Their antioxidizing capacity of some diverse types of peaches and nectarines is influenced in a polyvalent manner by the cultivar, the interaction with the parental plant, the maturation time, the manner and period of keeping. The antioxidizing capacity of peaches expressed in μmol TE/g FW was between at 1for Stark Satume (PG) and 4,1 for Maria Dorata (NG). The total contents in poly-phenols (μg GA /g FW) was between 190 for Stark Satume (PG) and 930 for Maria Dorata (NG). By calculus they determined a correlation with R^2=0,9 between the antioxidizing capacity (FRAP) and the contents in poly-phenols. (11) Apricots are remarcable for their sensitiveness to enzymatic scald due to the oxidization of the phenolic compounds.

The appearance of the unwanted brown color also depreciates the sensorial/nutritive quality of the processed products. Is characterized and identified the main phenolic components of apricots: protocatechic acid (+ catechin), chlorogenic acid (- epi-catechin), naringine 7 glycoside/prunine, quercetin 3 glucoside, quercetin 3 rhamno-glucoside/rutin and campherol 3 rutinoside. The chlorogenic and neo-chlorogenic acids + catechin, - epi-catechin and rutin are major compounds among the apricot ply-phenols. On the other hand, the protocatechic acid, prunine and pro-cyanides B_2, B_3 and C_1 were for the fist time identified in apricots. (10)

Is studied the exceptional nutritive value of strawberries. Between 9 fruit species cultivated in Italy, the TEAC values (μmol TE/g FW) of the shrubs fruits stand out clearly as plus variants. The bilberries have the highest antioxidizing capacity (39 μmol TE/g FW), due to the high contents in anthocyanins. A remarkable antioxidizing capacity was also noticed for wild strawberries (33 μmol TE/g FW), and raspberry respectively (23 μmol TE/g FW), followed, as an average value, by strawberries (15 μmol TE/g FW). A relatively reduced potential (under 5 μmol TE/g FW) was registered by quinces, kiwi, apples, apricots and peaches. The indicators studied represent a genetic character constituting sometimes an average of parentals for TPH (mg GAE/g), but there are also cases of positive transgression. As for TEAC (mol TE/g FW), most times the values of the descending cultivars are superior to ascendants that served in melioration.

Is studied a number of 16 cultivars of strawberries representative for Europe highlighting the variability manifesting from case to case. The variants were placed in a growing order from Queen Elisa (TPH minimum, about 1,8 mg GAE/g) and up to Sveva (TPH maximum, about 3,1 mg GAE/g). We may not speak of a full concordance between the TPH values and the TEAC values, but the general trend indicates an approximate resemblance, at least for an important part of the variants. Thus, reduced values of TEAC were registered by Queen Elisa, whereas important values were signaled for the last 6 cultivars having high TPH values. We appreciate that the deviation from an ideal up going curve is ± 4 μmol TE/g FW. (3)

Is also investigated the quantity and activity of the poly-phenolic antioxidants from apples. For the immature apples, most of flavonols are made from monomers (epicatechin and catechin), as well as from dimer and trimer pro-antho-cyanides whereas in the next phase they have amore important polymerization degree (depending on the cultivar and tissue, between 5,7 and 7,1). The study focuses on 8 apple cultivars. They dosed 20 of the main monomers and oligomer pro-antho-cyanides, the ascorbic acid as well as the antioxidizing capacity of extracts. The total contents in poly-phenols were on average of about 110 mg/100 g FW (212 for Renette and only 66 for Fuji). Flavonols (catechins, dimer and oligomer pro-anthocyanides) confirm as the main class of apple poly-phenols. The oligomer pro-antho-cyanides varied between about 38,8 mg/100 g for Fuji and 162,2 mg /100 g for Renette. Pro-antho-cyanide B_2 oscillated between 5,6-19,3 mg/100 g, epicatechin between 5,2 and 18,4 mg/100 g and catechin between 0,5 and 4,3 mg/100 g. The study also refer to the hydroxy-cynamic acids (Renette 38,4 mg /100 g, but Granny Smith only 4,5 mg/100 g), flavonols (between 8 mg /100 g for Braeburn and 3,5 mg /100 g for Renette), de-hydro-calcones (between 15 mg /100 g for Renette and about 2 mg /100 g for most variants), anthocyans respectively (alomost 4 mg /100 g for Imperatore, and absent for Renette, Granny Smith and Golden Delicious). The ascorbic acid may be found in

higher quantities at Golden Delicious and Braeburn (about 8 mg /100 g), and in very small quantities at Red Delicious and Royal Gala (0,5 ± 0,2 mg /100 g). The antioxidizing activity PRTE (Peroxyl Radical Trapping Efficiency) was determined by groups of cultivars (it is between 1,6 L/g for Renette and 0,5 L/g for Braeburn), and by groups of compounds (high effectiveness for quercetin and cyanide dilutions of 0,2 L/mg, and low for the remainder of compounds, dilutions under 0,05 L/mg). (12)

Others authors study has as subject 4 technological groups of peaches and nectarines represented by cultivars typical to the region (Redhaven yellow pulp peaches, white pulp Fidelia, nectarines yellow pulp Stark Red Gold and white pulp Silver Rome). Qualitatively, the phenolic profile of the variants seems almost homogenous, the chromatograms registered at 280 nm having relatively similar peaks. The cynamic acids are represented by two compounds (chlorogenic acid and neo-chlorogenic acid, with a maximum absorbance at 320 nm). Catechin and epicatechin have a maximum absorbance at 280 nm. Glycoside flavonols (between 2 and 4 peaks) and cyanides (especially cyanide 3 glucoside) specifically complete chromatograms.

Table 4

Average contents in phenolic substances (monomer forms, mg/g DW) for peaches and nectarines from Bologna – Italy (cf. Andreotti C. and colab. 2006)

Specification	Part of fruit	Stark Red Gold	Silver Rome	Redhaven	Fidelia
Catechin	skin	0,43	0,09	0,61	0,67
	pulp	0,11	0,19	0,18	0,2
Epicatechin	skin	0,15	0,39	0,15	0,1
	pulp	0,06	0,14	0,05	0,06
Pro-cyanide	skin	0,22	2,17	0,38	0,43
	pulp	0,06	1,01	0,15	0,16
Flavan 3-oli (total)	skin	0,8	2,66	1,13	1,19
	pulp	0,23	1,35	0,38	0,42

Table 5

Average contents in the main phenolic compounds (mg/g DW) for peaches and nectarines from Bologna – Italy (cf. Andreotti C. and colab. 2006)

Specification	Part of fruit	Stark Red Gold	Silver Rome	Redhaven	Fidelia
Neo-chlorogenic acid	skin	0,32	1,03	0,31	0,17
	pulp	0,21	0,8	0,25	0,25
Chlorogenic acid	skin	0,95	2,86	1,02	0,84
	pulp	0,3	0,97	0,31	0,12
Total of cynamic acids	skin	1,27	3,88	1,33	1,01
	pulp	0,51	1,82	0,56	0,36
Cyanide 3 glucoside	skin	0,38	0,83	0,36	0,35
Quercetin 3 rutinoside	skin	0,41	0,13	0,18	0,27

Other quercetins	skin	0,19	0,11	0,14	0,06
Total flavonols	skin	0,6	0,24	0,32	0,34

Quantitatively, there is a similitude between the contents in total poly-phenols from pulp (about 1 mg/g DW) and skin (about 3,5 mg/g DW) for 3 breeds (Stark Red Gold, Redhaven and Fidelia), whereas for Silver Rome the values are much higher (about 8 mg/g DW for skin and 3,5 mg/g DW for pulp). They draw the attention on the dietetic and antioxidizing importance of pulp for peaches and nectarines. (1)

Is determined the phenolic composition of 11 cultivars of apples, in epicarp and mesocarp and the phenolic contents. Are identified and measured several groups of phenolic compounds: pro-cyanides, hydroxyl-cinamats, acids, anthocyanins, flavonols and di-hydroxo-chalcones. Pro-cyanides were the most present group in pulp and skin contributing by 52%, and 44%, to the total phenolic index (TPI). The quercetin glucosides were found almost exclusively in skin whereas cyanide –3-galactoside was found only in the skin of the red apples.

The profile of the phenolic compounds for all the 11 genotypes presented differences and was more important in skin than pulp. Reinette russet registered the highest concentration in phenolic substances. The total phenolic contents (TPI/TPC) of extracts from pulp and skin correlated well to the antioxidizing capacity estimated by FRAP. The low contents in chlorogenic acid and the lack of total flavonols in the pulp may be associated to the genotype with the weakest concentration in phenolic substances with the lack of (enzymatic) scald as compared to other cultivars. (7)

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GETTING EATABLE FOOD FROM PUMPKIN DISTRICT IN REPUBLIC OF MOLDOVA

OBȚINEREA ADITIVULUI ALIMENTAR DIN DOVLEAC RAIONAT ÎN REPUBLICA MOLDOVA

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Abstract *.Was studied the technology how to obtain eatable food from pumpkins. Was used that kind of pumpkin: Jubileu-70, Carat, Ciarodeica in mash pumpkin and paste with varied concentrates the physical-chemic analysis to obtain the products demonstrated there is a different between them in the nutrition's: for example 5,0-13,5% drying substances; 4,8-8,0% polizaharide; 0,03-0,01% organic acid; starch from 2,0%; 1,0-1,2% cellulose; vegetable protein 0,8-1,2%; pectins substance 0,2-0,5%; 100gr of the working substance from pumpkin are contain 14,0 mg natrium, 170 mg calcium, 12 mg magnesium, 25 mg of phosphorus. Pumpkin is in a contrast with other vegetables, it content a big percent of carotin (from 35mg/100gr), it content vitamins: B_6, B_2, B_1, folic acid, nicotine, pantotenic. Valor of actives acid (pHl) are composed 5,2-6,8. Usage domain of mash pumpkin and pastes-industry, sweets and process milk. Types of pumpkin was examined have a good harvest and they are resisted and different climate in Republic of Moldova.*

Rezumat*.A fost studiată tehnologia de obținere a adtivului alimentar din dovleac de soiurile:Jubileu-70, Carat, Ciarodeica-în formă de piureu şi paste de variate concentrații. Analiza fizico-chimică a produselor obținute au demonstrat că ele se deosebesc printr-un conținut sporit în substanțe nutritive şi anume: 5,0-13,5% de substanțe uscate; 4,8-8,0% polizaharide; 0,03-0,01% acizi organici; amidon pînă la 2,0%; 1,0-1,2% celuloză; proteine vegetale 0,8- 1,2%; substanțe pectinice 0,2-0,5%; 100g de substanță prelucrată de dovleac conține 14,0 mg sodiu, 170 mg potasiu, 12 mg magniu, 25 mg fosfor. Dovleacul se deosebeşte în comparație cu alte culturi legumicole, prin conținut sporit de carotină (pînă la 35mg/100g), vitaminele B_6, B_2, B_1, acid folic, nicotinic, pantotenic. Valoarea acidității active (pH-ul) alcătuieşte 5,2-6,8. Domeniul de utilizare a piureului şi pastei-industria de panificație, cofetărie şi prelucrare a laptelui. Soiurile de dovleac cercetate au o recoltă bună şi sunt rezistente în condițiile climaterice a Republicii Moldova*

Food additive is a substance, which is not normally used as food and which is not used as a characteristic food ingredient of some or of no nutritive value, being added intentionally to the food products on the technological purposes in the process of producing, processing, preparing, treating, packaging, transporting or stocking of such food products, it or its derivates become or may become a component of these food products directly or indirectly [1]. S. Dumitrache, Professor, Dr. [1] notes that the food additives are substances, which are used in the preparation of the food products in order to improve their qualities or to allow application of the advanced technologies of processing or any natural or synthetic substance, which the producer introduces in the food in a very little quality in order to prolong the duration of the product storage or to

confer such attractive perceptive qualities to the products, that the consumer wishes: appearance, consistency, color, smell, aroma, taste, fragility, etc.

As a result of the informational analysis the directions of use of the pumpkin food additives were determined, namely:

- pumpkin powder is used as a natural colorant and jelifier in the confectionary industry [2,3,4,5].

- in the bakery – it improves the quality of the bakery products, thanks to the complex functional effect in the dough qualities, intensifying this way the process of gases formation in 14-16%; the fermentation cycle length decreases and the bread nutritive value increases, improving the color and enlarging the assortment of the diet bread [6,7].

- the hydrated pumpkin powder increases the nutritive value of the meat and cooked meat products, thus balancing the biologically active and food substances, increasing the property of protection of the meat products membrane, improving the property of the organism antioxidant protection [8,9,10].

- in the preparation of sauces, condiments as a consistency stabilizer, thus improving their color [11].

In the aspect of the pumpkin pastes, purées, products with a high concentration (candied fruits, jams, etc.), with a high content of β-carotene, as an additive of the biologically active substances and an antioxidant in the production of mayonnaises, milk products, cheeses. The use of pumpkin fillings improves the organoleptic properties of the finished product and increases the storage term and the nutritive value of the products [6,8].

The morphological components of pumpkin have the complex properties, and practically all fruit parts are used in the processing: peel in the form of powder, which has the fungicide and bactericide properties, suppressing the effect of the microorganisms and contributes to the increase of terms of storage of the forage [11].

- pumpkin pulp – in the production of the pumpkin food additive as purée, paste, powder;

- pumpkin seeds – to obtain the qualitative pumpkin oil, containing the important quantities of the vitamin E, As, Zn and determines the curative properties, and the seed membrane is used in the production of the food fibers.

Research purpose: To develop the food additive of the high biological value by using the pumpkin growing in the Republic of Moldova. To diversify the assortment of the food products based on the food additive of pumpkin.

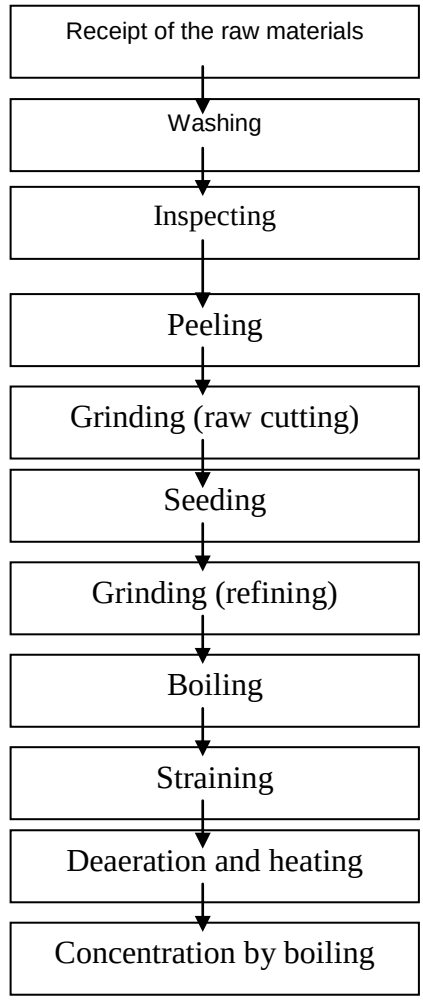
MATERIAL AND METHODS

The determination of the physicochemical indexes of the raw material and the products obtained by processing has been carried out in accordance with the following methods:

- Mass fraction of the soluble dry substances, %– according to GOST 28567-90;
- Mass fraction of the titrable acids – according to GOST 25555.0-89;
- Content of vitamin C – according to GOST 24556-89;
- Content of β-carotene – according to GOST 8756.22-80.

RESULTS AND DISCUSSIONS

Based on the research the type of the food additive of pumpkin was determined – pumpkin pastes in the assortment with the high nutritive value and the preliminary recipes have been developed and their process flowsheet is presented in the fig. 1. In accordance with the process flowsheet, the production of the paste includes concentration of the pumpkin purée in void.



Drawing 1

Fig.1. Process flowsheet of the pumpkin paste production

The pumpkin sort growing in the Republic of Moldova, „Jubileu -70 [10] of all the sorts growing in the Republic of Moldova [10] has been used for the research. In the table 1 the chemical indexes of the pumpkin puree and paste are presented, the sort „Jubileu -70 is distinguished by the rich crops, resistance to the climate conditions and to the pest insects. This pumpkin has a bright yellow color, which is very important in the use of the food additive as a colorant. The pumpkin color depends on the content of β-carotene, which is relatively thermally resistant in comparison with the other vitamins. Based on the table data it results that the paste contains a significant quantity

of ß-carotene. In accordance with this index, it supercedes fresh carrot in 5 times [9], which is used as a colorant of the food - butter, confectionary creams, cakes, biscuits. The pumpkin paste presents an interest in the use as a colorant, an antioxidant and a filling in the confectionary and cultured milk foods products. The research on determination of the other important indexes are continued.

Table 1

Chemical indexes of the pumpkin paste

Sample	Mass fraction of the dry substa. %	fructose	glucose	saccha-rose	Total (3+4+5)	Carotene, (mg/100g)	
						100g raw material	100g dry substan-ces
1	2	3	4	5	6	7	8
Purée	8.3	2.04	2.31	3.4	7.75	13.0	156.6
Paste	25	8.17	9.04	11.42	28.63	47.5	144.8

CONCLUSIONS

1. Based on the informational, patent and scientific research, the type of the food additive, which will be obtained from pumpkin has been determined:

- Purée;
- Pumpkin paste (in the assortment);

2. Of the large assortment of the pumpkin sorts, the sort „Jubileu-70" with a high content of carotenoids has been selected as a basic food additive for the use of products processing.

3. The process flowsheet to obtain the pumpkin paste has been developed.

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STUDY REGARDING GERBERA CULTURE ON ARTIFICIAL SUBSTRATES

STUDIU PRIVIND CULTURA GERBEREI PE SUBSTRATURI ARTIFICIALE

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Abstract: *This study was done in a 1200 m^2 glasshouse built according to a Dutch project within SAPARD programe. It is located in a private farm, in Hălchiu village, in Braşov county. The gerbera plants were grown in individual containers, or cultivated on raised beds on the soil. The experimental material belongs to Rubin variety. As culture substrate were used coconuts coir peat, which was periodically fertilized with macro and micronutrients, according to the specific requirements of different culture stages. The experimental technology of using artificial substrates, assured a high flowers production, bigger in the second year of culture. In May - June period were produced the most flowers (22-28 fl/m^2), in comparison with winter period (2-5 fl/m^2). Coconuts coir peat has high moisture retention, reduces frequency of irrigation, improves aeration in substrates, enhances a strong and healthy root system, with good performances regarding vegetative growth and flowers production.*

Rezumat: *Prezentul studiu a fost efectuat într-o seră cu o suprafaţa de 1200 mp, construită după proiect olandez, prin programul SAPARD, aflată într-o fermă privată din localitatea Hălchiu, Judeţul Braşov. Plantele de gerbera din soiul Rubin, au fost crescute în containere individuale, timp de doi ani, comparativ cu varianta de cultură pe brazde înălţate la sol. Substratul de cultură alcătuit din fibră de nucă de cocos, a fost aprovizionat ritmic cu îngrăşăminte complexe şi microelemente, conform cerinţelor diferitelor faze de cultură ale plantelor. Tehnologia experimentală a utilizării substratului artificial, a asigurat o producţie ridicată de flori, mai mare în anul al doilea de cultură. În lunile mai-iunie s-au produs cele mai multe flori (22-28 flori/mp.), comparativ cu cele din timpul iernii (2-5 flori/mp.). Fibrele de cocos au reţinut umiditatea mai bine, reducând frecvenţa fertirigărilor şi au îmbunătăţit aerarea în substrat, provocând o dezvoltare sănătoasă şi puternică a sistemului radicular, cu consecinţe favorabile directe asupra creşterii vegetative şi a producţiei de flori*

INTRODUCTION

Gerbera (*Gerbera jamesonii*) is one of the most important cultures for cut flowers, appreciated by the buyers due to its beauty and the various assortments (color, shape of flowers as for her good keeping capacity in water after harvest).

There were made many experiments at gerbera, as to others flower species, to substitute the usual culture soil with different culture growing substrates, technique named "*Soil less culture*", or "*Hydroponics*".

Many growers preferred this new culture system to avoid the losses produced to the plants by the soil transmitted diseases and nematodes, as the expenses connected to the structural improvement and chemical of the soil, to make it less compact and with a good nutritive composition.

For gerbera soil less culture, different authors experimented several materials able to constitute a favorable culture substrate, as perlite, zeolite, thin gravel, coconuts coir fibres or coir peat, expanded clay, rice chaff (peel of the rice), pine bark, polystyrene foam, rock wool, a.s.o., in function by the accessibility, the cost price and experiences obtained in their utilization [1].

It was accumulated thus a good experience, in the last years in the cultivating gerbera countries, like Holland, Italy, France, Brazil, Colombia, Costa Rica and others. Up to day researches conducted in Turin, Italy by Drs. Angelo Garibaldi and Ludovica Gullino [2, 3, 6], has proved extremely helpful in understanding nutritional and watering needs of this plant, as well as establishing parameters for adequate pest and disease management.

Generally, they had in view the acquiring of a good drainage, an increase of air capacity of the substrate as the retention of mineral elements solutions at the level of substrate, to take over by the plants roots, for inducing an increase of the production and quality of the flowers, particularly in the periods with poor light from wintertime.

The aim of this study is to test the capacity of growing soil-less artificial substrate for gerbera, composed by coconut coir, as a substitute for peat.

MATERIALS AND METHODS

The experiment was done in a glass house built after a Dutch project, through a SAPARD program, having a 1200 m^2. surface, located in the Hălchiu locality, Braşov county.

The glass-house is 3,5 m high, the opening of the windows is done automatically, for automatic controlling and adjustment of the temperature and humidity, to the projected parameters for gerbera culture.

Two plastic sheets in what the air is keeping under a necessary pressure form the glass-house walls. The heating is done by natural gas, the thermic agent being warm water, the glasshouse is heated in cold time for achieving the optimal temperature parameters.

The biological material utilized is the Rubin variety, obtained by meristematic culture, imported from Holland. Computerized fertigation was applied through drippers irrigation system.

There were experimented by comparison three variants:

V_1 – the culture on raised beds on the soil: the bed is raised 10 cm in comparison to the soil level, and over it, is spreading a layer of 20 cm composed by leaves soil, pine bark, old manure and black peat.

The raised beds have 25-30 cm total height, 90 cm bottom width, 70 cm at upper side and with the path of 40 cm. On every bed were planted two rows of gerbera plants, 30-40 cm distanced, corresponding to 7 *pl/m*^{2};

V_2 – the culture in containers, on 80 cm high tables, able to carry the polythene containers and the plants. The containers have about 5*l* in each volume, with the same culture substrate like in V_1, in every containers being planted one gerbera plant;

V_3 – the culture in containers, in the same manner like in previous variant, but the culture substrate is made by coconuts coir fibers, material imported from Holland.

At V_2 and V_3 variants, the plant density on the table is also 7 plants/m^2., and the date of planting young plants was 25-th June, three years ago.

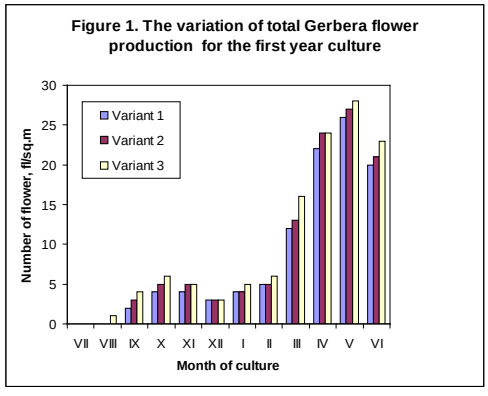
In every variant were studied 28 plants, in four repetitions.

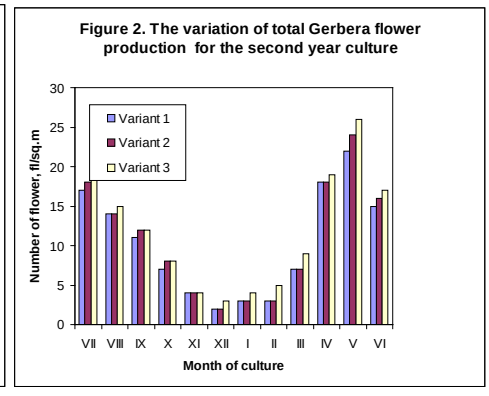
Fertigation was the same for all the variants, utilizing drippers of 2 l/hr capacity, but the frecvency was higher for V_2 and V 3, than in the soil. Nutrient solution prepared in a 1,2 m^3 tank was applied through the irrigation system and contained the following concentration of nutrients: NO_3 – 12 *mmol/l*, NH_4 – 1 *mmol/l*, H_2PO_4 – 2 *mmol/l*, SO_4 – 1 *mmol/l*, K – 10 *mmol/l*, Ca – 2 *mmol/l*, Mg – 1 *mmol/l* and the microelements Fe, Mn, Zn, B, Cu, Mo, with concentrations in the range [1 –25] μ*mol/l*, on the hole, all the mineral elements not exceeding the concentration of 30 *mmol/l*.

The production obtained monthly was registered, on the entire culture period of two years, from every variant and repetition. The beginning of flowering was in the month of July of the planting year, registering of flowers continued until the month of June, the second culture production year.

RESULTS AND DISCUSSIONS

The number of flowers reported to 1 m^2, obtained at each of three variants, on the whole two years culture period, apart for every month, and the total quantity of flowers, are resulting from the following graphics (*figure 1, 2, 3)*:





On the total, in the two years culture, at the three variants, V_i, $i \in [1-3]$, they were obtained the following productions, expressed in flowers/ m^2 (table 1).

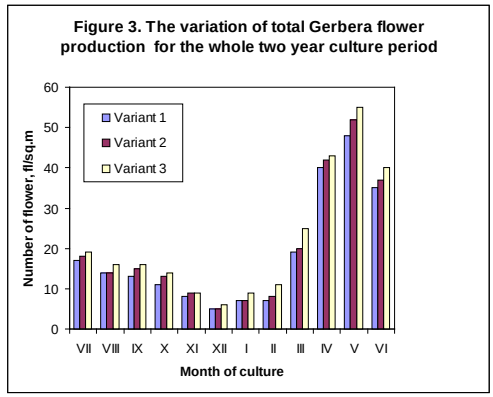


Table 1.

Total flowers obtained from Gerbera culture at all three variants

Variant	Total flowers [fl/m^2]	from which on the years of culture:	
		first year	second year
V_1	225	102	123
V_2	239	110	129
V_3	262	121	141

The experimental data were compared through the method of variation analyses and the determination of test ***F***, for the total gerbera flowers at all three variants, obtained in the two years culture, according to the table 2.

Table 2.

The results of variation analyses and the determination of test F

The reason of variability	S.P.	G.L.	S^2	Test F
Total	3370	11		
Repetitions	296,6	3		
Variants	2792	2	1396	29,78 (5,14; 10,92)
Errors	281,4	6	46,88	

The experimental value of ***F*** (29,78) exceeding the theoretical value for P=5% and even for P=1%, results that between the three variants are real production differences.

So, V_3 - determines the obtaining of a flower production (262 *fl/m*^{2}), distinct significant bigger than at V_2 and also bigger than V_1 (225 *fl/m*^{2}.). V_2, at its turn produces very significant more flowers than V_1.

The increasing of flowers number at the variants in containers cultivated on raised table (V_2 and V_3), take place beginning with the first year production and just from the first month of flowering, what can be explained through a better heating of the culture substrate and a more favorable illumination of plants.

V_3 with coconuts coir fibers as culture substrate realized the highest production, the fertigation being the best utilized by the plants, by retention in a good ratio the water and fertilizers substances, with the necessary air for the physiological processes of absorption and synthesis.

In the autumn and winter period, the production decreases at all variants (2-5 *flowers/m^2/monthly*) due to the diminishing of daily illumination period, as to the poor light in day time, whereas in the month of April- June it is reached the peak of production (18-26 flowers/m^2/month).

From all the 112 gerbera plants that belong to V_1, in the two years culture period, 5 plants were affected by *Botrytis* and *Phytophtora* attack and they must be removed from the culture place, while to the others variants the healthy of the plants was better (2 plants were removed at V_2 and no one to V_3). This is because as the plants are situated in different containers the chance of transmission of diseases is reduced to a minimum, and the water and humidity in the nursery was lower than in soil culture. A big advantage is that the coconuts coir fiber does not have to be disinfected anymore.

The coconuts coir fibers retained better the moisture, reducing the frequency of fertigation and improved the aeration in substrate, determined an strong and healthy root system enhance, with good consequences on vegetative growth and flowers production. To the end of experimentation, after two years of production, the gerbera plants had not losses and looked still vigorous, making possible the production prolonging, for still one year culture cycle, without to be affected the quality of the flowers.

The cultivation in containers on raised table had also some big advantages, in comparison with the culture in glass house soil: crop-maintenance such as leaf picking can be done easier therefore often quicker, reducing in this manner labor requirement per 1000 m^2 in hours, especially in the second year of culture.

CONCLUSIONS

From examination of the gerbera flowers production, at all the tree variants, result the following conclusions:

- the number of flowers reported to 1 m^2, obtained in the first culture year is at all variants smaller than in the second culture year (V_1 - 102, V_2 - 110, V_3 - 121, opposite to V_1 -123, V_2 - 129, V_3 - 141);
- between the autumn-winter months production and that of spring months are great differences (2-5 *fl/m^2/month*, opposite 18-26 fl/m^2/month);
- the phyto-sanitary situation of the plants cultivated in containers on raised tables is better than those cultivated into the soil, the plants from the variant with coconuts coir fibers had not any losses during the two years culture;

- the biggest gerbera flower production, reported at 1 , was obtained at the variant V_3, with coconuts coir fibers as artificial culture substrate;

- the coconuts coir fibers proved a well suited medium for plants growing, improving the physical and biological conditions of the culture substrate;

- the cultivation in containers offers good possibilities and can be a significant improvement compared to the cultivation in the soil.

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THE INFLUENCE OF CUTTINGS AND SUBSTRATE ROOTING OF SOME ORNAMENTAL VARIETIES

INFLUENȚA SUBSTRATULUI ŞI A TIPULUI DE BUTAŞI ASUPRA ÎNRĂDĂCINĂRII UNOR FOIOASE ORNAMENTALE

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Abstract. *The ornamental varieties of Acer platanoides „Globosum", Clematis x jackmanii", Lagestroemia indica şi Ulmus damperii „Aurea" have proved to be of high interest as ornamentals in respect with their ornamental and biological specific features. As a results they are used for landscaping as individuals, small groups and in alignments. The studies carried out at the Research Institute for Fruit Growing Pitesti-Maracineni, Arges, were directed to improve their propagation abilities by softwood cuttings. We used two cutting types (top and bottom) and three rooting substrate. The cuttings made from the top of the shoots gave better results versus bottom cuttings, for all varieties. The best rooting substrate was the peat:perlite mixture (2:1).*

Rezumat. *Varietățile ornamentale de foioase luate în studiu (Acer platanoides „Globosum", Clematis x jackmanii", Lagestroemia indica şi Ulmus damperii „Aurea" prezintă un deosebit interes ornamental datorită caracteristicilor biologice şi ornamentale, fiind introduse în amenajările peisagistice ca exemplare solitare, în grupuri mici şi aliniamente. Cercetările desfăşurate la ICDP Piteşti-Mărăcineni, în anii 2005-2007, au urmărit multiplicarea acestor varietăți ornamentale de foioase, cu valoare decorativă ridicată, prin butaşi „verzi", sub ceață artificială, utilizând 2 tipuri de butaşi (de vârf şi de bază), tratați la bază cu biostimulatori de înrădăcinare (Radistim 1 sub formă de pudră şi Radistim 1 % soluție) şi comparați cu un martor netratat. Butaşii au fost plantați în 3 substraturi de înradăcinare alcătuite din: turbă:perlit (2:1), nisip, perlit. Rezultatele obținute au demonstrat că cel mai bun tip de butaş utilizat a fost butaşul de vârf pentru toate varietățile ornamentale luate în studiu, la care s-au obținut cele mai ridicate randamente la înrădăcinare, în toți anii studiați (valori cuprinse între 37.5-94,7 %) iar dintre substraturile de înrădăcinare cel alcătuit din turbă în amestec cu perlitul a indus cele mai mari valori privind înrădăcinarea butaşilor.*

MATERIAL AND METHOD

The experiments were performed in the plastic tunnels at the Research Institute for Fruit Growing Pitesti – Maracineni, during 2005 – 2007.

We used four ornamental varieties*: Acer platanoides „Globosum", Clematis x jackmanii", Lagestroemia indica* and *Ulmus damperii „Aurea* as biological material.

The biological material involved consisted in simple, tip and bottom cuttings in the phase of semi-hard cuttings (bottom) and herbaceous cutting (top).

The summer cottage was done between June 30 – July 10.

After propagation, the cuttings defoliated at the bottom were treated by the biostimulators: Radistim 1 powder and Radistim 1% solution (30 ″ time of immersion) and then planted in a rooting perlite substrates and peat:perlite mixture (2:1).

After planting, the artificial mist was used.

According to biometric measurements on the rooting system the data were statistically analyzed using t test and Duncan.

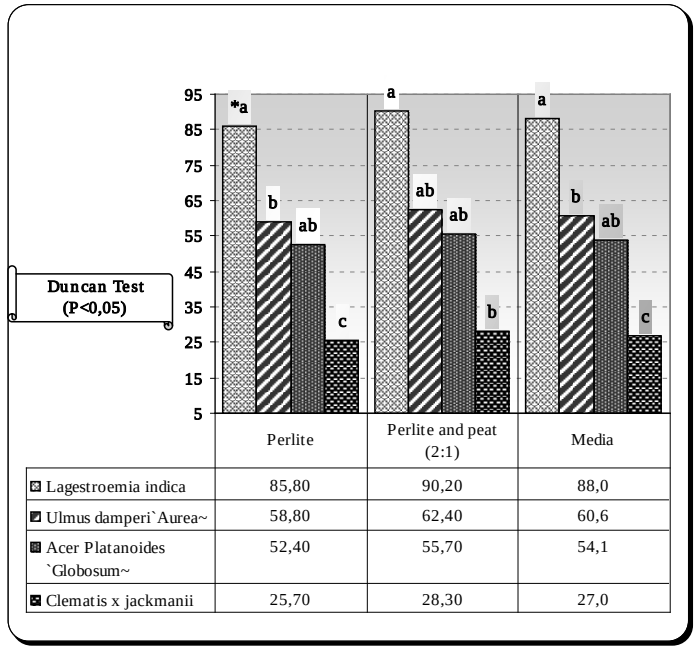
The experiments were threefactoral (4x3x2) with 24 treatments in 3 replications arranged as subdivided plots.

RESULTS AND DISCUSSIONS

The statistical analysis of the results showed a variation between *Acer platanoides „Globosum", Clematis x jackmanii", Lagestroemia indica* and *Ulmus damperii „Aurea.* Over the investigation period, *Lagestroemia indica* had a high rooting percentage, getting the first place in the two graduation of B factor (the values have ranged from 85.80-90.20 %) and *Clematis x jackmanii* had a rooting percentage between 25.70-28.30%.

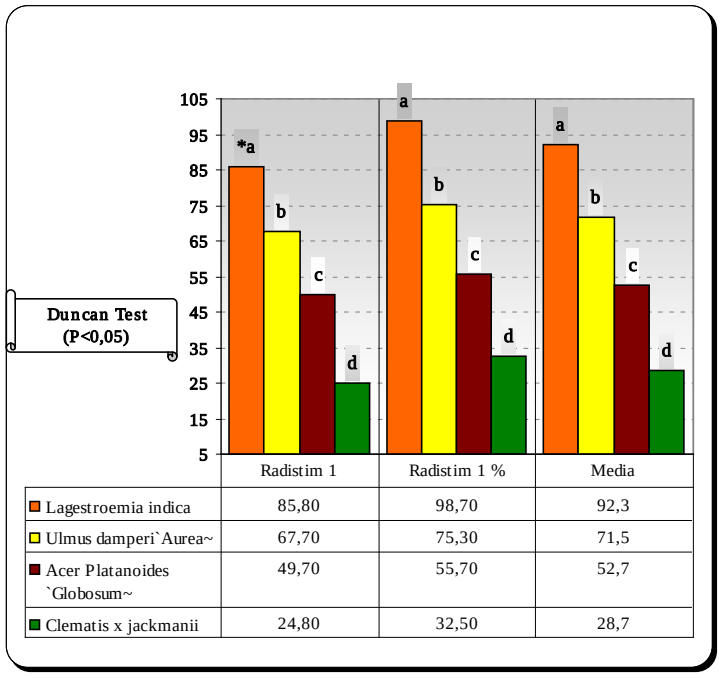
The average of rooting biostimulator (fig. 2) proved Radistim 1 % to be the best rooting biostimulator inducing the highest rooting yields in all ornamental varieties, with values between 32.5 – 98,7 %.

Fig. 3 indicated that the tip cutting induced the highest rooting in all varieties versus the bottom cutting (values between 32,7 – 90,8%).



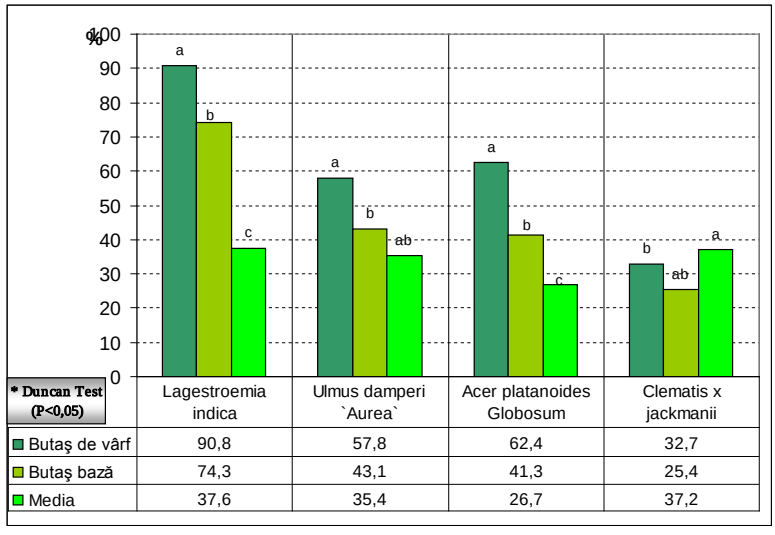
	Perlite	Perlite and peat (2:1)	Media
Lagestroemia indica	85,80	90,20	88,0
Ulmus damperi`Aurea~	58,80	62,40	60,6
Acer Platanoides `Globosum~	52,40	55,70	54,1
Clematis x jackmanii	25,70	28,30	27,0

Fig. 1 - Variability of rooting percentage for the ornamental species/varieties in conditions utilization of the two rooting substrates



	Radistim 1	Radistim 1 %	Media
Lagestroemia indica	85,80	98,70	92,3
Ulmus damperi`Aurea~	67,70	75,30	71,5
Acer Platanoides `Globosum~	49,70	55,70	52,7
Clematis x jackmanii	24,80	32,50	28,7

Fig. 2 - Variability of rooting percentage for the ornamental species/varieties in conditions of a rooting biostimulators used



	Lagestroemia indica	Ulmus damperi `Aurea`	Acer platanoides Globosum	Clematis x jackmanii
Butaş de vârf	90,8	57,8	62,4	32,7
Butaş bază	74,3	43,1	41,3	25,4
Media	37,6	35,4	26,7	37,2

Fig. 3 - Variability of rooting percentage for the ornamental species/varieties of a tip and bottom cutting used

CONCLUSIONS

1. The tip cuttings gave higher rooting yields versus the bottom cuttings in all ornamental specie of *Lagestroemia indica* (74.3-90.8 %).

2. *Lagestroemia indica* and *Ulmus damperi `Aurea`* varieties showed the highest rooting percentage in all treatments.

3. Application of the biostimulators (Radistim 1 % and Radistim 1powder) has obviously improved the rooting yield versus the untreated control, treatment.

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IN VITRO PROPAGATION OF *MAGNOLIA X SOULANGEANA* SOUL. – BOD. HYBRID – FACTORS AFFECTING AXILLARY BUDS PROLIFERATION

ÎNMULȚIREA IN VITRO A HIBRIDULUI *MAGNOLIA X SOULANGEANA* SOUL.-BOD. FACTORI CARE INFLUENȚEAZĂ PROLIFERAREA MUGURILOR AXILARI

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Abstract *Magnolia genus includes a group of about 80 species with persistent or falling leaves and with bloom before or after coming into leaf. Magnolia x soulangeana Soul. – Bod. is a valuable hybrid for its early bloosom. Continuation of experiences regarding in vitro micropropagation of magnolia aimed to establish culture medium for axillary buds proliferation. In vitro multiplication capacity was influenced by the composition of mineral salts of basic medium, 6-benzilaminopurine (BAP) concentration and the number of subcultures. The best shoot multiplication rate (MR) i.e. 10 plantlets / explant after 5 subcultures, was established with Lepoivre mineral salts, Jaquiot vitamins, 1.0 mg/l naftilacetic acid (NAA) at 5.0 mg/l BAP. At the same time the effect of some antioxidants and absorbant component on browning of plantlets due to the polyphenols emission was studied. None of the tested components eliminated totally the browning of plantlets. Further experiments are necesary for multiplication protocol improving and to establish the conditions of rooting and aclimatization.*

Rezumat. *Genul magnolia cuprinde un grup de aproximativ 80 de specii cu frunze persistente dar şi căzătoare şi cu înflorire atât înainte cât şi după înfrunzire, Magnolia x soulangeana Soul. - Bod fiind un hibrid valoros pentru înflorirea timpurie. Continuarea experienţelor privind multiplicarea magnoliei a avut ca scop stabilirea mediului de cultură pentru inducerea proliferării mugurilor axilari. Capacitatea de multiplicare in vitro a fost influenţată de compoziţia sărurilor minerale, de concentraţia 6- benzilaminopurinei (BAP) şi de numărul de subculturi. Cea mai bună rată de multiplicare (RM) a lăstarilor, 10 plantule /explant după a 5-a subcultură a fost stabilită folosind sărurile minerale Lepoivre (L), vitaminele Jaquiot (JQ), 1,0 mg/l acid naftilacetic (ANA), la o concentraţie de 5,0 mg/l BAP. A fost studiat totodată efectul unor componente antioxidante şi absorbante asupra procesului de brunificare a plantulelor datorat emisiei de polifenoli. Nici unul dintre componentele testate nu a eliminat total brunificarea. Sunt necesare experienţe viitoare pentru îmbunătăţirea protocolului de multiplicare şi pentru a stabili condiţiile de înrădăcinare şi aclimatizare a magnoliei*.

Magnolia x soulangeana group constitutes the largest and best-known category of deciduous flowering magnolias. Cutting propagation is preferred for most magnolias. However, rooting potential of cuttings varies considerably among cultivars as well as among species. In recent years, propagation of wide range of ornamental plants by tissue has become accepted commercial practice. *In vitro* propagation is a desired method for multiplication of valuable plants at faster

rates than conventional procedures. Micropropagation of magnolias has been reported from shoot tip explants and axillary buds (Biederman, 1987; Kamenicka and Lanakova, 2000) and via somatic embryogenesis (Merkle, 1995). The aim of this study was to establish culture media for *in vitro* axillary buds proliferation and at the same time to study the effect of some antioxidants and absorbent component on browning of plantlets due to the polyphenols emission.

MATERIAL AND METHODS

We used magnolia shoots developed during initiation phase. Murashige - Skoog (MS) and Quoirin and Lepoivre (QL) with Jaquiot vitamins was the basic medium. All media contained 30 g/l glucose and 32 mg/l Na Fe EDTA and were solidified with 9 g/l agar. The growth hormones used were NAA in concentration of 1.0 mg/l and BAP in concentrations of 1.0 – 5.0 mg/l (Table 1).

Table 1

Media composition used for shoot multiplication in *Magnolia x soulangeana*

Composition	Medium 1	Medium 2	Medium 3	Medium 4	Medium 5	Medium 6
Macroelements	MS	MS	MS	QL	QL	QL
Microelements	MS	MS	MS	QL	QL	QL
Vitamins	JQ	JQ	JQ	JQ	JQ	JQ
NAA mg/l	1.0	1.0	1.0	1/0	1.0	1.0
BAP mg/l	1.0	3.0	5.0	1.0	3.0	5.0

MS = Murashige and Skoog (1962); QL = Quoirin and Lepoivre (1977); JQ = Jaquiot (1956); BAP = 6- benzylaminopurine; NAA = naftalene acetic acid.

The evaluation of multiplication rate (MR) was recorded after each subculture at four weeks. All tests had three replications and the data were analyzed for significance by analysis of variance, with the mean separation by Duncan's Multiple Range test (Duncan, 1995) with S.P.S.S. for Windows Release 14.0.0.

During the course of the present work, the problem of tissue and media browning due to phenolic oxidation was particularly encountered. Thus, to reduce or control phenolic browning we used sterile solution of antioxidants agents such as ascorbic acid, citric acid (0; 25; 50 and 100 mg/l) and soluble PVP (polyvininylpyrrolidone) (100; 500; 1000 mg/l) like absorbent component. Plantlets (60 for each treatment) were soaked for 30 – 60 min. in these sterile solutions and than transferred to the Quoirin and Lepoivre (QL) mineral salts and Jaquiot vitamins with 1.0 mg/l NAA and 5.0 mg/l BAP. Control plantlets were rinsed in water. The viability, color, growth and degree of browning were observed frequently and number of browning plantlets was noticed after 42 days. All cultures were grown at 25 ± 2 ºC under 16 h photoperiod (40 – 50 µE ms ²sec provided by white cool fluorescent lamps.

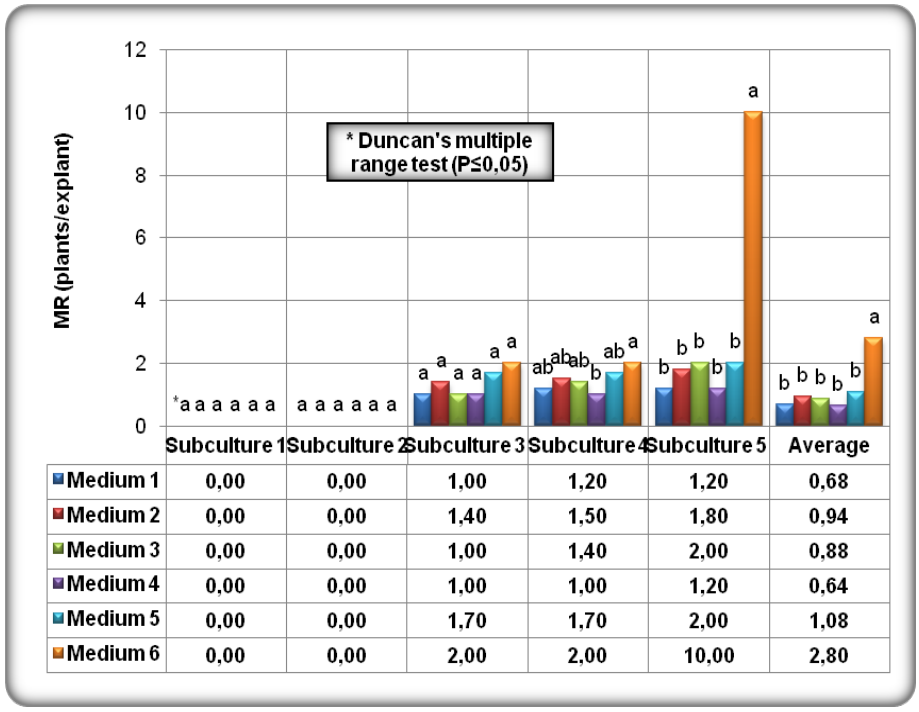
RESULTS AND DISCUSSIONS

Observations regarding micropropagation ability of *Magnolia x soulangeana* showed that shoot proliferation is difficult and required a longer period (12 weeks) of BAP exposure to obtain cytokinin autonomy. The results (Fig. 1) indicated that a good MR was achieved on QL basic media with JQ vitamins comparative with MR obtained when MS basic media with JQ vitamins

were used. Comparative to the MS basic media, which promoted a MR of 2.0 plants/ explant, the QL basic medium proved to be appropriate for shoot multiplication. It allows a MR of 10.0 plants/explant, after 5 subcultures.

Another factor which influenced the shoot proliferation was BAP concentration. Different levels of cytokinin influence shoot quality. Study to optimize factors for development of multiple shoots revealed that BAP had a positive effect in a high concentration. Multiplication factor increased with increasing amounts of BAP. More than two shoots were produced per explant when incubated on media supplemented with 5.0 mg/l BAP and 1.0 mg/l NAA, irrespective of basal medium composition.

Results presented in Fig. 1 shows that also the number of subcultures influenced the MR. No shoot proliferation was observed after the first and the second subculture.



	Subculture 1	Subculture 2	Subculture 3	Subculture 4	Subculture 5	Average
Medium 1	0,00	0,00	1,00	1,20	1,20	0,68
Medium 2	0,00	0,00	1,40	1,50	1,80	0,94
Medium 3	0,00	0,00	1,00	1,40	2,00	0,88
Medium 4	0,00	0,00	1,00	1,00	1,20	0,64
Medium 5	0,00	0,00	1,70	1,70	2,00	1,08
Medium 6	0,00	0,00	2,00	2,00	10,00	2,80

Fig.1. – Multiplication rate of *Magnolia x soulangeana* related to number of subcultures and culture media

Axillary shoot proliferation in magnolias is difficult because of a high content of phenolic substances and the formation of vitrified shoots (Kamenicka and Valova, 1994.The presence of phenolic compounds and high polyphenol oxidase activity cause explant browning which affects vegetative propagation and limits morphogenic responses. A strategy to control phenolic oxidation becomes a necessity.

This investigation shows that at woody plants with high phenolic acid content, soaking shoots in antioxidants was useful for reducing phenolic oxidation. Plantlets without antioxidants or PVP (control) pretreatment released a brown – red exudates into the medium. Although, none of the tested antioxidant components did not reduced very browning effect, all of the pretreatments showed a positive effect. Among the compounds tested, citric acid (100 mg/l) had significantly less browning of plantlets, than other treatments (Fig. 2). The effect of ascorbic acid was almost as good as of citric acid at the same concentration, but the viability of treated plantlets was low. The pretreatment with PVP who absorb phenols through hydrogen bonding had a good effect. Percentages of shoots showing browning oxidation were fewer than 30 % depending on PVP concentration (Fig. 2). antioxidants protect explants from browning as they act as reducing agents by decreasing the redox potential of phenols in the medium. This is achieved by reverting quinones that are formed by oxidation of phenolic compounds produced in damaged tissue or by competing with free radicals and removing them from the reaction (Debergh and Read, 1991). With PVP, hydrogen bonds absorb polyphenols, reducing their synthesis and thereby preventing browning of explants.

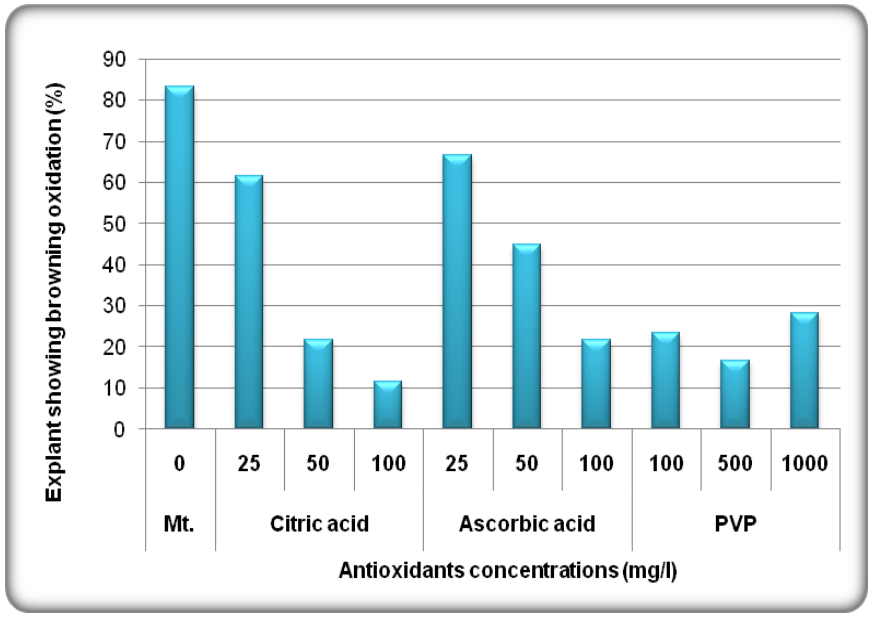
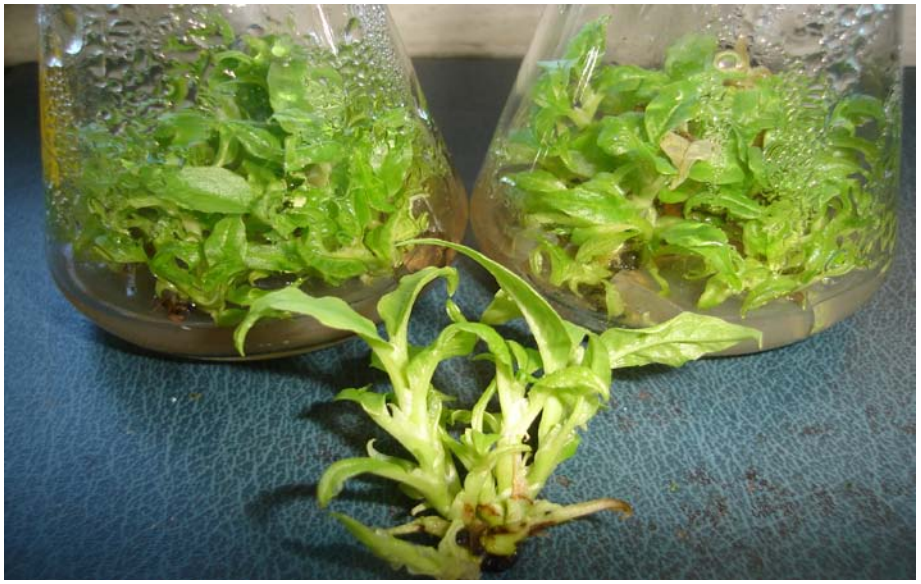


Fig.2 – The effect of antioxidants and absorbent components on browning oxidation of media and *Magnolia x soulangeana* shoots



CONCLUSIONS

Our results demonstrate the critical influence of culture medium, auxins and cytokinins concentration and number of subcultures on axillary shoot formation for *Magnolia x soulangeana* micropropagation.

The best shoot multiplication rate (MR) i.e. 10 plantlets / explant after five subcultures, was established with Lepoivre mineral salts, Jaquiot vitamins, 1.0 mg/l naftilacetic acid (NAA) at 5.0 mg/l BAP.

Although, pretreatements with antioxidants/reducing agents were a good effect on stop the oxidation reactions we consider that is a laborious method and we recommend frequent subculture onto fresh media.

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PRELIMINARY STUDIES REGARDING THE PLANT'S QUANTITATIVE FEATURES AS PREMISE FOR THE UTILISATION OF A GENOTYPE OF *CHRYSANTHEMUM CINERARIIFOLIUM* (TREVIR) VIS) SPECIE IN THE CONTROL OF PESTS, THROUGH METHODS SPECIFIC FOR ECOLOGIC AGRICULTURE

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Abstract: *At VRDS Bacau, the cultivation of Chrysanthemum cinerariifolium (Trevir) Vis) specie, started in 2005 year. The establishment of the crop was done utilising an autochthon biological material, a biotype with a large genetic variability. This perennial specie is known as a plant with multiple uses (can be decorative, in China is utilised also as medicinal, especially for vermifuge proprieties) but is recognised as a plant that plays an important role in biologic agriculture practice as a prime material for the extraction of pyrethrin, especially from flowers. In gardens, only the presence of this plant keeps away the insects from the plant from near-by thus being repellent. The plant can be dried and utilised latter because the dried plant conserve the insecticide and repellent proprieties of fresh plant. The study focuses on the possibility to adapt to the agro-pedologic conditions from the East of Moldavia as well as for cultivation in ecologic conditions. Due to the fact that one of the most important technological links in the cultivation of this specie is harvesting and drying of plants, the experimental variants are concentrated on the optimal moment for flower's harvest, the position of flower on plants (central or marginal). The quantitative study refers to the determination of fresh and dried flower weight per plant, determining also the ratio dried weight/fresh weight.*

Rezumat: *La SCDL Bacău s-a început cultivarea speciei Chrysanthemum cinerariifolium (Trevir) Vis), din anul 2005. Înfiinţarea culturii s-a făcut cu material genetic provenit din ţară si este un biotip cu o mare variabilitate genetică. Aceasta specie perena este cunoscuta ca o planta cu utilizari multiple (poate fi decorativa, in China se foloseste si ca medicinala, in special pentru proprietatile vermifuge), dar este recunoscuta ca avand un rol important in practicarea agriculturii ecologice, ca materie primă pentru extragerea piretrinei, din flori. În grădină, numai prezenţa acestei plante îndepărtează insectele de pe speciile din apropiere, fiind repelentă. Planta poate fi uscată şi utilizată mai târziu, deoarece îşi păstrează proprietăţile insecticide şi repelente. Studiile întreprinse se referă la adaptabilitatea la condiţiile agro-pedologice ale zonei de Est a Moldovei si a cultivării in conditii ecologice. Deoarece una din cele mai importante verigi tehnologice în cultivarea acestei specii este recoltarea şi uscarea florilor, variantelor experimentale se referă la momentul de recoltare al florilor, numărul de recoltări, poziţia florilor pe plantă (centrale sau marginale). Cantitativ, s-au determinat greutatea masei de flori proaspete şi uscate pe plantă, determinând şi raportul de masă uscată/masă proaspătă.*

Key words; biotype, the control of pests, ecologic, quantitative study

The specie *Chrysanthemum cinerariifolium* (Trevir) Vis), is a perenial plant, known as a plant with multiple uses (can be decorative, in China is used also a medicinal especially for its vermifuge properties) but also is recognized for the important role that is played in ecologic agriculture as a prime material for the extraction of piretrine (natural insecticide) from flowers. In the gardens only the presence of this plant keeps the insects away, being repellent. The plant can be dried and utilized lately because it maintains its repellent and insecticide properties.

The utilization of some natural extracts from plants represents a method that is allowed by the law, and a natural piretrine is one of the most efficient and required product utilized for the control of a large spectrum of damaging insects.

At VRDS Bacau the experimentation was focused toward the study of a genotype of *Crysanthemum cynerariifolium* (Trevir) Vis) cultivated in the experimental polygon for biologic agriculture for the establishment of the optimum moment of harvesting of inflorescence and the identification of qualitative of this biotype, in order to obtain a maximum content in piretrine and the utilization of the extract in the control of pests from vegetable crops cultivated ecologically.

MATERIAL AND METHOD

At VRDS Bacău the cultivation of *Crysanthemum cynerariifolium* (Trevir) Vis) specie started in 2006 year. The establishment of the crop was accomplished generatively from a biotype originally from our country. It seems that the biological material origin is in a population with a large genetic variability. During the spring of 2006 year, seedling was produced and in May the collection of perennial plants was planted in the experimental polygon for biological material. In the first year of cultivation only two plants blossom. The technology applied was specific to "bio" cultivation: without chemical amendments or pesticides, the maintaining of cleanliness of crops. In 2007 and 2008 years the crop over-wintered well, the protection of the plants being not necessary.The studies are concentrating over the adaptability to agro-pedologic condition from the East area of Moldavia and "bio" cultivation.

The experimental variants. Because one of the most important technological link in the cultivation of this specie is the flower's harvesting and drying, the experimental variants (Table 1 and Table 2) refers to the date's of harvesting of flowers, number of harvest, position of flowers per plant (central or marginal), the way in which the plant is prepared in order to dried. Quantitatively the weight of dried and fresh flowers weight per plant was determined, calculating also the ration dry weight per fresh weight.

In 2007 year, the first one with the fully blossom of plants, the biological material was studies for the determination of the quality of plants as insecticide plant, in order to establish the modality in which the preparats must be prepared and their application on other vegetable crops from "bio" polygon. The harvesting of flowers was accomplished at fully opening of flowers, after 5 days from the beginning of blossoming, according with the experimental variants.

Table 1.

The experimental variants

V1 - three harvests/plant*
V2 - two harvests/plant*
V3 - two harvests/plant
- V3.1 – central flowers

- V3.2 – marginal flowers
V4 – two harvests, flowers harvested with cane, kept for 24 hours in water
V5 - two harvests, flowers harvested with cane, kept for 48 hours in water
V6 - two harvests, media for 41 plants
V7 - one harvest, media for 28 plants

Table 2.

The date for flower's harvesting, on experimental variants:

Variants			**Date of harvesting the flowers		
V1			30.05.2007	07.06.2007	15.06.2007
V2				07.06.2007	15.06.2007
V3				07.06.2007	14.06.2007
V4				13.06.2007	20.06.2007
V5				18.06.2007	25.06.2007
V6				07.06.2007	15.06.2007
V7					18.06.2007

After the harvest the flowers were numbered and weight fresh and also after drying. At dried flowers, the volatile oils compounds were determined utilizing specific methods.

RESULTS AND DISCUSSIONS

It is important to know firstly the specie and this is the reson why, we will present some characteristics regarding the origin presentations, requirement toward environmental conditions, utilization, and few details regarding the cultivation.

1.1 The presentation of *Chrysanthemum cinerariifolium* (Trevir) Vis) specie – dalmation pellitory.

The active principle extracted from this plant is piretrum or piretrine (which in fact is represented by six natural compounds), with insecticide properties, term that is utilized in the production and selling, referring in this peculiar case to the powder made from dried flowers of piretrum.

Names in different languages: English – dalmation pellitory; French – pyrèthre de Dalmatie; German – Asehenkrautblättrige Wucherblume

Family: *Compositae*

Synonym: *Tanacetum cinerariifolium* (Trevir), *Pyrethrum cinerariifolium* (Trevir) Vis), *Chrysanthemum cinerariaefolium*

Origin: The native area is in the east of Europe and in Caucasian area, near the ex-Iugoslavia but is well spread also in China, Iraq, Turkey, Spain, and Italy. In the present the dalmatian chrysanthemum is cultivated mainly in commercial purposes, in the mountain area of Kenya, Tanzania and in Ecuador. The plant is also cultivated in Canada, but the production is small and is more frequently utilized in small farms and family gardens. Although the commercial production of pyrethrum is in the Ecuadorian

mountain area, the plant can grow also in our region, although the concentration of pyrethrum and the number of harvests/year is much lower than in native regions.

Prezentation. The dalmation pellitory is a perennial plant, of 0.45 – 0.65 m high. It blossom from July till September, the flowers are hermaphrodite and are pollinated by bees and butterflies. The utility rate of plant is 2 : 5. The flowers are middle typical, white colored on the edge and in the central area the tubular, fertile flowers are yellow. The floral canes are powerful and rigid. The leaves from the entire plant are green-blue.

The plant prefers relatively dry, heavy and calcareous soils. The area that is in shadow should be avoided, because only in full sun the quantity of pyrethrum is at maximum level. It grows well also in soils that are rich in humus, humid climate but the concentration of pyrethrine will be lower.

The multiplication of plant can be made through the plant's division or through seeds. The seeds are sown in the spring, February – March, in greenhouse and germinates at temperatures of almost 20 - 22º C, are pricked out and seedlings are produced at palettes or small pots. The definitive plantation in the field can be made when the plants are well branched and rooted. Vegetative can be multiplied through the division of shrubs on autumn or spring, with plantation at definitive place. Or small parts of plants can be planted in small pots at shadow and moderate temperature for rooting and then are planting in the field during summer or the next autumn. The density realized in the field is of almost 9 plants/m^2.

Cultivation. The plants doesn't require strong fertilizations, doesn't respond to nitrogen, but the presence of phosphor in quantities sufficient for the plants leads to an increase in the flower's production. During cultivation there are no special problems with the pests and pathogen attack, the only exception is sometimes with the trips that can appear in the flowers

Utilization

	*Culinary.* Is not recognized as edible plants.
	*Ornamental*. The plant is not decorative, but due to its multiple utility can be utilized in the garden near flower and utile species, conferring a pleasant aspect.
	*Medicinal*. The specie is not considered as medicinal, but the flowers have an antibiotic activity, being utilized in China against helminthes.
	*In biologic agriculture*. The most important utilization is as prime material for the extraction of pyrethrine, from flowers (especially from the tubular flowers from inflorescence); the biggest concentration is in the floral buds (1.22 %). In the garden, only the presence of this plant acts as a repellent for insects from nearby. The plant can be dried and utilized much latter because it maintain its insecticide and repellent proprieties.

1.2 Rezults obţained

The results of the studies regarding the production of flowers fresh and dried on experimental variant are presented in Table 3. We have to mention that the first harvest was accomplished after 5 days from the opening of flowers, the second at 7 days, and the last after 8 days.

Table 3.

The production of flowers per experimental variants in open field at VRDS Bacau, 2007 year

Nr. crt.	Variants	Nr. of flowers/plant	Fresh flowers	Dried flowers	Rapport
		media	mv-g.	mu-g.	mu/mv
1	V1 - three harvests/plant*	722	352.89	103.41	29.30
2	V2 - two harvests/plant*	429	193.68	52.30	27.00
3	V3 - two harvests/plant	311	152.71	41.49	28.17
	- V3.1 – central flowers	102	55.29	15.79	28.55
	- V3.2 – marginal flowers	209	97.42	25.70	26.37
4	V4 – two harvests, flowers harvested with cane, kept for 24 hours in water	401	231.47	65.23	28.77
5	V5 - two harvests, flowers harvested with cane, kept for 48 hours in water	478	343.64	98.60	28.69
6	V6 - two harvests, media for 41 plants	150	118.74	34.40	28,97
7	V7 - one harvest, media for 28 plants	130	129.82	46.69	35.97
The media of experimental variants		**419**	**239.38**	**69.09**	**28.86**

The analysis of the present date's regarding the obtained production of flowers shows that:

- the best results were obtained on variant with 3 harvest/plant, the first being made on 30.05.2007, with a media of 722 flowers/plant, with 352,89 g/plant green weight (mv), 103,41 g/plant dried weight (mu), with a ratio mu/mv of 29,30. From the presented results is seems that the number of harvest per plant influence the production results:

- a large number of flowers harvested per plants was obtained also on variants V5 (478 flowers/plant) and V2 (429 flowers/plant), and the smallest were registered at variants V7 (130/plant) and V6 (150 flowers/plant);

- the quantity of fresh flowers vary on large limits between the experimental variant from 352,89 g/pl at V1 (3 harvest per plant) and 118,74 g/pl at V6 (media of 2 harvest from 41 plants); good results was obtained also on variant V5 with 343,64 g/plant;

- the best results resulted at weight dried flowers/plant were obtained at variants V1 (103,41 g/pl) and V5 (98,6 g/plant the smallest at V6 (34,40 g/pl) and V3, respectively V3.1 (41,49 g/pl, V3.1 – 15,79 g/pl);

- the ration dried weight per fresh weight vary between 35, 97 at variant V7 and 27,00 at V2; a good drying ratio was obtained also at variants V1 (29,30), V6 (28,97) and V5 (28,69).

CONCLUSIONS

1. The best results were obtained at variant with three harvest per plant the first being done on 30.05.2007, realizing a media of 722 flowers/plant, with 352,89 g/plant green weight (mv), 103,41 g/plant dried weight (mv), with a ratio mu/mv of 29,30. From the presented results is seems that the number of harvest per plant influence the production results.

2. The analyze of the dates registered at flower's harvesting on experimental variants, shows that the largest number of flowers can be obtained after the second harvest, than at the first harvest, the worst results being obtained at the third harvest.

3. In the following years, the studies will continue in order to accomplish a correct characterization of the behavior of this biological material in the agro-pedo-climatic conditions from VRDS Bacau, the crop that is in the first years of harvest of flowers and the second one of cultivation in biologic agricultural conditions.

4. The analysis accomplished regarding the compounds of volatile oils for the 7 experimental variants, at biotype of *Chrysanthemum cinerariifolium* (Trevir) Vis) cultivated at VRDS Bacau after the norms and principles of ecologic agriculture shows that 22 compounds were identified, from which three are pyretrine: Cinerin I, Piretrin I and Jasmolin I.

5. The preliminary studies regarding the quantitative and qualitative characteristics of the biotype *Chrysanthemum cinerariifolium* (Trevir) Vis cultivated give the hope of their utilization in the obtaining of natural pyretrine and preparations for the control of pests through the methods specific for ecologic agriculture.

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ASPECTS ABOUT APPLY FERTILISERS IN ECOLOGICAL VINE GROWING

ASPECTE PRIVIND ADMINISTRAREA ÎNGRĂŞĂMINTELOR ÎN PLANTAŢIILE VITICOLE ECOLOGICE

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Abstract. *Ecological viticulture is mainly a system that corresponds to the healthy and high quality foods request. Also, ecological wine crop provides the breeding and protection of natural resources on long term for the benefit of future generation. In order to practice the system of ecological viticulture is important to reduce the environment pollution and to promote cautiously the intensive systems of viticulture productions taking into according the use of industrial inputs do not produce pollution over the limits, issued by the food safety standards.*

Rezumat. *Viticultura ecologica este, in primul rand, un sistem care raspunde exigentelor cererii de produse sanatoase si de calitate superioara; ea constituie o viticultura care garanteaza protectia si ameliorarea resurselor naturale pe termen lung si le transmite nealterate generatiilor viitoare. Pentru a practica o viticultura ecologica este necesar sa se tina seama de faptul ca pe langa orientarea spre protectia resurselor naturale trebuie limitata si poluarea mediului inconjurator si sa fie promovate sistemele intensive de productie viticola, dar cu circumspectie incat utilizarea cantitatilor de imputuri de natura industriala sa nu produca efecte poluante, peste limitele admisibile, stabilite prin normele de securitate alimentara.*

The Romanian Department for the Agriculture is funding nation-wide compost application trials covering all major grape-growing regions. These trials are not primarily targeted at promoting organic viticulture but rather to support the development of markets for recycled organics. Nevertheless, the use of compost as a management tool with a wide range of beneficial effects is very relevant for the organic grape growing industry. The use of compost in viticulture can, as in other agricultural/horticultural applications result in a wide range of positive effects. However, there is also scope for potentially detrimental effects.

MATERIAL AND METHODS

We used statistical date and the results of the analysis methods. This research was compiled which presents an international overview of the current level of knowledge and the state of play of compost use in viticulture.

RESULTS AND DISCUSSIONS

Supply of plant nutrients

Compost contains all macro- and micronutrients essential for plant growth. However, not all nutrients are readily available in mineral forms for plant uptake. Considerable amounts of nitrogen and phosphorus are organically bound in the compost and are released only once the organic matter is mineralised through microbial

activity. The level of readily available mineral nitrogen contained in compost and the degree of nitrogen release due to the mineralisation process following compost application are of particular interest.

The nutrient budget in Table 1 shows that a compost application of approximately 10 t dm/ha (20 m^3/ha) should be sufficient to meet the demand of grapevines, except for nitrogen. However, the apparent lack of nitrogen in the budget is alleviated through airborne nitrogen deposits (30 - 50 kg/ha per year in Germany), through mineralisation of soil humus reserves or through leguminous cover crops. Most, or a high proportion of phosphorus, potassium, magnesium and calcium found in recycled organics compost is available to plants immediately or becomes plant-available over time. Approximately 20 % of phosphorus in compost react like P in mineral fertilisers and are immediately available for plant uptake while the remainder is more strongly bound and will become available later. Virtually all potassium supplied with compost can be used immediately by plants.

Table 1

Availability and supply of nutrients contained in 20 m^3/ha of an average bio-waste compost in comparison to the nutrient demand of grape vines

Nutrient	Nutrient level (% dm)	Nutrients available to plants in kg/ha and as percentage of total (in brackets)		Nutrient demand of vines (kg/ha per year)
		In first year	Within four years	
N	**1.2**	10-20 (10-15%)	approx. 50 (approx. 40 %)	45-80
P_2O_5	**0.7**	20 - 30 (30 - 40 %)	70(100%)	16-23
K_2O	**1.2**	70- 100(65-85%)	120(100%)	83-100
MgO	**1.8**	10-30(5-15%)	7	10-151
CaO	**6.0**	sufficient	sufficient	15-40

The situation is more complex with nitrogen of which only a small proportion is directly available to plants initially and the remainder being mineralised and released only over time (3-4 years). As a rule of thumb it is generally assumed that approximately 5 % of the total amount of nitrogen found in recycled organics compost is present in a mineral form and hence directly plant available and that annually approximately 10 % of the total nitrogen is mineralised over the next few years. It is estimated that in total approximately 40 % of all nitrogen contained in compost at the time of application will become available to plants.

In order to reconcile conflicting research results and to solve many open questions related to nitrogen availability and the mineralisation of organic matter, which is important both from a plant nutritional and environmental point of view, a 10 year long-term, cooperative research project was established. It aims to provide a better understanding of the long-term dynamics of mineralisation and nitrogen supply potential of compost.

However, most available data relate to temperate climatic conditions in Europe and it has to be expected that nitrogen dynamics associated with compost use are quite

different in climatically different wine growing regions. An assessment of nitrogen availability from composted chicken manure and slaughterhouse waste in conditions showed that compost is not necessarily a slow release fertiliser. Surprisingly, according to plant growth results, composted chicken manure provided more nitrogen than urea during the first seven weeks of the trial and generated a flush of growth which peaked after nine weeks simultaneously with that of urea fertilised plants and at almost the same level (fig. 1). Considerably more research is warranted to examine the effects of using compost in various climatic conditions.

Fig 1 - Effect of inorganic and organic nutrient sources (2 g N/12 lt. pot from each source) on plant growth (grass)

Improvement of soil physical, chemical and biological properties

In many experiments it was shown that compost use could substantially improve soil physical, chemical and biological properties, which are often important factors in determining its fertility status. The improvement of these soil properties results often in indirect benefits such as reduced erosion, ease of cultivation or a reduced disease incidence.

Crop yield and quality effects

Compost use showed inconsistent effects on grape yields, depending on the type of compost used, the vineyard soil and the control it was compared against. A 3-year trial in an organic production system started to show beneficial long-term effects of compost use in the last year of the experiment.

The use of compost as mulch resulted in substantial yield increases in some Australian trials. An observed three-fold yield increase was primarily due to increased survival of bunch numbers in very dry growing conditions (fig. 2). Additional nutrient supply through the use of mulch was not looked at.

According to the available literature, compost use on grapevine makes relatively little difference to the quality of the must or wine generated from these grapes.

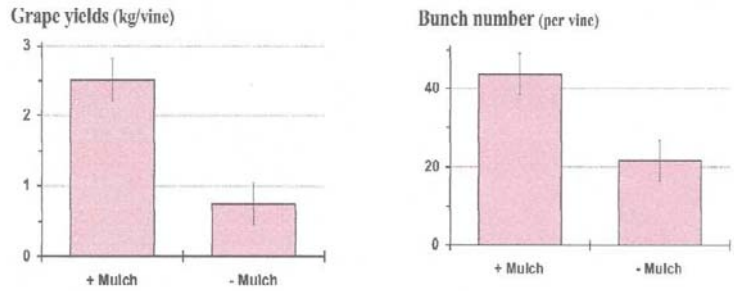

Fig 3 - Effect of 7.5 cm mulch layer (50 cm wide) on grape yield and bunch survival in 18 month-old vines (conventional production)

CONCLUSIONS

Most of the obtained research data and information on the use of compost in viticulture originates from Europe. A wide range of positive effects can be attributed to the use of compost, some of which were also shown in vineyard trials. Compost provides essential plant nutrients but their release over time seems unpredictable. This is why research efforts in Europe now focus on this aspect which is important both from a plant nutritional as well as environmental point of view. Research in other regions has focused on the use of compost to redress the most pressing local problems, for example water shortage. However, future research into the use of compost should also investigate aspects such as nitrogen mineralisation from compost in warmer. climatic conditions and the release of nitrogen and phosphorus from compost to assess its nutritional value over time and its potential detrimental effects if used inappropriately.

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WAYS AND SOURCES OF ACCUMULATING NITROGEN IN THE ARRABLE SOILS OF THE REPUBLIC OF MOLDOVA

CĂILE ŞI SURSELE DE ACUMULARE A AZOTULUI ÎN SOLURILE ARABILE ALE REPUBLICII MOLDOVA

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Abstract. *The investigation focuses on the estimation and concretization of the values of molecular nitrogen accumulation from the atmosphere biologically and non-biologically. Biologically, the accumulation of nitrogen in the soil is done through symbiotic and non-symbiotic bacteria from vegetal wastes, secondary production, organic and green fertilizers. Non-biologically, nitrogen accumulates from atmospheric precipitation water, industrial fertilizers and other sources.*

Rezumat. *Obiectivul investigațiilor rezidă în estimarea şi concretizarea valorilor de acumulare a azotului molecular din atmosferă pe calea biologică şi nebiologică. Pe calea biologică azotul în sol se acumulează prin intermediul bacteriilor simbiotice şi nesimbiotice din resturile vegetale, producția secundară, îngrăşămintele organice şi verzi. Pe cale nebiologică azotul se acumulează în sol din apa precipitațiilor atmosferice, din îngrăşămintele industriale cu azot şi din amendamente. S-au elaborat parametrii medii ai articolelor de venit ale bilanțului de azot din solurile Republicii Moldova.*

Nitrogen, similar to water, solar energy and organogenic elements (carbon, hydrogen), is an indispensable element of the biological circuit of chemical elements, manifested through accumulation and transformation processes in various organisms, soil and environment. Nitrogen components found in soil serve as nutrition sources for plants and microorganisms. Without soil nutritive nitrogen, the vegetal pigment cannot be formed. Chlorophyll provides the natural development of photosynthesis processes, the growth and the development of plants, as well as the formation of main and secondary production. The value and the harvest quality of different cultures depend, to a great extend, on the level of providing the plants with accessible nitrogen in soil.

At present, there are known two main ways of accumulating nitrogen in soil: biological and non-biological. The non-biological molecular nitrogen accumulation from the atmospheric air in soil, which constitutes 78.06% of the volume and 75 % of the weight, is produced when the nitrogen molecule (N≡N) gets into direct contact with hot air currents. This thermal energy equal to 225 kkal and appears in the warm period of the year when the clouds charged with opposite electric charges collide. In such conditions, the tight links between atoms

weaken and the nitrogen molecule begins to disintegrate coming into reaction with the hydrogen found in the precipitation water according to the following reactions:

$$1)\ N_2 \xrightarrow{+225kkal} + 3\ H_2 = 3\ NH_3 \qquad 2)\ NH_3 + H_20 = NH_4OH$$

In the Republic of Moldova, the value of accumulation of the nitrogen in soil caused by precipitations per an agricultural year constitutes in average: 15 kg/ha in the Northern pedo-climacteric zone, 13 – in the Center and 11 kg/ha in the Southern zone (Table 1).

This principle is also used when producing industrial fertilizers containing nitrogen from molecular nitrogen of the atmospheric air. The most wide spread chemical fertilizers in the Republic of Moldova are ammonium nitrate, carbomid, amophos, nitrophosc, ammonium anhydride, ammonia water and complex liquid fertilizers (N-8-10; P_20_5-28-34).

In a 75-year period (1930-2005), 2938.6 thousand tons of nitrogen mineral fertilizers were incorporated into the soil. The largest quantity was applied in the period 1980-1990, when each hectare of ploughed land received 66-70 kg of nitrogen (Table 2). This contributed to the creation of a positive balance of nitrogen in soil. At present, the level of application of nitrogen mineral fertilizers is of 1.4-21.0 kg/ha, the average - 11 kg/ha, which is insufficient in order to form a balanced equilibrium of nitrogen in soil.

Table 1

Dynamics of applying mineral fertilizers containing nitrogen as active substance in the arable soils of the Republic of Moldova

Investigated period	were applied			
	kg/ha	thousand tons on the whole agricultural surface		
	In average per year	Annual average	thousand ha	thousand tons
1930-1950 (20 years)	1.9	3.2	1684.2	64.0
1951-1960 (10 years)	2.0	3.6	1800.0	36.0
1961-1965 (5 years)	6.2	13.0	2096.8	65.0
1966-1970 (5 years)	15.7	33.8	2152.9	169.0
1971-1975 (5 years)	35.4	75.6	2135.6	377.0
1976-1980 (5 years)	46.6	99.6	2137.3	498.0
1981-1985 (5 years)	70.4	148.2	2105.1	741.0
1986-1990 (5 years)	66.2	138.0	2084.6	690.0
1991	40.0	87.0	2175.0	87.0
1992	30.0	65.0	2166.6	65.0
1993	9.0	20.0	2222.2	20.0
1994	4.0	9.0	2250.0	9.0
1995	11.0	9.6	872.7	9.6
1996	6.0	13.0	2166.7	13.0
1997	4.3	9.4	2186.0	9.4
1998	3.1	6.8	2193.5	6.8
1999	1.4	3.0	2142.8	3.0
2000	3.4	7.6	2235.3	7.6

2001	15.0	11.2	746.0	11.2
2002	18.0	14.7	817.7	14.7
2003	19.0	13.3	700.0	13.3
2004	19.0	14.2	747.4	14.2
2005	21.0	14.8	704.8	14.8
Average (1930-2005)	19.5	35.4	1580.6	2938.6

The biological way of accumulating nitrogen in soil includes: symbiotic and non-symbiotic fixation of nitrogen, vegetal remains, secondary production, organic fertilizers of different origin, green fertilizers, organogenic remains and residue, alluvial soil, mud, lacustrine sludge and other sources.

Symbiotic and non-symbiotic nitrogen fixation has a significant quota in the income articles of nitrogen in arable soils and constitutes in average 69.9 kg/ha of arable land (Table 2).

Vegetal remains and only 1/3 of the secondary production entirely used can compensate 50 % of the nitrogen consumed in the main production, mineralization and other non-productive nitrogen losses in soil. 48 kg/ha of nitrogen can yearly be returned into the soil with the help of vegetal remains and 1/3 of the secondary production.

Table 2

Biologic nitrogen fixation potential in the cultivation of agricultural plants in the conditions of the Republic of Moldova

Culture	Yield/ ha	Parameters of accumulation in soil through bacteria				total biologic nitrogen fixation potential, kg/ha
		symbiotic		non-symbiotic		
		kg/t*	kg/ha	kg/t*	kg/ha	
Peas	2.0	37.0	74.0	8.3	16.3	**90.3**
Vetch	1.5	43.3	65.0	7.9	11.8	**76.8**
Soya	1.5	48.0	72.0	8.5	12.8	**84.8**
Beans	1.2	16.7	20.0	8.1	9.7	**29.7**
Hungarian vetch (hay)	3.5	12.3	43.0	5.5	19.2	**105.2**
Clover (hay)	5.0	13.0	63.0	9.5	47.5	**110.5**
Onobrychis caputgalli (cocks head) (hay)	6.0	21.0	126.0	10.0	60.0	**186**
Alfalfa (hay)	7.0	27.0	190.0	10.7	74.9	**264.9**
Cereals (grains)	3.5	-	-	4.1	14.4	**14.4**
corn	4.0	-	-	1.9	7.6	**7.6**
Beet (roots)	35.0	-	-	0.9	31.5	**31.5**
Sun flower	2.0	-	-	8.0	16.0	**16.0**
Tobacco	2.0	-	-	8.2	16.4	**16.4**
Vegetables and potatoes	22.0	-	-	0.5	11.0	**11.0**
Tree and vine strings and branches	9.0	-	-	0.3	2.7	**2.7**
Average	-	27.3	46.4	6.2	23.5	**69.9**

Note: kg/t of main production

Table 3

Nitrogen accumulation potential in soil through vegetal remains and 1/3 of secondary production in cultivating various cultures

Culture	Yield t/ha	Accumulation (kg/ha N):				Average multiannual surface, thousand ha	Accumulation potential in soil, thousand tons N
		1/3 secondary production	Stubble field and other vegetal wastes	Roots in 0.6 m layer	total, kg/ha		
Vegetables (grains)	1.5	-	16.6	20.8	37.4	90	3.4
Autumn cereals (wheat, barley)	3.0	5.4	21.0	22.8	49.2	390	19.2
Spring cereals (barley, oats)	2.5	4.1	15.0	17.9	37.0	80	3.0
Corn (grains)	3.5	17.3	14.8	20.5	52.6	310	16.3
Sun-flower	1.5	15.6	56.2	16.4	88.2	100	8.8
Tobacco	2.0	-	75.5	42.6	110.1	30	3.5
Sugar beetroot	30.0	33.0	18.0	13.6	64.5	80	5.2
Fodder beetroot	50.0	25.0	30.0	22.5	77.5	10	0.8
Corn (silo)	15.0	-	23.9	39.5	63.4	60	3.8
Hungarian vetch	12.0	-	34.6	47.4	82.0	40	3.3
Perennial grasses	7.0	-	37.8	103.7	141.5	80	11.3
Vegetables and potatoes	15.0	-	74.7	26.8	101.5	110	11.2
Vine yards	5.0	-	21.6	8.1	29.7	210	6.2
Orchards	8.0	-	34.6	13.0	47.6	180	8.6
Other cultures	2.8*	5.1	19.6	21.3	46.0	330	15.2
Average		**15.1**	**32.9**	**29.1**	**77.1**	**2100****	**119.8**

*in cereals units; ** total thousand ha of agricultural land

The recovering of nitrogen in soil through the application of organic fertilizers is the most important compensation source of nitrogen in soil (Table 4).

If the accumulation and utilization of these organic sources were well organized, then more than 276,000 hectares of arable soil could be fertilized at a norm of 40-50 t/ha, thus recovering 28-36 kg/ha of nitrogen in soil annually (Table 4).

Table 4

Nitrogen contents in organic fertilizers and the possibility of soil enrichment with this element through them (generalized data)

Component	N contents, kg/t gross mass	Application norm– annual average for crop rotation, t/ha	Restoring potential and fertilization per year	
			Accumulation of N in soil, tons	Can be fertilized, ha
Cattle manure				
with cover	5.6	5.7 (40)	19197	85701
without cover	3.9	8.6 (60)	12644	54034
semi-liquid	2.0	14.3 (100)	471	2355
fluid	2.2	28.6 (200)	8492	19300

Pig manure				
with cover	8.2	4.3 (30)	6560	26667
without cover	5.7	5.7 (40)	5569	24425
fluid	2.3	28.6 (200)	5175	11250
Bird droppings				
with cover	22.2	1.4 (10)	2065	9301
without cover	16.3	2.1 (15)	1516	6200
fluid	1.4	28.6 (200)	7508	26814
Ovine manure				
with cover	9.5	3.6 (25)	2594	10922
without cover	9.2	4.3 (30)	920	3333
Average for all types and forms				
with cover	11.4*	3.8* (26)	30416	132595
without cover	8.8*	5.2* (36)	20649	87992
semi-liquid	2.0*	14.3* (100)	471	2355
fluid	2.0*	26.6* (200)	21175	53364
Total			**72711**	**276306**

* Average content of nitrogen and the average application norm of different types and forms of manure; in brackets is indicated the norm of fertilizer, t/ha in rotation once in 7 years

The sources for nitrogen recovering in soil with the help of organogenic remains, mud, alluvial soil, and from different constructions are presented in Table 5.

An additional source of nitrogen accumulation in arable soils could be green fertilizers, which can be produced in the Republic of Moldova on a total surface of 8,000 – 10,000 hectares, accumulating more than 175,000 tons of nitrogen or 20-20 kg/ha per year.

Table 5

Nitrogen potential contents and reserves accumulated from various oganogenic residues in alluvial soil and in lacustrine mud

Material	total volume, thousand tons	Contents of N, kg/t	Application norm – annual average, t/ha	Total nitrogen contained tons	Can be fertilized, hectares per year
Hydrolytic residuum	5.0	16.3	15	81.5	333
Hydrolytic lignine	14.4	1.4	24	6.15	600
Mud originating from water purification	1200	12.0	40	14400	30000
Defecation mud	1000	3.1	40	3100	2500
Lacustrine mud	538000	1.9	100	17350	5300
Soil removed from construction sites	150	2.1	150	3150	100
Alluvial soil (0-50 cm)	90000	1.7	200	35294	4500
Total	**630369**	**5.5 (average)**	**81**	**73382**	**16333**

CONCLUSIONS

So, the nitrogen income articles in the agricultural soils of the Republic of Moldova are multiple and have different volumes. According to importance and origin, these can be conventionally arranged in the following way: crop rotations with perennial grasses and vegetable cultures; all vegetal remains from surface and roots; secondary production of different cultures; non-symbiotic nitrogen fixation in the cultivation of non-vegetable cultures; nitrogen from seeds and planting materials; nitrogen accumulated from precipitations;; green vine strings and branches of fruit trees remained after clipping; wastes from industrial enterprises and communal households; mud from lakes and ponds; alluvial soils from valleys and meadows for the amelioration of eroded soils; the fertile stratum from construction sites.

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F E R T S E M - SOFTWARE FOR THE OPTIMIZATION OF THE FARMYARD MANURE AND MINERAL FERTILIZATION OF THE VEGETABLE SEED CROPS

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The present economic and market framework in which one of the most important vegetable growing activities evolves, namely **seed production**, acutely suggests a rational calculus of the requirements and therefore fertilizer consumption. We endorse this assessment through the fertilizers costs, the difficulties still existing in the timing supplying and in the specific sort of some real situations and also through their importance in the **achieving of competitive and high quality seeds**. To this effect within a **RELANSIN** project there has been developed a computing software both for the required organic and mineral fertilizers and their allotment per implement moments.

The software considers the following **inputs**:

- **soil reaction (pH);**
- **texture (or clay content in %);**
- **nitrogen index (NI, %);**
- **mobile phosphorus (P_{AL}, ppm);**
- **exchangeable potassium (K_{AL}, ppm);**
- **farmyard manure fertilization practiced for the last 3 years (t/ha);**
- **cultivated plant (mother or seed plant crops);**
- **surface (ha).**

The calculus for the fertilizer requirements is made on the basis of certain correlations between yield and agrochemical parameters of the soil (NI, P_{AL} and K_{AL}) on the one hand and fertilizer dosage on the other hand. Such correlations are in terms of cubic equations. For the first series of correlations 135 equations were calculated for the dependence of the mother and seed plant crops onto the agrochemical parameters of the soil. Thus establishing the optimum values of the NI, P_{AL} and K_{AL} to which the plants can give a maximum response (table 1). Figures 1-4 shows the dependence experimentally observed and calculated of the farmyard manure, nitrogen, phosphorus and potassium rates onto the IN, P_{AL} and K_{AL} values in the soil. The differences between the two curves, observed and calculated are practically insignificant. Considering the status of the soil fertilization, the quantity of mineral elements extracted from the soil for a certain harvest, and other requirements specific to vegetable cultures whether mother plants or seed plant crops, for the second series of correlations, 245 cubic equations were calculated whereby the organic fertilizer and mineral active substances requirements are estimated. To this effect we illustrate an example for root celery:

1. For the crop of root celery mother plants:

$N,kg/ha = 297.593 - 103.738*IN + 14.789*IN^2 - 0.841*IN^3$

$P_2O_5,kg/ha = 338.778 - 5.106*P_{AL} + 0.044*P_{AL}^2 - 1.48*10^{-4} P_{AL}^3$

$K_2O,kg/ha(1) = 489.362 - 2.340*K_{AL} + 47.01*10^{-4}*K_{AL}^2 - 3.398*10^{-6}*K_{AL}^3$

$K_2O,kg/ha(2) = 562.468 - 2.688*K_{AL} + 54.02*10^{-4}*K_{AL}^2 - 3.904*10^{-6}*K_{AL}^3$

$K_2O,kg/ha(3) = 646.930 - 3.094*K_{AL} + 62.18*10^{-4}*K_{AL}^2 - 4.493*10^{-6}*K_{AL}^3$

Table 1

Optimum values of the agrochemical parameters of the soil for "maximum" yields

Crop	NI, %	P_{AL}, ppm	K_{AL}, ppm	Yield	Crop	NI, %	P_{AL}, ppm	K_{AL}, ppm	Yield
Tomatoes, s.p.	2.0	70	300	100 kg/ha	Carrot, m.p.	2.5	100	400	50 t/ha
Red pepper, s.p.	4.0	120	400	100 kg/ha	Carrot, m.p.	3.0	100	500	600 kg/ha
Sweet pepper, s.p.	3.0	140	400	80 kg/ha	Parsley, m.p.	2.5	100	400	30 t/ha
Pimiento, s.p.	2.5	60	300	100 kg/ha	Parsley, s.p.	3.0	100	500	600 kg/ha
Egg-plants, s.p.	4.0	80	400	100 kg/ha	Parsnip, m.p.	2.5	100	400	37,5 t/ha
Early cauliflower, s.p.	3.5	80	300	200 kg/ha	Parsnip, s.p.	3.0	100	500	600 kg/ha
Early cabbage, s.p.	2.5	70	310	400 kg/ha	Moon radishes, m.p.	2.0	100	300	10 t/ha
Autumn cabbage, m.p.	4.0	70	250	90 t/ha	Moon radishes, s.p.	3.0	120	400	500 kg/ha
Autumn cabbage, s.p.	3.0	100	400	600 kg/ha	Summer radishes, m.p.	3.0	70	250	35 t/ha
Onion for chive	2.0	140	500	6 t/ha	Summer radishes, s.p.	3.0	100	300	600 kg/ha
Chive onion, m.p.	3.0	120	275	25 t/ha	Winter radishes, m.p.	3.0	70	250	35 t/ha
Direct seeded onion, m.p.	4.0	140	400	20 t/ha	Winter radishes, s.p.	3.0	100	300	600 kg/ha
Onion, s.p.	2.5	120	350	400 kg/ha	Red beet, m.p.	4.0	60	450	40 t/ha
Leek, m.p.	2.5	100	350	30 t/ha	Red beet, s.p.	4.0	100	400	800 kg/ha
Leek, s.p.	2.0	80	300	250 kg/ha	Celery, m.p.	3.0	70	350	30 t/ha
Garlic, planting material	3.0	120	450	5 t/ha	Celery, s.p.	4.5	80	450	500 kg/ha
Lettuce, s.p.	4.0	140	450	350 kg/ha	Chicory, m.p.	5.0	60	600	25 t/ha
Spinach, s.p.	4.0	140	450	700 kg/ha	Chicory, s.p.	2.0	80	300	500 kg/ha
Thyme, s.p.	3.0	80	400	200 kg/ha	Cucumbers, s.p.	4.0	120	450	150 kg/ha
Dock, s.p.	3.0	100	300	300 kg/ha	Marrows, s.p.	3.0	80	450	200 kg/ha
Orach, s.p.	2.0	70	250	150 kg/ha	Cantaloupes, s.p.	2.0	70	300	100 kg/ha
Dill, s.p.	2.0	70	250	500 kg/ha	Water melons, s.p.	5.0	120	450	200 kg/ha
Garden bean., s.p.	2.0	100	500	700 kg/ha	Pumpkin, s.p.	5.0	120	450	200 kg/ha
Garden pea, s.p.	2.5	120	600	1500 kg/ha	s.p.= *seed plants;* *m.p. = mother plants;*				

2. for the seed root celery crop:

$GG,t/ha = 57.144 - 26.870*IN + 5.157*IN^2 - 0.358*IN^3$

$N,kg/ha = 366.661 - 202.265*IN + 43.749*IN^2 - 3.200*IN^3$

$P_2O_5,kg/ha = 561.306 - 11.817*P_{AL} + 0.122*P_{AL}^2 - 4.500*10^{-4} P_{AL}^3$

$K_2O,kg/ha(1) = 360.223 - 1.889*K_{AL} + 41.45*10^{-4}*K_{AL}^2 - 3.022*10^{-6}* K_{AL}^3$

$K_2O,kg/ha(2) = 414.690 - 2.175*K_{AL} + 47.74*10^{-4}*K_{AL}^2 - 3.479*10^{-6}* K_{AL}^3$

$K_2O,kg/ha(3) = 476.525 - 2.499*K_{AL} + 54.83*10^{-4}*K_{AL}^2 - 3.994*10^{-6}* K_{AL}^3$

This requirement is corrected according to the history of the organic fertilization of the relative parcel (table 2).

Table 2

Corrective factors for the NPK dosage according to the year of the organic fertilization.

Fertilization year	f_{cN}(FM)	$f_{c\ P2O5}$(FM)	$f_{c\ K2O}$(FM)
I	1.3	0.8	2.5
II	0.8	0.6	1.3
III	0.6	0.2	0.8

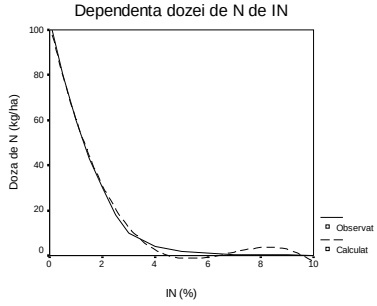


Fig. 1-The relationshep between the rates of N and NI

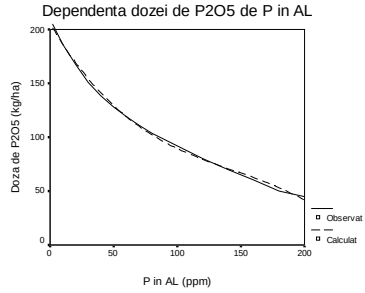


Fig. 2-The relationshep between the rates of P_2O_5 and P_{AL}

N, kg/ha = $102.746 - 49.602*NI + 7.628*NI^2 - 0.372*NI^3$

$R^2 = 0.995$

P_2O_5, kg/ha = $205.228 - 2.011*P_{AL} + 0.011*P_{AL}^2 - 2.565*10^{-5}*P_{AL}^3$

$R^2 = 0.997$

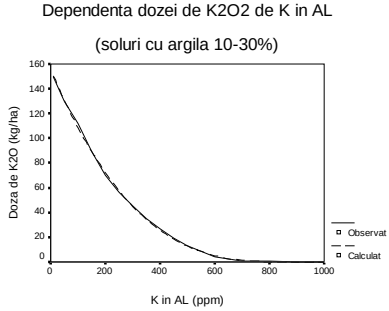


Fig. 3-The relationshep between the rates of K_2O and K_{AL} (soils with 10-30% clay)

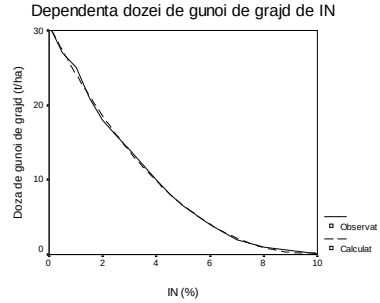


Fig. 4-The relationshep between the rates of farmyard manure and NI

FM, t/ha = $30.668 - 6.933*NI + 0.457*NI^2 - 0.00681*NI^3$

$R^2 = 0.999$

The phosphorus dosage is also corrected according to soil reaction:

$$\mathbf{f_{c\ P2O5}(pH) = 0.81 + 3.22*10^{-4}*e^{pH}}$$

The soil reaction was determined in seven classes, from highly acid to strongly alkaline (table 3):

Table 3

The appreciation of the soil reaction (pH)

Soil reaction	pH value
Highly acid	Less than 5.00
Moderate acid	5.00 – 5.80
Slightly acid	5,81 – 6,80
Neutral	6.81 – 7.20
Slightly alkaline	7.21 – 8.40
Moderate alkaline	8.41 – 9.00
Strongly alkaline	Over 9.01

Regarding the soil agrochemical indicators of the NI, P_{AL} and K_{AL}, the domains in table 4 were used.

Table 4

The appreciation of the soil fertility

Soil fertility	IN, %	P_{AL}, ppm	K_{AL}, ppm
Very low	Less than 1.0	Less than 35	Less than 65
Low	1.1 – 2.0	36 - 72	66 – 132
Medium	2.1 – 3.0	73 - 102	133 – 200
Good	3.1 – 4.0	103 - 144	201 – 300
Very good	4.1 – 6.0	144 - 180	301 – 400
High	6.1 – 8.0	181 - 220	401 - 600

For the potassium dosage a correction according to the clay content of the soil was inserted:

$$\mathbf{f_{c\ K2O}}(\text{clay}) = \mathbf{9.46*10^{-2}*clay - 0.215*10^{-2}*clay^2 + 1.55*10^{-5}*clay^3}$$

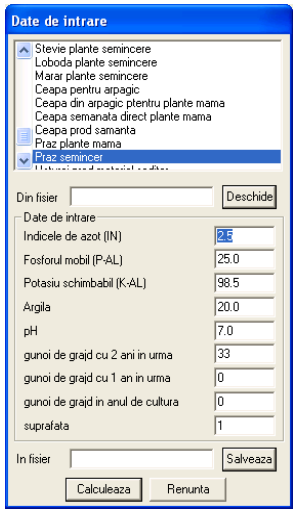
The appreciation of the soil texture is shown in table 5.

Table 5

The appreciation of the soil texture (% clay)

Soil texture	Clay content, (%)
Light	**less than 10**
Medium	**10 – 30**
Heavy	**over 30**

To this effect a software for 45 vegetable, mother plants and seed plant crops has been established.



The software works in two versions:

Version A: when the user knows the agrochemical parameters of the area:

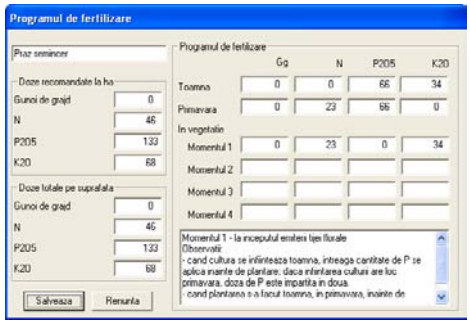
- We enter into program and we access the plant mother or seed plants, as in case.
- Crop selection and insertion of the agrochemical parameter values:

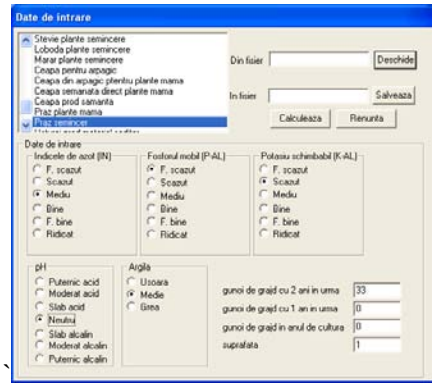
The program shows 45 crops.

The user marks the crop in wich he is interested. Let's say leek seed crop. After this, the program will ask to introduce the agrochemical parameters. For example: 2.5 NI, 25 ppm P_{AL}, 98.5 ppm K_{AL}, 20 % clay, pH 7.0, 33 t/ha farmyard manure applied two years ago and 1 ha area.

- The calculation of the amounts of fertilizers:

By selecting “Calculează” the software will calculate the fertilizers dosage (kg/ha) and display the fertilization program in kg/parcel and the moments of application along with some observations:





The fertiliser rates are:

- Farmyard manure: 0; N: 46 kg/ha; P_2O_5: 133 kg/ha;K_2O: 68 kg/ha;

These amounts of fertilisers will be applied as follows:

- Nitrogen: 1/2 in the spring (as NP fertiliser) and ½ in the vegetation period;
- Phosphorus: 1/2 in the automn and 1/2 in the spring time;
- Potassium: 1/2 in the automn and 1/2 in the vegetation period;

Version B: when the user doesn’t know the necessary agrochemical indicators. In this case a personal estimation of the soil reaction, texture and fertility will be introduced by marking one of the displayed classes:

In our exemple, where we selected leek seed crop, are marked:

- for NI: medium; for P_{AL}: very low; for K_{AL}: low; for pH: neutral;
- for texture: medium; for farmyard manure: 33 t/ha, two years ago;
- for area: 1 ha.

Thenceforth the program will run same as in version A.

Note that the fertilizers dosage calculated with FERTSEM considers the following:

- a balanced fertilization;
- “maximum” harvests both on mother plant cultures and seed plant crops;
- maintaining the soil fertility on an adequate level;

We also recommend that the small fertilizer dosage arising from the calculus should be applied in the periods preceding the maximum consumption from the plants and as complex fertilizers of NP, NK, PK, NPK type, as the case stands.

The program has also a series of restrictions which make the organic and mineral fertilizer dosage not exceeding certain maximum values irrespectively of how low are the values of agrochemical indicators.

FERTSEM takes also into account the “active” participation of the seed producer to the appraisal of the dosage and final fertilization schedule. Based upon his experience, the anticipated harvest and the evolution of the climatic factors, the fertilizer quantities can be modified, mostly lesser, in order to achieve the maximum efficiency.

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INDICATOR FOR THE EVALUATION OF THE SOILS FERTILITY LEVEL

INDICATOR PENTRU EVALUAREA NIVELULUI DE FERTILITATE A SOLURILOR

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Abstract. *By quantized summation of the main properties: texture, reaction, humus content, total nitrogen content or nitrogen index value (NI) and phosphorus and potassium contents in mobile forms, soluble in ammonium acetate-lactate solution at pH 3.7, we could make soils fertility appreciation. The value obtained through balanced arithmetic average calculation, or other balanced parameter of grouping centre, turned into an number of points, is appreciate by a scale from 0 to 30. This scale is designating the soil fertility levels, from very low to very high, passing through intermediary levels as low, medium and high. The evaluation of soil fertility is possible after analyzing of soil trials sampled usually from organic horizon. For soil fertility evaluation in case of orchard, grapevine, shrubbery, and other plants with profound rooting, mineral horizons could be taking into account.*

Rezumat. *Aprecierea fertilităţii solurilor se face prin insumarea cuantificată a principalelor însuşiri: textura, reacţia, conţinutul de humus, conţinutul total de azot sau valoarea indicelui de azot (IN) şi conţinuturile în forme mobile de P şi K, solubile în soluţia de acetat-lactat de amoniu la pH 3,7. Valoarea obţinută prin calculul mediei aritmetice ponderate sau a altui parametru ponderat al centrului de grupare, transformată în număr de puncte, se apreciază după o scară de la 0 la 30, care desemnează nivelele de fertilitate, de la foarte scăzut la foarte ridicat, cu trepte intermediare de: scăzut, ridicat şi moderat. Evaluarea fertilităţii se face în urma analizării probelor de sol recoltate din orizonturile organice. În cazul aprecierii fertilităţii pentru pomi, viţă de vie, arbuşti fructiferi şi alte plante cu înrădăcinare profundă se pot lua în consideraţie şi orizonturile minerale.*

The fertility represents essential features of the soil, which contributes, obviously to maintaining the life on earth. This feature is determined by many factors of physical, chemical and biological nature, which give an incontestable complexity.

For this reason, the fertility was and is see from different viewpoints, by Ştefanic and his coworkers(2006), divided them in three agronomic categories: agronomical, agrochemical and biological. The first group contained the definitions and the ideas which binding the fertility of productivity, considering them widely synonyms.

In the second group appear definitions and concepts which binds the fertility of the soil capacity to put water, nutritive substances and elements for plants needs at optimum level for the whole vegetation period, to assure proper conditions to develop and superior harvests from quantitative, qualitative, certainly and stable viewpoints.

Finally, the third category includes the definitions and biological processes, which contribute to the achievement in soil of completely necessary conditions for the satisfaction of optimum nutrition and develop needs of plants. In this case Ştefanic evolve some biological indicators (Ştefanic şi colab., 2006), used to the outline the synthetic indicator of soil fertility. This represent the sum of other indicators, resulted from many biological, chemical, biochemical (enzymatic) determinations. Author does not establish any soil fertility levels.

In order to create maps at large scale for soil vulnerability, specific for urban soils, especially those with horticultural use, was needed a simple procedure assessment for soil fertility that can be used in any agrochemical lab. In this respect, was developed a new indicator for soil fertility, which comprises chemical and physical properties of the soil, which are considered to indirectly mirror most of the other physical, chemical and biological features of the soil that sums the fertility of the soil.

MATERIAL AND METHODS

Soil fertility assessment is made by quantified sum of six specific indicators, one is physical – texture- and five are chemical: pH, humus content, total nitrogen or nitrogen indicator (NI), the content of the mobile forms of P (PAL) and K (KAL) which can be dilluted in ammonium lactate acetate (AL, pH=7,0).These features, quantified through content or pH value, was transform in content or reaction class according to methodology of pedological studies (Florea si colab., 1987).

RESULTS AND DISCUSSIONS

Each chemical substances and elements envisaged, of texture or reaction received a score from 1 to 5. Minimum score is a lower field or unfavorable content, and the maximum score displays a maximum field or favorable (tables 1 to 4). By summing the scores given for each property of the analyzed sample, it will be obtained a final score that will mark the level of fertility of that soil sample. For each genetic horizon, or each geometrical horizon the scores are calculated. Soil fertility is usually assessed for the organic horizon and/or for the transition horizon towards the mineral one. For plants with deep roots and for the soils that are planted with fruit trees, vineyard and other alike plants one can also take into account deeper mineral horizons. The final number of points for a soil is the weighted average of the points of each analyzed horizon, from organic ones or from entire soil profile. This weighted average value displays soil fertility after the cumulated points (table 5). Instead, weighted average can be taken into account other parameters of the grouping center like geometric average, median or module.

Table 1

The appreciation marks depending the textural class

Score	Clay <2μ %	Textural class
1	< 6 >45	Sand Clay
2	6 - 12	Sandy loam
3	32,1 – 45	Clay loam
4	12,1 - 20	Loamy sand
5	20,1 - 32	Loam

Table 2

The appreciation marks depending to the soil reaction

Score	pH_{H2O}	Reaction class
1	<3,5	Extremely acid
	3,6-5,0	Very powerful and powerful acid
	8,5-9,0	Moderate alkaline
	9,1-10,0	Powerful and very powerful alkaline
	>10,1	Extremely alkaline
2	5,1-5,8	Moderate acid
3	5,9-6,4	Weakly acid
	7,9-8,4	Weakly alkaline
4	6,5-6,8	Weakly acid
	7,3-7,8	Weakly alkaline
5	6,9-7,2	Neutral

Table 3

The appreciation marks depending to the humus content

Score	Humus content limits (%) depending on textural class						Content class
	N	U	S	L	T	A	
	Sand	Sandy loam	Loamy sand	Loam	Clay loam	Clay	
1	<0,2	<0,4	<0,5	<0,6	<0,8	<1	Extremely low
2	0,3-0,5	0,5-0,8	0,6-1,1	0,7-1,3	0,9-1,5	1,1-2,0	Very low
3	0,6-1,0	0,9-1,7	1,2-2,2	1,4-3,0	1,6-3,5	2,1-5,0	Low
4	1,1-2,0	1,8-4,0	2,3-5,5	3,1-6,5	3,6-8,0	5,1-10,0	Medium
5	2,1-5,0	4,1-7,0	5,6-8,5	6,6-10,5	8,1-12,5	10,1-16,0	High

Table 4

The appreciation marks depending to the macro elements content

Score	total N	IN	P_{AL}	K_{AL}	Content class
	%	-	$mg \cdot kg^{-1}$	$mg \cdot kg^{-1}$	
1	<0,100	<1,0	<8	<65	Very low
2	0,100-0,140	1,1-2,0	8,1-18	65,1-130	Low
3	0,141-0,270	2,1-3,0	18,1-36	130,1-200	Medium
4	0,271-0,600	3,1-4,0	36,1-72	200,1-300	High
5	>600	4,1-5,0	>72	>300	Very high

Table 5

The appreciation of fertility level according to the point's number

Accumulated points number	Fertility level significance
0-10	Very low
10,1-15	Low
15,1-20	Moderate
20,1-25	High
25,1-30	Very high

As an example of the proposed method were chosen samples from three soil types samples and these are: prespodic dystricambosol (PCep) from Stâna de Vale (jud. Bihor), albic stagnosol STal) from Recea-Baia Mare (jud. Maramureş) and cambic phaeozem (FZcb) from Drăgăneşti Vlaşca (jud. Teleorman).

The scores of those six physical and chemical properties for the organic horizons of those three types of soil are shown in the figure 1. One can notice contrasting differences between first two soil types (prespodic dystricambosol şi albic stagnosol) and higher marks obtained for the third one (cambic phaeozem). In fact even the weighted number of points for the organic horizons of those three types of soil are quite different and make that first two analyzed soils be classified with low fertility score, with 10.9 points (PCep), 14.3 points respectively (STal) and high 20.9 points (FZcb).

When the fertility score is calculated for the whole soil profile are obtain much lower scores. For the given examples the scores are: 9.86 for prespodic dystricambosol, 9.79 for albic stagnosol and 13.1 for cambic phaeozem, concluding that are very low levels of fertility for the first two and low for the third.

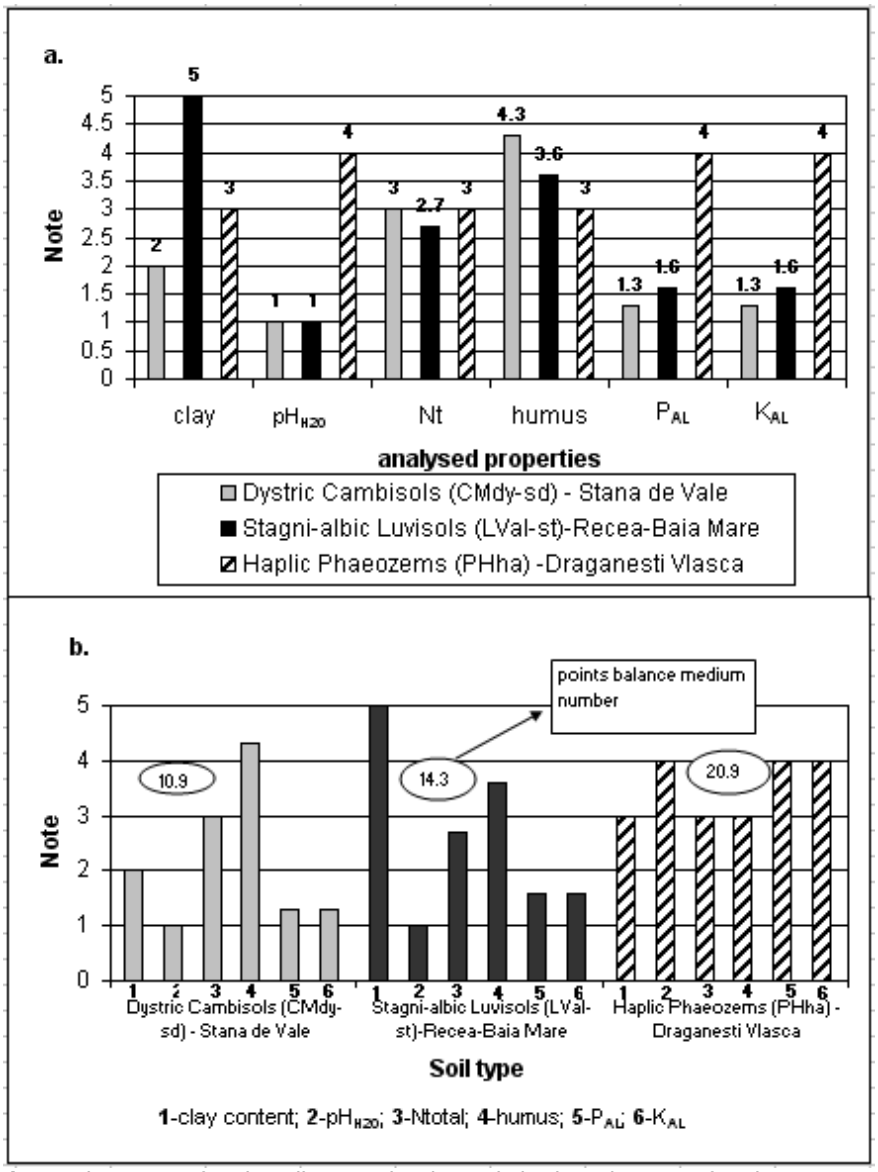

Fig. 1. The notes of main soil properties (organic horizons) group after the nature of analyses (a), after soil type (b) and points balance medium number for fertility appreciation

From many computations made for different types of soil we concluded that are few soils with high fertility and, in the field, in natural conditions was found no soil with high fertility score. Even in anthropic enhancement conditions with organic or chemical fertilizers they do not reach high levels of fertility, displayed in fertility scores.

CONCLUSIONS

For soil fertility assessment are used six specific indicators, one is physical – texture-, and five are of chemical origin: pH, humus content, total nitrogen of the nitrogen indices (IN) and the content of mobile forms of phosphorus (P_{AL}) and potassium (K_{AL}), that are soluble in ammonium acetate lactate (AL). Their values are estimated with scores from 1 to 5, as their grow in quantity or in availability to offer optimal conditions for plants growing and crop forming. By summing the obtained scores for each indicator, a final score is obtained, up to 30 points, which, at its turn is framed in a global class of fertility.

Fertility assessment is usually made by using analytical data of the organic horizons. For the soils used for fruit trees vineyard and alike plants with deep roots the fertility assessment can be made also by using mineral horizons.

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FERTILITY REGENERATION POSSIBILITIES OF SOILS AFFECTED BY EROSION

POSIBILITĂȚI DE REGENERARE A FERTILITĂȚII SOLURILOR AFECTATE DE EROZIUNE

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Abstract. *Hydro erosion is the main threat for the soils placed on slopes. As a result, the most fertile surface stratum is washed by torrential precipitations. The erosion processes in the Republic of Moldova are found on about 1.5 million hectares (60 % of the agricultural territories). Annual losses of fertile soil constitute 26 million tons (19 t/ha). 700,000 tons of humus, 50,000 tons of nitrogen, 34, 000 tons of phosphorus, and 597,000 tons of potassium are lost together with the soil. This fact leads to the reduction of agricultural cultures harvest by 30-70 % compared to un-eroded soils. Regeneration of arable soil fertility affected by erosion is possible through rational use of organic fertilizers. The present paper attempts at pointing out these possibilities.*

Rezumat. *Principalul pericol al solurilor amplasate în pantă este eroziunea hidrică în rezultatul căreia se spală stratul superficial de sol, cel mai fertil, sub acțiunea precipitațiilor torențiale. În Republica Moldova procesele de eroziune se manifestă pe circa 1,5 milioane hectare (60% din teritoriile agricole). Pierderile anuale de sol fertil constituie 26 milioane tone (19 t/ha). Cu această masă de sol se spală: humus – 700 mii tone, azot – 50 mii tone, fosfor – 34 mii tone, potasiu – 597 mii tone, ceea ce conduce la reducerea recoltelor culturilor agricole cu 30-70%, în comparație cu solurile neerodate. Regenerarea fertilității solurilor arabile afectate de eroziune este posibilă prin valorificarea rațională a îngrășămintelor organice. Prezenta lucrare încearcă să evidențieze aceste posibilități.*

Out of the natural processes dangerous to human society, soil erosion is the most complex one what regards the way of developing, the spreading areas and the caused dangers. Annual soil losses disfavor the conservation of nutritive elements and precipitation water retention, thus worsening soil fertility of slope terrains [1].

MATERIALS AND METHODS

The research and the observations were made in the period 1996-2006 at the Pedology and Erosion Experimental Station of „Nicolae Dimo" Institute of Pedology and Agro-Chemistry situated in the village Lebedenco, Cahul district, Republic of Moldova. The experimental field is a 5-7^0 slope inclined to North-East (figure 1).

The soil consists of common moderately eroded chernosem of a clay texture containing 2.07-2.54% of humus and 7.5-7.8 weak alkaline reaction.

Three fertilization systems have been studied: organic, mineral and mixed. The scheme of the experience and the cultivated cultures are presented in Table No. 4. The variants 4, 5, 7, 8 and 9 have the function of determining the optimal doze and the periodicity of manure application. Two annual dozes are tested (12.5 and 25 t/ha). The first is evaluated as optimal doze for the maintenance of humus; the second one is planned as a doze of fertility increase.

Fig.1 – Experimental field planted with alfalfa

The washed off (deluvial) soils formed as a result of erosion constitute an important reserve for the restoration of the eroded soils. The composting with components rich in nutritive elements constitutes the most efficient way of their being used [2]. For this purpose a sample of compost was also investigated [variant 9].

The straw is a very important source of organic matter for the soil and can be used as an organic fertilizer without preliminary composting or transformation into artificial litter [3]. The straw, to which nitrogen fertilizers were added (variant 2), was incorporated in soil in order to reduce the C:N proportion after which the parcels were disked and ploughed. Each year in spring, soil samples are collected for laboratory tests from places indicated on the plot. The surface of the plot is of 6 m x 40 m= 240 m^2

RESULTS AND DISCUSSIONS

In order to know the nitrogen, phosphorus, and potassium content which is introduced in the soil at fertilization, we analyzed the used organic fertilizers (Table 1).

Table 1

Analysis of organic fertilizers used in the experience, % of humid mass

No. crt.	Specification	N	$P_2 0_5$	$K_2 0$
1	Manure	0,53	0,32	1,31
2	Compost	0,29	0,24	1,45
3	Straw	0,62	0,14	1,28

As a result of the chemical analyses we concluded that the fertilizers contributed to the increase of humus in common chernosem moderately eroded by 0.26-0.47% compared to the initial content (Table 2). Simultaneously with the increase of humus under the influence of the applied fertilizers, the content of the mobile forms of the nutritive elements also increased. In the ploughed layer of the fertilized variants the increase of mobile phosphorus and changeable potassium is of about 1.39-2.10 and 4.2-31.9 mg/100 g of soil respectively compared to the initial content.

Table 2

Soil Agro-chemical Indicators after the application of fertilizers in the ploughed layer

Variant	Content		
	Humus, %	$P_2 0_5$	$K_2 0$
		mg/100 g soil	
1	2	3	4
1996, initial content before the application of fertilizers			
Control plot	2.07	1.89	16.8
Straw, 4 t/ha + $N_{60}P_{60}$	2.19	1.75	15.9
$N_{60}P_{60}$	2.28	1.69	16.0
Manure, 50 t/ha after 4 years	2.09	1.93	15.3
Manure, 100 t/ha after 4 years	2.54	1.78	16.7
Manure, 200 t/ha after 8 years	2.17	1.54	16.8
2006, the 10th year of application			
Control	2.15	1.93	18.1
Straw, 4 t/ha + $N_{60}P_{60}$	2.45	3.41	23.4
$N_{60}P_{60}$	2.41	3.08	20.2
Manure, 50 t/ha after 4 years	2.42	4.03	28.5
Manure, 100 t/ha after 4 years	2.98	3.68	31.8
Manure, 200 t/ha after 8 years	2.66	2.71	48.7
Increase compared with the initial content			
Control	0.08	0.04	1.3
Straw, 4 t/ha + $N_{60}P_{60}$	0.26	1.66	7.5
$N_{60}P_{60}$	0.13	1.39	4.2
Manure, 50 t/ha after 4 years	0.47	2.10	13.2
Manure, 100 t/ha after 4 years	0.44	1.90	15.5
Manure, 200 t/ha after 8 years	0.39	1.17	31.9

Due to the organic substances contained in the applied fertilizers the soil physical indicators improved (Table 3). The organic fertilizers contributed to the maintenance of the soil in a better affine condition. As a result, the apparent density was reduced, the soil resistance to penetration dropped. The tendency to increase total porosity is being observed. The influence of fertilizers upon the soil physical characteristics is presented in Table 3.

Table 3

Influence of fertilizers upon the soil physical characteristics in the ploughed layer

Variant	Apparent density g/cm^3	Density g/cm^3	Total porosity, %	Resistance to penetration, kgf/cm^2
Control plot	1.26	2.66	52.6	23.4
$N_{60}P_{60}$	1.24	2.64	53.0	22.8
Manure, 50 t/ha after 4 years	1.22	2.64	53.8	20.1
Manure, 100 t/ha after 4 years	1.18	2.63	55.1	13.3
Manure, 200 t/ha after 8 years	1.16	2.63	55.8	16.8

Improvement of physical and chemical indicators of the common chernosem moderately eroded through the application of fertilizers led to the increase of the yield of the agricultural cultures (Table 4).

Table 4

Soil agrochemical indicators after the application of fertilizers in the ploughed layer

Variant of fertile-zation	Control plot yield and increase on the fertilized variants							
	1999, winter fodder (peas + oat)	2000, au-tumn wheat	2001, corn, seeds	2002, au-tumn bar-ley	2003, corn, seeds	2004, Sun flower	2005, Au-tumn wheat	2006, alfalfa, green fodder
1	4	5	6	7	8	9	10	11
Control plot (with-out ferti-lizers)	56.6	12.4	31.7	14.3	34.2	12.7	14.3	77
Straw, 4 t/ha after 4years + $N_{60}P_{60}$	24.0	2.4	5.2	2.7	7.3	3.1	3.1	25
$N_{60}P_{60}$	8.3	1.3	5.5	2.4	5.2	1.2	2.1	30
Manure, 50 t/ha after 2 years	11.1	5.3	12.8	7.1	15.3	7.4	6.7	95
Manure, 50 t/ha after 4 years	8.6	4.2	10.4	8.2	11.3	6.3	8.6	114

Variant of fertile-zation	Control plot yield and increase on the fertilized variants							
	1999, winter fodder (peas + oat)	2000, au-tumn wheat	2001, corn, seeds	2002, au-tumn bar-ley	2003, corn, seeds	2004, Sun flower	2005, Au-tumn wheat	2006, alfalfa, green fodder
1	4	5	6	7	8	9	10	11
Manure, 50 t/ha after 4 years+ $N_{60}P_{60}$	70.8	6.5	13.3	9.4	12.4	7.1	9.4	121
Manure, 100 t/ha, after 4 years	26.3	8.0	10.8	11.3	10.1	8.2	10.0	119
Manure, 150 t/ha after 6 years	41.4	11.4	11.4	10.4	16.2	9.2	11.7	118
Manure, 200 t/ha after 8 years	48.6	13.7	13.5	12.3	8.3	7.5	10.5	129
Compost, 100 t/ha (manure, 80% + deluvial (washed off) soil, 20%	26.6	11.1	7.2	3.1	5.8	3.9	2.6	85

CONCLUSIONS

- Application of fertilizers, especially of organic ones, constitutes a primordial factor for the improvement of the soils affected by erosion.

- Organic fertilizers on such soils should be applied in the doze limits of 50-100 t/ha, calculated in the equivalent of manure with cover. In case of insufficiency of organic fertilizers resources, a doze of 50 t/ha should be applied in combination with chemical fertilizers $N_{60}P_{60}$.

- As organic fertilizers, manure originated from all kinds of animals, town mud, solid wastes, coming from the processing industry of agricultural products, other organogenic wastes can be used.

- In the case when the organic fertilizers contain an excess of humidity their composting is necessary. Deluvial (washed off) soil, mud, straw etc. can be used as absorbents.

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ASSISTING DECISION ON THE LAND SUITABILITY FOR GREENHOUSE PROJECTS

ASISTAREA DECIZIEI ASUPRA PRETABILITAȚII TERENULUI PENTRU ÎNFIINȚAREA DE SERE

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Abstract. *Making a decision in starting a greenhouse project implies assessing different factors. The land suitability is one of the most important of them. The land suitability is finally decided as a result of field work and laboratory physical and chemical analysis. The overall decision is made from partial ones regarding the soil properties (such as soil texture, edaphical volume, salinization, and alkalization), the land unit characteristics, the ground water level, and others. To assess the different soil properties, the field data and the laboratory results must be framed in the land suitability classes settled for greenhouses. Official tables and recommendations are available for this purpose, but an automation of this process would bring obvious advantages. The paper proposes a series of procedures to automate search and to make decisions. These procedures are part of a more complex software application in process of development within an academic Grid computing project initiated by four universities and a research institute from Iasi, Romania.*

Rezumat. *Luarea unei decizii referitoare la înființarea unei sere implică evaluarea unei serii de factori. Pretabilitatea solului pentru sere şi solarii are o importanță deosebită. Ea se stabileşte în urma prelucrării datelor obținute în etapa de teren şi a celor rezultate din analize de laborator. Pentru a evalua diferite proprietăți ale solului, datele obținute în teren şi rezultatele de laborator trebuie încadrate în intervalele de valori corespunzătoare unor clase de pretabilitate. Astfel de recomandări se găsesc în metodologia oficială de efectuare a studiilor pedologice, dar o automatizare a acestui proces aduce beneficii evidente. Lucrarea propune o serie de proceduri de automatizare a procesului de cautare in normele metodologice existente şi de emitere a recomandarilor de utilizare şi ameliorare a unităților de teren studiate.*

Locating a greenhouse is often dictated by a series of preconditions like water resources, market requirements and other factors. Moreover, a greenhouse is a protected space that requires long term monitoring of soil features, especially those ones that are easily modifiable. This is why a pedological study is necessary in order to decide if the respective land unit is suitable for starting such a project.

In complex decision situations a large amount of data are involved and the decision maker needs support from a computer system. A software used for those purposes is called Decision Support System (DSS). It is expected to aid the decident to make the best decision. The type of support can be very different [2], from filtering useful information from large masses of data to evaluating alternatives or comparing plans with achievements. Such a software tool could bring benefits within a pedological study for a greenhouse project.

MATERIAL AND METHODS

A pedological study regarding a greenhouse location comprises a terrain phase, a laboratory phase and a data processing phase. In the terrain phase, specific observations are made on the geology, lithology, hydrography, morphology and other soil features. Climate observations are also made. In the laboratory phase physical and chemical analyses are preformed on soil samples. The results are then compared with the observations made in the terrain phase. The resulted data must be processed in order to make a decision.

Official classifications of soil types divide greenhouse soils in classes, subclasses, groups and subgroups [3]. Classes represent the highest grouping level. Situating a soil in a certain class is determined by different restricting factors, the most intense of them being considered as determinant. The following classes are defined for soils that are to be used for building greenhouses:

Class I – soils with no restrains or degradation risks;

Class II - soils with low restrains or degradation risks;

Class III - soils with moderate restrains or degradation risks;

Class IV - soils with severe restrains or degradation risks;

Class V - soils with extremely severe restrains or degradation risks.

The general approach is to study several soil profiles from the respective land unit and to draw a global conclusion from the partial ones. There are several horizons in each soil profile, that is relatively homogenous soil layers that must be identified and measured. A standard depth of about 50 – 100 cm is also designated.

STRUCTURE OF THE DECISION SUPPORT SYSTEM

To assess the different soil properties, the field data and the laboratory results must be framed in land suitability classes for greenhouses. Official tables, recommendations and other reference materials are available for this purpose, but because of the great amount of data, an automation of this process would bring obvious advantages. This is where the Decision Support System intervenes.

The DSS will receive as input the terrain and laboratory data. As output, it will produce a report which during the data processing was step by step enriched with partial conclusions regarding the land suitability from different points of view like soil texture, edaphic volume, salinization, alkalization, terrain slope, Calcium Carbonate contents, nonuniformity degree, humidity excess, lateral drainage. An overall conclusion is suggested in the end of the report.

The system uses a database that stores in tables the existing official recommendations and classifications. These documents were processed to extract and systematize the useful information. Normalizations were made where necessary to bring the tables to an acceptable relational form. The system is designed to accept future adding of new tables when appropriate.

The objective for the Decision Support System is to help making decisions on the soil suitability for greenhouse projects. The general system has three categories of components: experimental input data, standard indicators and soil properties, and a set

of algorithms that process the input data on the basis of existing standards and draw the conclusions regarding the land suitability for building a greenhouse.

The architecture of the Web DSSm is presented in the figure 1:

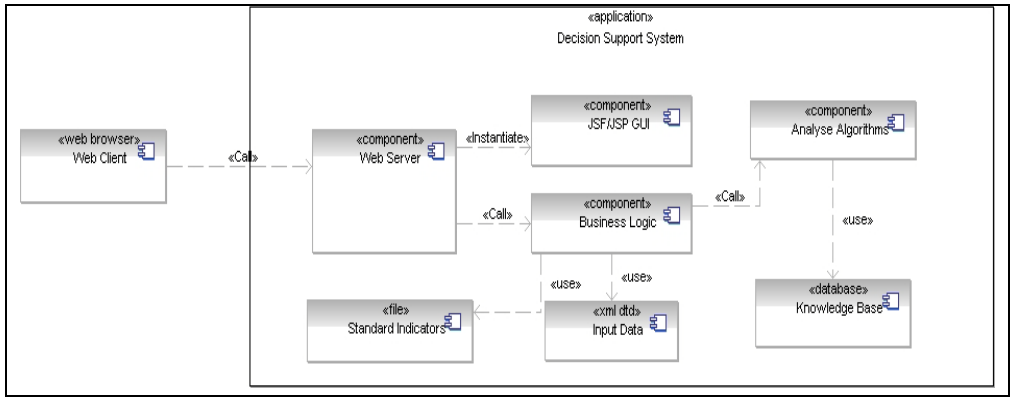

Fig.1 - The architecture of the Web Decision Support System for Greenhouse

The user interface page has three tabs: Nomenclatoare (i.e. Nomenclature), Date experiment (i.e. Experimental Data) and Rezultate (i.e. Results).

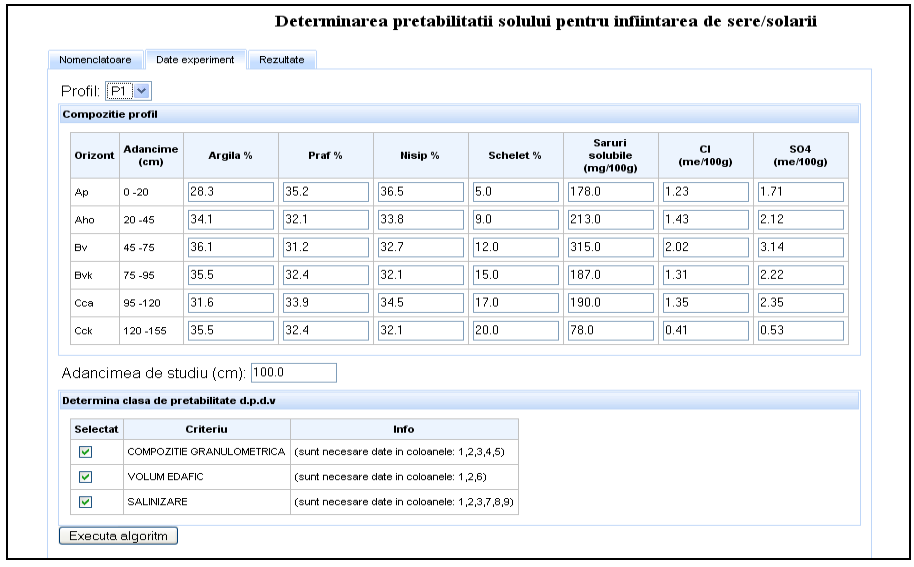

Fig. 2 – The input data page

The Date experiment section is shown in figure 2 as an example. One can see two sections in this page: one for data input and another for selecting, through checkboxes, the desired analysis criteria.

The results (Rezultate) tab displays the resulted reports pursuant to applying the analysis algorithms. In figure 3 is shown as example the report regarding the suitability from the edaphic volume point of view.

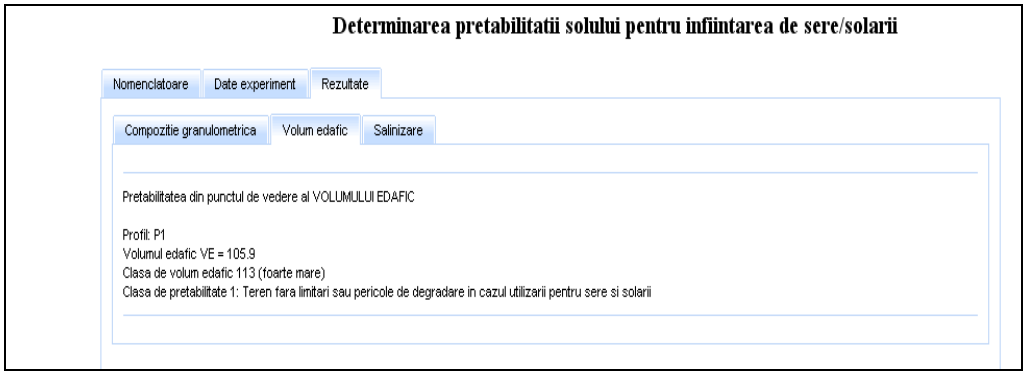

Fig. 3 – The reports page: edaphic volume tab

The DSS is developed as a service within an academic Grid Computing structure called GRAI. The term Grid Computing denominates [1] an infrastructure for parallel/distributed computing that implies using organized software components that run on a large number of computers.

CONCLUSIONS

A Web Decision Support System in soil suitability for greenhouse projects is under development as a service on a Grid Computing infrastructure.

Future work is focused on a deeper evaluation and optimization of the implemented algorithms and on extending the Grid services and Web DSS.

Acknowledgement. GRAI runs under the CEEX grant no. 74 II03 /31.07.2006, financed by the Romanian Ministry of Education, Research and Youth.

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ANALYSIS OF HYDRODIMAMICS PROPERTIES OF SOILS IN A LABORATORY TANK MODEL

ANALIZA PROPRIETĂȚILOR HIDRODINAMICE ALE SOLURILOR PE UN MODEL FIZIC EXPERIMENTAL

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Abstract. *Accurate estimation of hydrodynamics properties of soils is essential for many agricultural water related studies. The hydrodynamics properties of soils can be determined on a soil sample using a tank model and a laboratory method. The main objectives of this study were: (i) soil-volumetric water content curve, (ii) the relationship matric potential-water content, (iii) the relationship hydraulic conductivity-water content.*

Rezumat. *Cele mai multe proiecte de hidroamelioratii necesita determinarea cu precizie a proprietatilor hidrodinamice ale solurilor. Acestea pot fi determinate pe modele fizice experimentale. Obiectivele principale ale acestui studiu sunt: (i) stabilirea profilului hidric al solului, (ii) stabilirea relatiei potential-umiditate, (iii) stabilirea relatiei conductivitate hidraulica-umiditate.*

In the literature, different methods are presented to access the hydrodynamics properties of soils. Nevertheless, some of these methods require expensive and very specific devices. Others needs personnel with special skills while others are very laborious and time consuming.

Moreover, the same methods are not used in all the countries and the soil type will be a reason for selecting one or another method.

These properties are usually expressed as functional relationships between the soil hydraulic conductivity and water content or matric potential, and between the matric potential and water content (soil water retention curve). Both functions are highly nonlinear and direct laboratory or field measurements are time consuming and involve considerable uncertainty. Therefore, parameter estimation methods to determine soil hydraulic properties are of interest. Inherent in this approach is the assumption that the soil hydraulic properties may be described by a relatively simple set of deterministic function (hydraulic model) that contains few unknown parameters. The most widely used soil hydraulic models are those of Gardner (1958), which was extended by Brutsaert (1966), Brooks and Corey (1964) and van Genuchten (1980) which following Mualem models (1976).

In this study the hydrodynamics properties of a soil were estimated using van Genuchten-Mualem type expressions.

MATERIAL AND METHODS

The measurements have been made in the Physical Soil Laboratory of the Ovidius University of Constantza and the results could be seen in the following paragraphs.

The soil samples have been taken from a podzolic soil. We took samples for the following range of depths: 0-30cm, 30-60cm and 60-100cm.

Measured data include particle size distributions, bulk density soil water content characteristics. The particle size analysis has been done with the hydrometer analysis method. Using the ternary diagram we determined the soil type. For this example we obtained the following fraction: 28 % clay, 21 % silt and 51 % sand. According with the textural classification used in Romania, the soil layer up to the 30 cm can be situated in the sandy clay loess (LAS) category, the soil layer between 30 and 60 cm is a loam clay loess (LAL) and the bellow horizon (from 60 to 100 cm) enters in the clay category (A).

The hydrodynamics properties of soil are water retention and saturated and unsaturated hydraulic conductivity. Water retention characteristics are commonly given as the soil water content (θ with units of $cm^3$of water per cm^3 of soil) versus a capillary pressure (h, usually defined in cm of water pressure). The notation followed in this article will assume that h is negative for unsaturated soils.

Soil - volumetric water content measurements in lab have been illustrated in the following figure (Fig. 1)

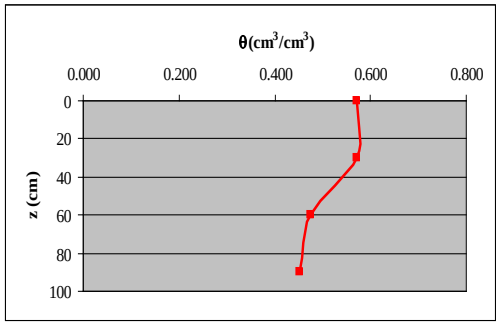

Fig. 1-Soil-volumetric water content curve

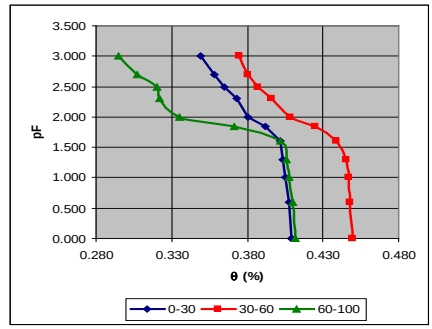

Fig.2 - Soil-water retention curve

Water retention measurements in lab have been determined with the pressure cell with porous plate (1 bar high flow ceramics) apparatus. The measurements were performed at -1, -4, -10, -20, -40, -70, -100, -200 and -316,22cm of capillary pressure (approximate values). The water retention curves for all 3 horizons are presented in Fig.2. In this graphic on X-coordinate is the volumetric water content (θ) and on Y-coordinate is pF (logarithm decimal of capillarity pressure). This graphics proved that this soil presents an appreciable micro porosity in normal condition of supply water.

Saturated hydraulic conductivity (Ks) was determined with the constant head permeameter method after the soil samples were used in the pressure cell with porous plate apparatus.

The saturated hydraulic conductivity has been measured for every type of soil horizon using undisturbed cylindrical samples, with 2 cm high and 5, 6cm in diameter. For this test we have used a constant head permeameter without suction. The specific conductivity with ksat saturation is calculated with the following equation:

$$k_{sat} = \frac{v}{i}, \quad v = \frac{V}{A \cdot T}, \quad i = \frac{h}{l}, \text{ where}$$

V represent the volume of the water (cm^3) evacuated meanwhile of time *T* (s), k_{sat} is the hydraulic conductivity of saturation (cm/s), *A* is the cross section of sample (cm^2), *h* is the difference between both piezometer tubes (cm), *l* (cm) represents the height of sample.

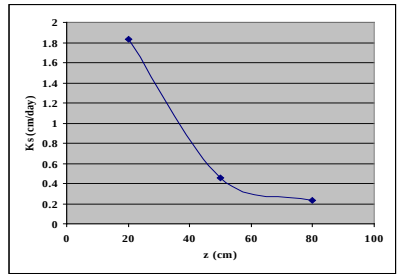

Fig. 3 – Saturated hydraulic conductivity function: Ks-z (depth)

The value of the specific saturated hydraulic conductivity calculated is corrected with a coefficient if the reference lab temperature is more or less than 20°C.

The saturated hydraulic conductivity function is presented in the Figure 3. The saturated hydraulic conductivity (Ks) value varies between 1.82 and 0.22 cm/day.

By following the function Ks – z (depth), we observed two stages: a fast Ks attenuation what means a fast drainage, follow by a flattening of the slope curve corresponding to a lent drainage.

RESULTS AND DISCUSSIONS

For modelling and other numerical or graphical purposes, it is often convenient to provide volumetric water retention and unsaturated hydraulic conductivity characteristics in functional form. For this reason we have tried to find a method (Fig.4) which allows estimating simultaneously these hydrodynamics properties of soil: the matric potential-volumetric water content relationship, h(θ), and the hydraulic conductivity-volumetric water content relationship, K(θ).

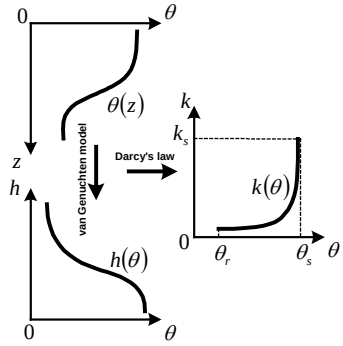

Fig. 4 – Laboratory method to estimate water retention and unsaturated hydraulic conductivity characteristics in functional form.

To fit the matric potential-volumetric water retention h(θ) curve, illustrated above [Fig.2-pF(θ)], we have used a Van Genuchten – Mualem model:

$$h(\theta) = \alpha \cdot (\Theta^{1/m} - 1)^{1/n}$$

where: $\Theta = \frac{(\theta - \theta_r)}{(\theta_s - \theta_r)}$, effective saturation (dimension less value defined by van Genuchten); $\theta =$ the volumetric water content (cm^3/cm^3); θ_r = the residual volumetric water content, defined as the water content for which the gradient $\frac{d\theta}{dh}$ becomes zero, (cm^3/cm^3); $\theta_s =$ the saturated volumetric water content (cm^3/cm^3); $\alpha =$ fitting parameter (m-1); m, n = fitting parameter: $m = 1 - \frac{1}{n}$.

From the above equation, the volumetric water content function of a soil can be estimate once the saturated volumetric water content and two curve fitting parameters, α and n are known.

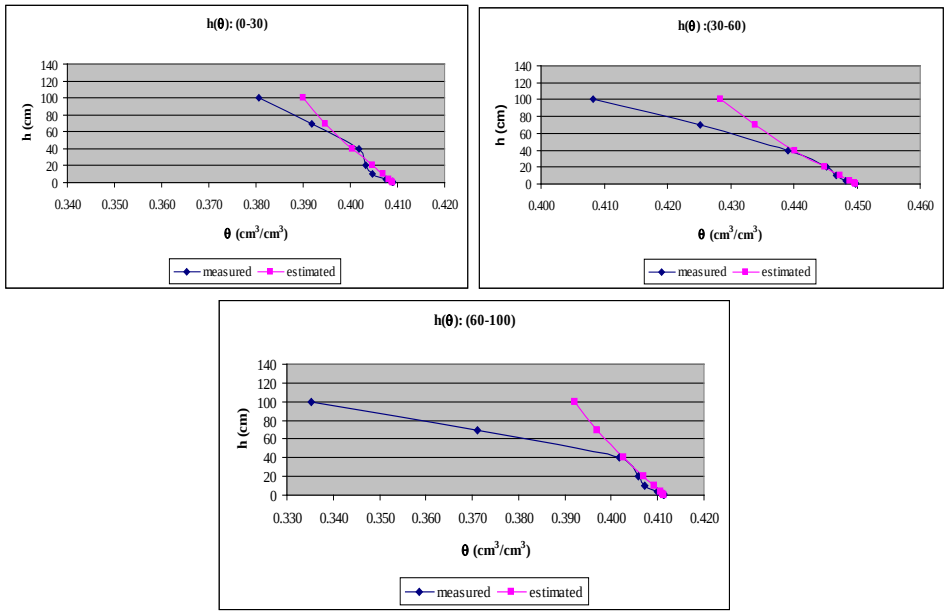

Fig. 5 - Fitted Van Genuchten - Mualem matric potential-volumetric water content h(θ) curves

The observed values are fitted with the Van Genuchten equation by minimize an objective function: the sum of squared residuals (SSC). The suitable fit of the flexible function data is measured using root-mean-square error (RMSE) for the regression of the observed vs. fitted values ($RMSE = \sqrt{SSC/N}$), the correlation coefficient (corel) and the Nash coefficient (eNash). For a suitable fit, the $RMSE \cong 0, \quad corel \cong 1, \quad and\ eNash \cong 1\ or \cong -1$. The parameter values are presented in Table nr.1.

Table 1

Fitted soil hydraulic parameters for the retention curves plotted

α (m^{-1})	*n*	θ_r (cm^3/cm^3)	θ_s (cm^3/cm^3)
0.009	1.1	0.07	0.409

From the results in Fig.5 we conclude that fitting parameters α, *n* gives an excellent fit to observed data for this type of soil.

The following assumptions were made: one-dimensional flow; homogenous soil; isotherm medium. Thus we could apply the Darcy's generalized law:

$q = -K(\theta) \cdot gradH$, where: $H = h(\theta) - z$ and equation becomes

$$q = -K(\theta) \cdot \left(\frac{dh(\theta)}{dz} - 1 \right)$$

Using the equation above, we could estimate the hydraulic conductivity function and develop the relationship hydraulic conductivity - volumetric water content: $K(\theta)$. The results obtained for the function unsaturated hydraulic conductivity – water content were presented in the Fig. 6. Regarding the value of the estimated saturated hydraulic conductivity, the Van Genuchten - Mualem model gives good results.

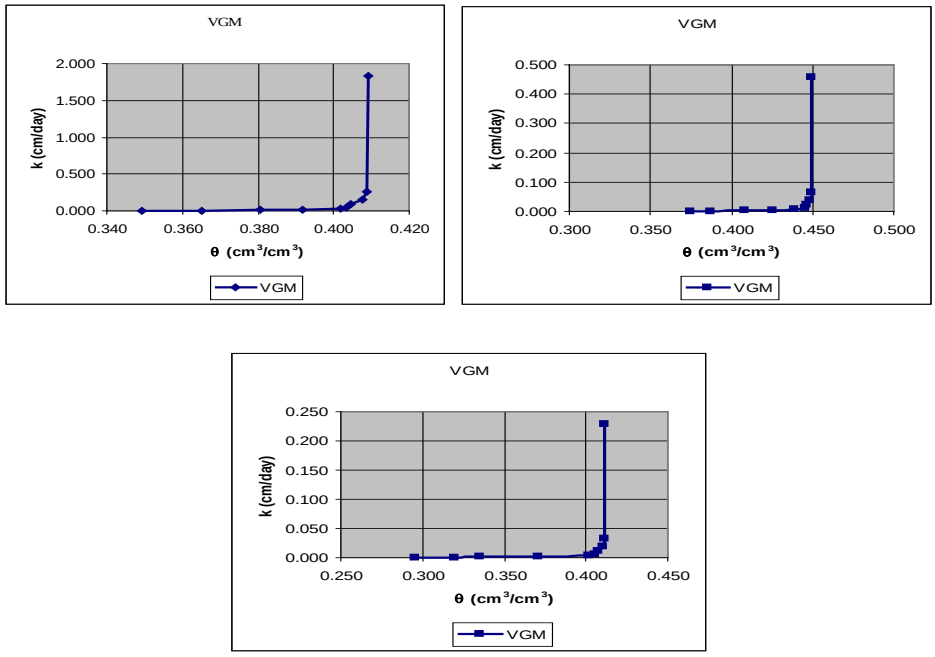

Fig. 6 - Fitted Van Genuchten - Mualem hydraulic conductivity-volumetric water content K(θ) curves

CONCLUSIONS

Knowledge of hydraulic properties of soil is essential for irrigation and drainage design, leaching requirement formulation. These properties are usually expressed as functional relationships between the soil hydraulic conductivity and water content or matric potential, and between the matric potential and water content.

The purpose of this study was to determine the volumetric water retention and hydraulic conductivity curves near saturation (in range of matric potential h=0cm to h=-316,22cm⇔pF=2,5), using experimental data and a simple laboratory method.

The Mualem - Van Genuchten (1980) model have been calibrated with experimental data.

The $h(\theta)$, $K(\theta)$ functions has been established with accuracy and the results are global satisfactory.

Finally, we can conclude that this method to estimate the volumetric water retention and hydraulic conductivity curves in laboratory is useful for describing or predicting near –saturated soil hydraulic properties and for deterministic or stochastic simulation of water retention and movement in soil.

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ECOTOXICOLOGICAL RESEARCH REGARDING THE DANUBE WATER QUALITY ON CALAFAT – BECHET SECTION

STUDIU ECOTOXICOLOGIC PRIVIND CALITATEA APELOR DUNĂRII, PE SECȚIUNEA CALAFAT - BECHET

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University of Craiova

Abstract. *This study endorsed the task of establishing the quality classes of Danube river water in Calafat – Bechet section in 2005 – 2006 period (according to Ord. 1142/2002). The chemical indicators present in Danube waters, meaning oil derivates, point out that this river fits into the second quality class. From an ecotoxicological point of view, was measured the chlorophyll a quantity and was registered the organochlorides pesticides presence in water. Lindan, gamma isomer HCH (ppb), DDT (ppb), heptachlor, aldrin were also determined, fitting the water in 3-rd and 4-th quality classes. In the same time, was enlisted the heavy metals presence, which enframed the Danube water in 2-nd and 3-rd quality classes.*

Rezumat. *Studiul a fost efectuat în perioada 2005 - 2006 şi a vizat stabilirea claselor de calitate ale apei fluviului Dunărea în secţiunea Calafat - Bechet, în conformitate cu Ordinul 1142/2002. Indicatorii chimici determinaţi, respectiv produsele petroliere, încadrează apele Dunării în categoria a II-a de calitate. Din punct de vedere ecotoxicologic, s-a măsurat cantitatea de clorofilă a şi s-a stabilit prezenţa în apă a pesticidelor organoclorurate. În acest context au fost puse în evidenţă următoarele produse: Lindan – izomerul gamma HCH (ppb), DDT (ppb), heptaclor, aldrin, care încadrează apele Dunării în categoria a III-a şi a IV-a de calitate. Un conţinut mai ridicat a fost evidenţiat în anul 2005, comparativ cu anul 2006.Totodată, s-a constatat prezenţa metalelor grele care încadrează apele Dunării în categoria a II-a şi a III-a de calitate.*

Beside the natural impurification that is a biodynamic disorder of aquatic ecosystem, Danube is polluted also artificial by the human activity, their consequence influencing the human health. This can happen especially by the liquid substances introduction (sewage, industrial water, pluvial water), which were taken from dry land different matter used like nutrients or pesticides, solid matter and different gas. In addition, may appear also accidental pollutions with oil or other dangerous substances.

MATERIAL AND METHODS

According to the Ord. no. 1142/2002 the surface waters must obey certain quality parameters. Thus, we determined: CCO-Mn (mg O_2/l) by the titrimetric method with $KMnO_4$; NH_4^+ with DR2010 spectrophotometer; the oil compounds with the hydrocarbure detector; pesticides determined with HPLC. The chlorophyll a quantity was determined also spectrophotometric with the CECIL device. There were sampled

water probe from Danube, on Calafat-Bechet section. The hydrocarbures were determined after an accidental pollution with oil compounds of Danube (2006).

RESULTS AND DISCUSSIONS

The Danube water are impurified with a series of polluted substances because of the affluent and collector canals addition.

The chlorophyll a, the main indicator of primary production, was enlisted considerable variation in 2005, meaning very intense biologic processes, especially in July and September, when the water temperatures registered higher values. The chlorophyll determination gives information on the biomass and on the potential photosynthetic activity of algal. The medium values oscillate around the 10μg/l value (Fig. no. 1).

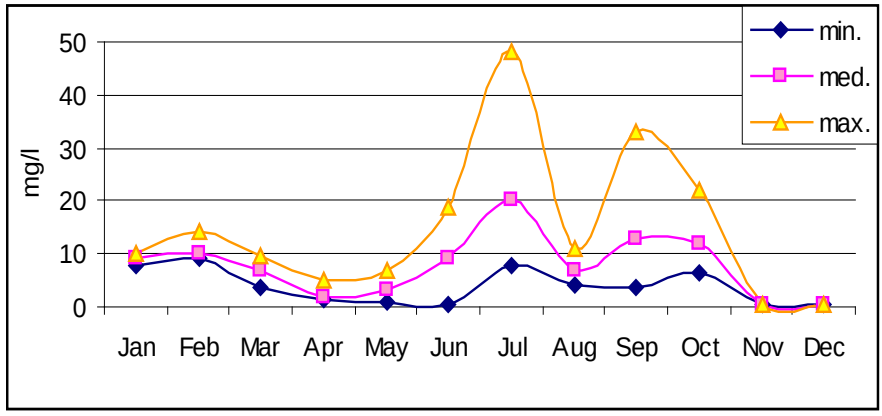

Fig. 1. Chlorophyll a evolution

The hydrazine is a mix of nitrogen with hydrogen, their aspect is an liquid without color which is used like antioxidant and reducer. It rarely used to chemical washing in power plant. The average concentration must being null, in our case this overcome the standards (Fig. no. 2).

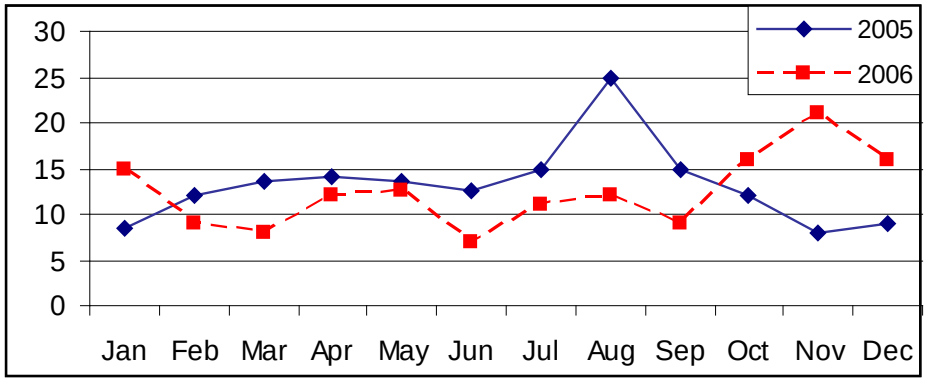

Fig. 2. The evolution of the hydrazine monthly average in 2005 and 2006 (ppb)

The average concentration of oil compounds determined in 2006 in Danube water, enframed in 2-nd quality classes limits (0,1-0,2 mg/l), the average values determined in 2006 being lower comparative with 2005 (Fig no. 3).

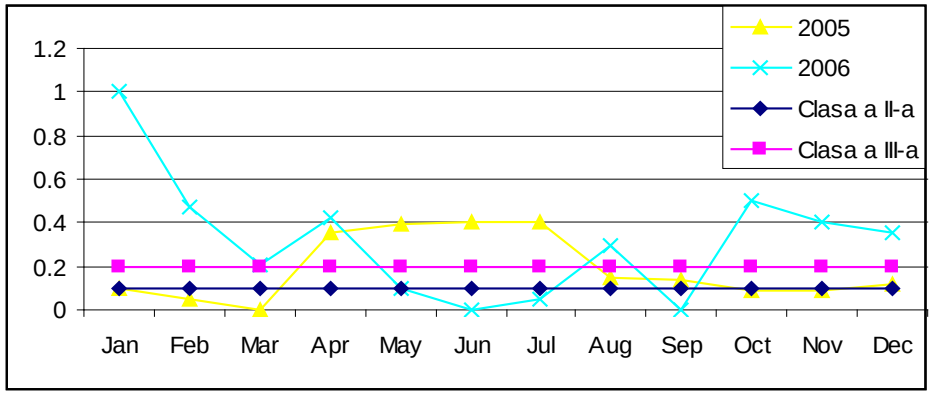

Fig. 3. The oil compound monthly average values evolution in 2005 and 2006 (ppm)

The organo-chlorinate pesticides concentration determined in 2006 highlight the diminishing of this values comparative with before year and fitting the water into the limits of 2-nd quality classes. The provenience of these substances is from the levigation in underground water following their available in agricultural crops.

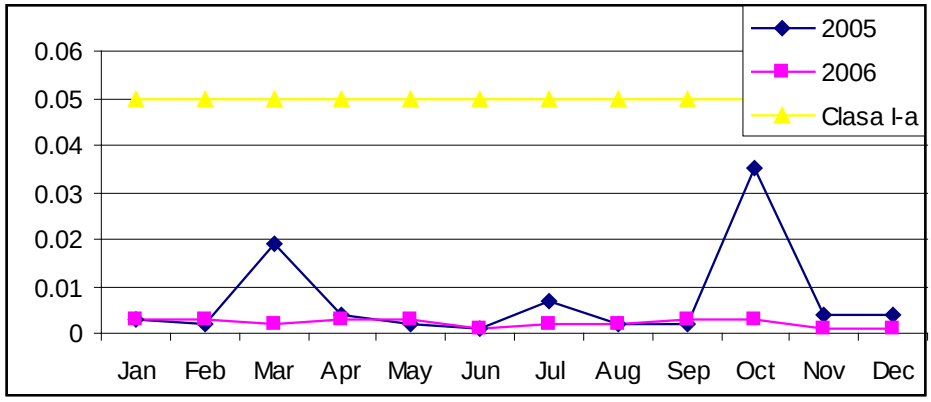

Fig. 4. The Lindan – isomer gama HCH monthly average values evolution in 2005 and 2006 (ppb)

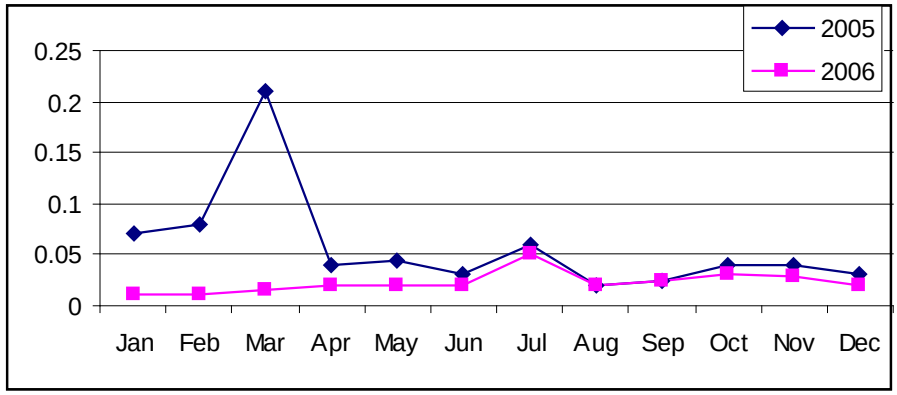

Fig. 5. The HCH monthly average values evolution in 2005 and 2006 (ppb)

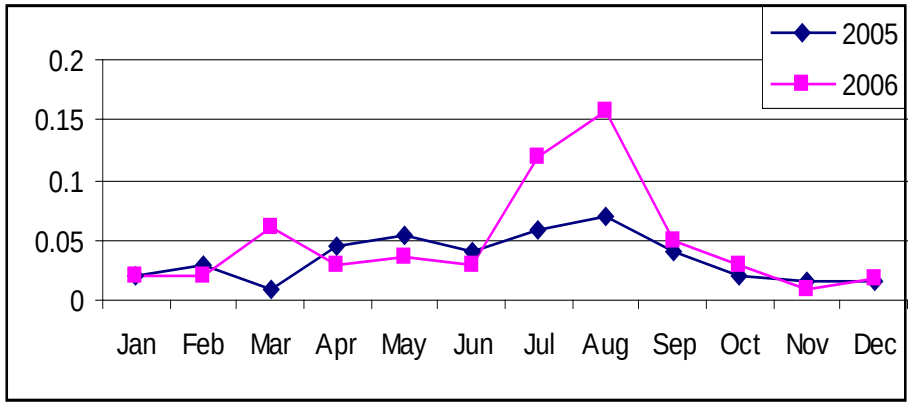

Fig. 6. The total DDT monthly average values evolution in 2005 and 2006 (ppb)

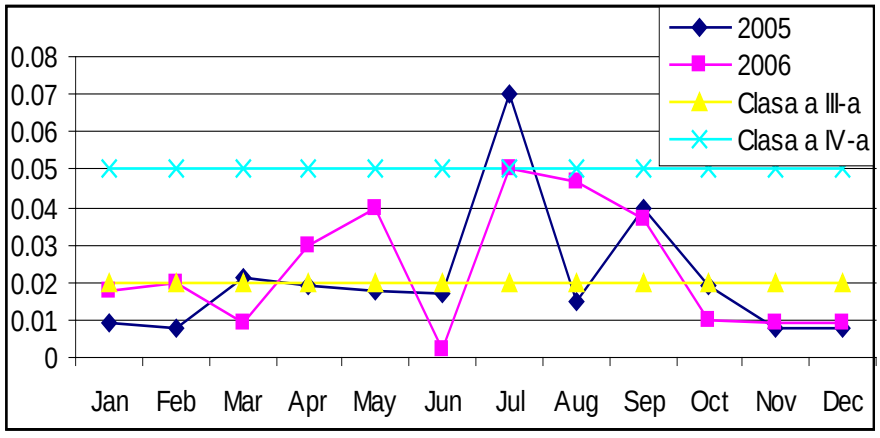

Fig. 7. The DDT monthly average values evolution in 2005 and 2006

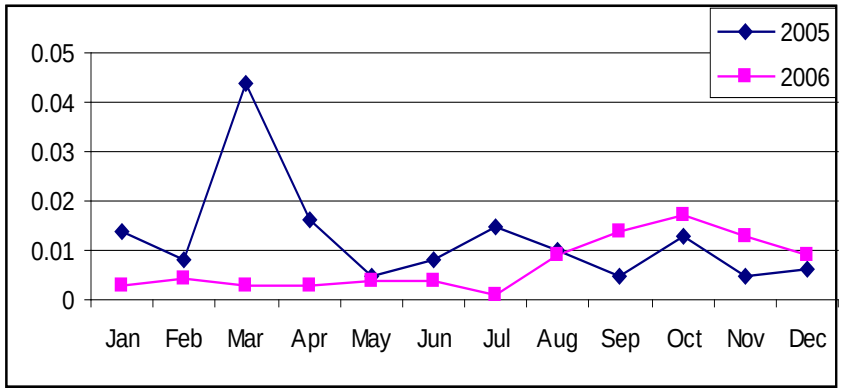

Fig. 8. The normal Heptaclor monthly average values evolution in 2005 and 2006 (ppb)

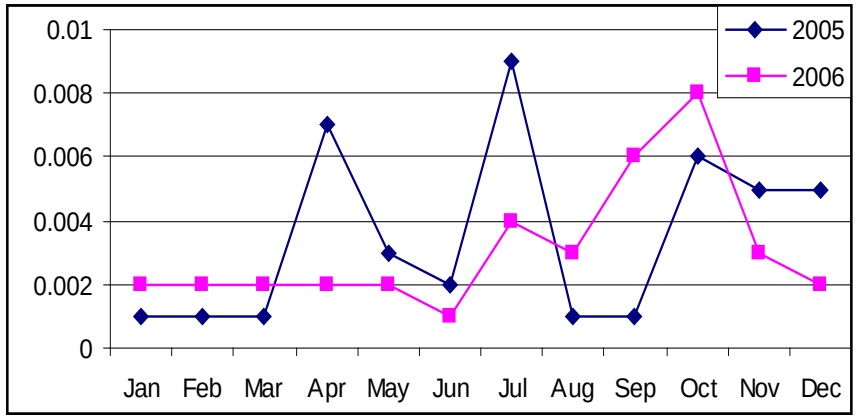

Fig. 9. The Aldrin monthly average values evolution in 2005 and 2006 (ppb)

The determinations regarding the heavy metals presence in Danube water highlights that in 2006 from the seven analyzed metals just Zn and Hg have concentrations which doesn't overcome the limits of 2-nd water quality classes. The other metals overcome the concentrations correspondent to the 2-nd quality classes:

- Fe varying between 200-4200 ppb (CMA = 100 ppb), registering a maximum in spring;
- Cd varying between 2-15 ppb (CMA = 1 ppb), the maximum being registered in summer;
- Cu with a concentration between 100-820 ppb (CMA = 20 ppb), was registered a maximum in spring;
- Mn has a variation between 80-600 ppb (CMA = 50 ppb), the maximum being enlisted in spring and summer;
- Pb has the concentration between 40-140 ppb (CMA = 5 ppb), registering a maximum in spring season.

CONCLUSIONS

This study was carried out in 2005-2006 period and focus on the water quality classes of Danube on Calafat-Bechet section, according to the Ord. no. 1142/2002.

First was monitorized the quality of Danube water in 2005, comparative with the maxim admissible values. Thus was determined the quantity of chlorophyll a which presents maxim values in eutrofication process.

From the chemical point of view, the quantity of oil produces determining the 3-rd quality classes.

The probes sampled in 2006, from quantitative point of view, are superior of those from the precedent year, without overcoming the maxim admissible level.

The ecotoxicological study was very important because it established the presence of organochlorinate pesticides. Thus, was highlighted the next produces: Lindan – gamma isomer HCH (ppb), DDT (ppb), heptachlor, aldrin, which fitting the Danube water in 3-rd and 4-th quality classes. A higher level was highlighted in 2005 comparative with 2006.

The heavy metals quantity overcomes the maxim admissible concentration for the 2-nd quality classes.

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NONLINEAR ANALYSES OF THE EMBANKMENT DAMS TO SUDDEN WATER LEVEL CHANGES IN THE RESERVOIR

ANALIZA NELINIARA A BARAJELOR DIN MATERIALE LOCALE LA VARIAȚII BRUŞTE ALE NIVELULUI APEI ÎN LAC

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Abstract. *In this paper, the effects of sudden water level changes in the reservoir on the earth dams' behavior it were studied. The water level variation in the reservoirs is a problem, which it was disregard in the past, and it was not study enough. For this reason, to put in evidence the earth dams' response in case of sudden water level changes in the reservoir, a series of numerical simulations have been done using a computer program, called Cosmos 2.6, based on the finite element method. A numerical procedure has developed on Dopca Dam and a comparison, for the model validation, it was make between numerical simulation results and timely field observations made on Dopca Dam. The problem is how the sudden rising or lowering water level of the reservoir affects the deformations of the dam. The analysis of the reservoir water level changes by the model clearly indicates that the water level variations are an important factor for the Dopca Dam structural behavior (deformation).*

Rezumat. *In acest articol este studiat efectul variatiilor bruste ale nivelului apei in lac asupra comportarii barajelor din materiale locale. Pentru a pune în evidență răspunsul barajului la aceste variații au fost realizate o serie de simulări numerice folosind programul COSMOS 2.6, bazat pe metoda elementului finit. Studiu de caz s-a realizat pentru barajul Dopca. Pentru validarea modelului s-a realizat o comparație între valorile simulate şi cele măsurate. Modelarea numerică efectuată a scos în evidență că variația nivelului apei în lacul de acumulare are o deosebită importanță asupra comportării structurii barajului.*

The embankment dams are structures that need a wide foundation surface. Generally, these dams have founded on the lands that have the same properties like earth fill materials of dams. For this reason, to study the earth dams behavior it must been taken in account the earth dam-land foundation interaction. For the shear stress and strain analyses, the earth dam-reservoir interaction it is important too. Thus, it will take in account the sudden variation of the water level in reservoir. The sudden variation it is produce in the case when it is necessary a sudden drawdown of water level in reservoir or in case of a flash flood. In this paper presented the earth dams' response in case of sudden water level changes in reservoir.

MATERIAL AND METHODS

The numerical simulations for the case of sudden rise of the water level in the reservoir were done for Dopca dam, a last affluent of the Olt river, at a distance of 1,5 km upstream of the Dopca village, in the Brasov department. The Dopca dam is an earth fill dam, made of embankment from the materials extracted from the reservoir basin, with a reinforced concrete face, having a surface about 7800 m^2, made on the upstream face with the maximum height of 18,0 m and the length at the top of 175,0 m (fig. 1).

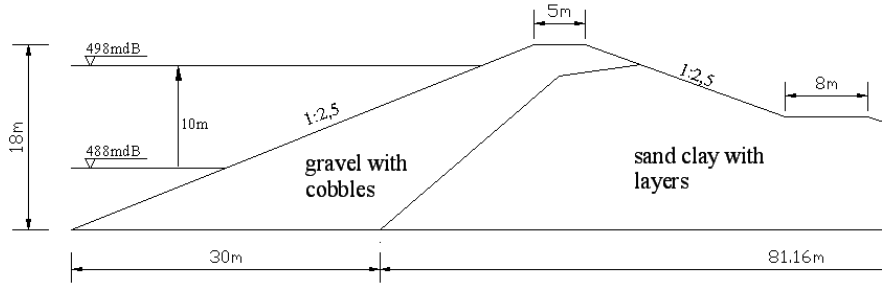

Fig.1 – Dopca dam section

Two cases it was use for the numerical simulations over the dam: sudden fill and the rapid drawdown of water in the reservoir behind dam. In case of the first simulation, it was consider a rise of water level in the reservoir about 1m/day and in the second case a rise of water level about 3m/day. Numerical analyses has made in nonlinear hypothesis of materials behavior from the body dam using finite element program with Drucker-Prager model. In both cases, the simulations have done with the help of the program of finite elements COSMOS 2.6.

The results obtained by simulation it was compare with measured data. The measured data has achieved from the reference point installed in the body dam (fig. 2).

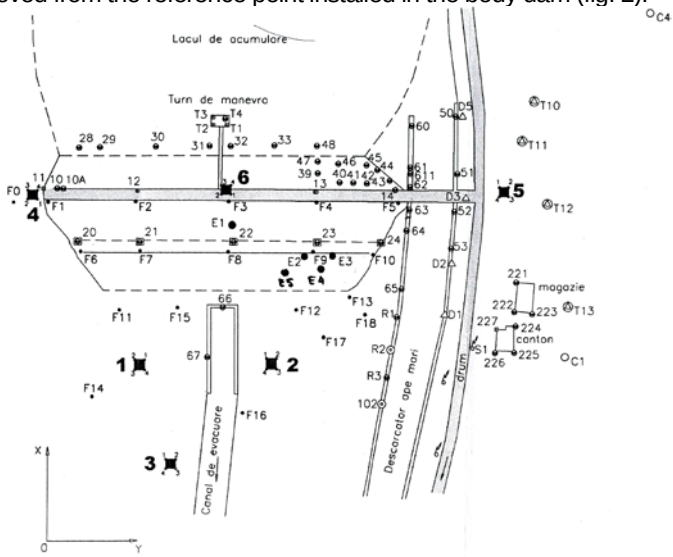

Fig.2 –The reference points position

RESULTS AND DISCUSSIONS

For the first case when the rise of level of water level was considered of 1m/day the filling had taken place in 10 days meaning 864000 seconds, and in the second case the filling had taken place in 3,33 days meaning 288000 seconds. To be sure, that the results obtained represents a behavior close to the behavior of the real dam, the results have been compared with the real behavior of the dam in time.

The finite element discretization of the dam section has presented in fig.3. For the calculus, we have considered the nodes number 1, 9 and 18 (fig.4). For example are presented the results for node number 9 that coincide with the reference point number 39 (fig.2).

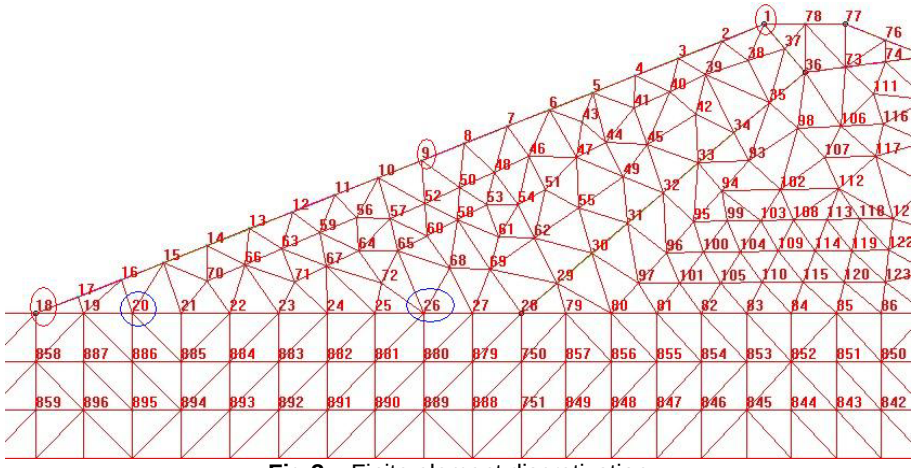

Fig.3 – Finite element discretization

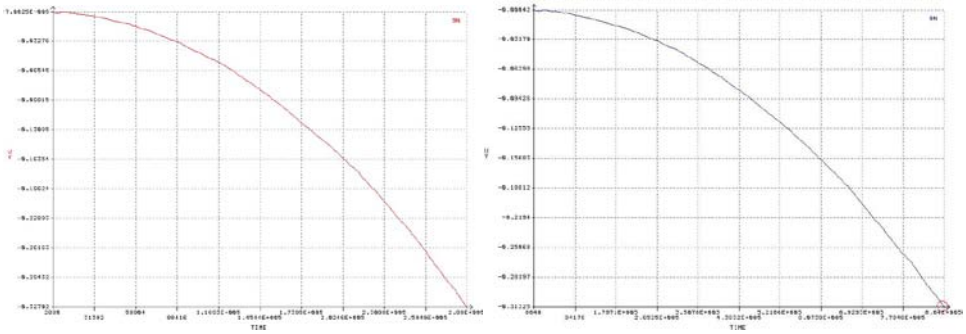

Fig. 4 - The settlement variation on the y direction in node 9 in the case of sudden variation –left and the case of slow variation – right (cm)

The total settlements value on y direction in the case of sudden variation is 3.29mm (for the 9 node). At the 39 reference point was measured a value of

3.27mm. In the fig. 5 the differences between the settlement obtained by the calculation and the settlement obtained by the measurement for the rest of point (41 and 46) are presented.

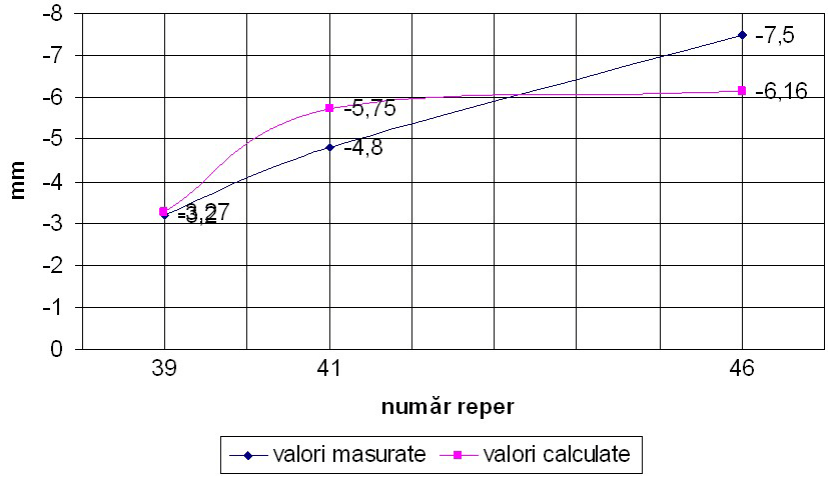

Fig.3 – Comparesing between measured data and observed data

In this graphic, the x axes represent the references point number and the y axe represents the total settlement measured and simulated.

CONCLUSIONS

The methods used to simulate the earth dam behavior offers good results. We note that the differences between the settlement measured and simulated are very small (min. 0.02mm and maximum 1.34mm).

Following the comparing value of the results in the two cases, we can se that the influence of sudden variation of the water level over the results is very important. The differences of the displacement on the y (vertical) direction are very small, but we calculated also the settlement on the horizontal direction. The differences on the x (horizontal) direction are important and could not be ignore.

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STUDY OF REFERENCE EVAPOTRANSPIRATION IN DOBROGEA REGION

STUDIU ASUPRA EVAPOTRANSPIRAȚIEI DE REFERINȚĂ ÎN DOBROGEA

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Abstract. *Accurate estimation of regional evapotranspiration (ET) is essential for many agricultural water related studies. The data from 10 weather stations, with at least 40 years of data during the period of 1965–2005, were used for estimation of reference ET (ET_0) in Dobrogea region. Two main objectives of this study were: (i) prediction of mean monthly and annually ET_0 in Dobrogea using the adjusted Thornthwaite method, and (ii) study of spatial variation of multi-annual ET_0.*

Rezumat. *Determinarea cu precizie a evapotranspiratiei este esentiala pentru cele mai multe din proiectele de irigatii. Pentru estimarea evapotranspiratiei de referinta, sunt utilizate datele de la 10 statii climatice din Dobrogea, pe aproximativ 40 de ani din perioada 1965-2005. Doua obiective sunt urmarite in acest studiu: (i) calculul medii lunare a evapotranspiratiei de referinta utilizand metoda Thornthwaite ajustata si (ii) studiul variatiei spatiale a evapotranspiratiei de referinta multi anuale.*

Evapotranspiration (ET) is the loss of water to the atmosphere by the combined processes of evaporation from the soil and plant surface and transpiration from plants (1). Estimation of evapotranspiration is one of the major hydrological components for determining the water budget. Quantification of referable reference evapotranspiration (ETo) for short grass is necessary in the context of many issues, for example, crop production, management of water resources, scheduling of irrigation, evaluation of the effects of changing land use on water yields, and environmental assessment (5).

MATERIAL AND METHODS

Dobruja or Dobrudja (Dobrogea in Romanian) is a region situated in the South – East of Romania, between the Black Sea and the lower Danube River (Fig.1). Generally, Dobrudja's climate is temperate - continental and is divided in 2 units (Fig.1): a units (I) which contain the Danube Delta, its south, the too lagoons (Razim lake and Sinoe lake) and the eastern region and another units (II) which contain the rest of territory while the climate is influenced by the moderate continental belt. Three general approaches to estimating reference ET_0 exist: temperature methods, radiation methods and combination methods. The temperature methods are empirical equations that rely on air temperature as a surrogate for the amount of energy that is available to the reference for evapotranspiration.

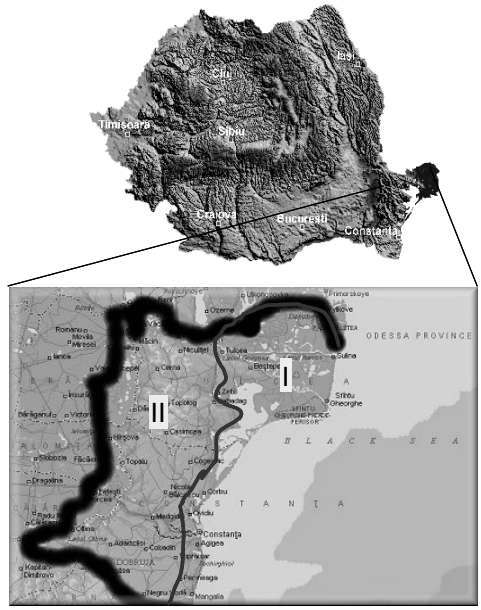


Fig.1 – Dobrudja region

Thornthwaite (1948) developed an empirical equation for estimating potential evapotranspiraion from a reference grass surface that requires only mean monthly temperature and day length estimates as input. The regression equation was developed using data from lysimeter and small watershed water balance experiments at several sites scattered throughout the United States. Thornthwaite recognized that there is a more direct physical relationship between potential evaporation and net radiation than between potential evaporation and temperature, but foresaw correctly that sufficient radiation measurements or accurate calculations to reliably estimate potential evaporation would be difficult to come by for many years to come. The formula used by Thornthwaite is: $\boldsymbol{ET_o} = 16 \cdot \left(\frac{10 \cdot \boldsymbol{t}}{\boldsymbol{I}} \right)^{\boldsymbol{a}}$ where: where $\boldsymbol{t}$ is mean surface air temperature in month i (°C) and $\boldsymbol{I}$ is the heat index defined in equation below. The exponent $\boldsymbol{a}$ in is a function of the heat index ($\boldsymbol{I}$).

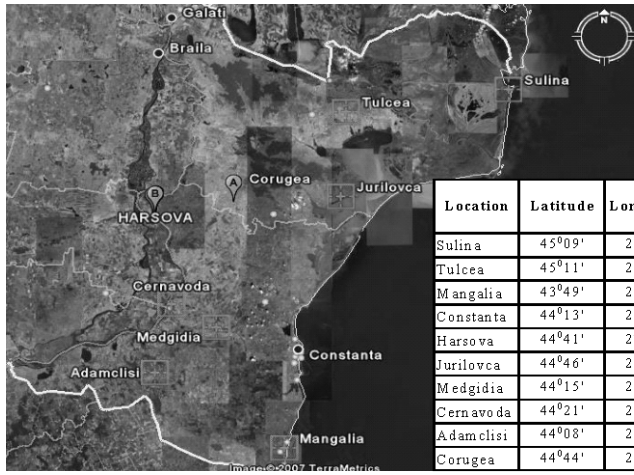
$$\boldsymbol{I} = \sum_{\boldsymbol{i}=1}^{12} \boldsymbol{i}, \quad \boldsymbol{i} = (\boldsymbol{t}/5)^{1.514},$$

$$\boldsymbol{a} = 6.7 \cdot 10^{-7} \cdot \boldsymbol{I}^3 - 7.71 \cdot 10^{-5} \cdot \boldsymbol{I}^2 + 1.79 \cdot 10^{-2} \cdot \boldsymbol{I} + 0.49$$

Monthly estimates of potential evapotranspiration calculated with this equation need to be adjusted for day length because 30 day months and 12 hour days were assumed when this relationship was developed. The adjusted potential evaporation accounting for month length and daylight duration is given by $\boldsymbol{ET_o} = 16 \cdot \left(\frac{10 \cdot \boldsymbol{t}}{\boldsymbol{I}} \right)^{\boldsymbol{a}} \cdot \frac{\boldsymbol{d}}{30} \cdot \frac{\boldsymbol{h}}{12}$, where $\boldsymbol{d}$ is length of the month in days, and $\boldsymbol{h}$ is the duration of daylight in hours on the fifteenth day of the month. However, there is no direct, unique relationship between temperature and energy. This limits the generality of the following temperature methods. Local calibration of the methods may provide

some measure of accuracy, particularly for averaging periods on a monthly or seasonal basis. Some modifications were made to the original formula. The modifications consist in the exponent $\boldsymbol{a}$ determination through calculation of the parameter $\boldsymbol{a}_0$, $\boldsymbol{a}_1$, $\boldsymbol{a}_2$, $\boldsymbol{a}_3$ from the follow equation: $\boldsymbol{a} = \boldsymbol{a}_3 \cdot \boldsymbol{I}^3 - \boldsymbol{a}_2 \cdot \boldsymbol{I}^2 + \boldsymbol{a}_1 \cdot \boldsymbol{I} + \boldsymbol{a}_0$. This parameter values were calculated using a Maple software program written in Java language. The calibration was made for the Constanta station using the temperature and evapotranspiration values measured in the 1973-1995 period.

Monthly evapotranspiration (ETo) estimates for 10 locations in Dobrudja region are calculated by the modification Thornthwaite methods. The analysis of 40 years of data during the period of 1965–2005, was used for estimation of reference ET (ET_0) in Dobrogea region. The data (temperature and the evaporation measured) we used were obtained from the archives of the Romanian Institute National of Meteorology. Name of stations, locations, elevation and multi annual mean temperature are presented in Fig. 2



Location	Latitude	Longitude	Elevation (m)	1965 - 2005 Avg temp (^{0}C)
Sulina	45^{0}09'	29^{0}39'	2.08	11.49
Tulcea	45^{0}11'	28^{0}49'	4.36	11.14
Mangalia	43^{0}49'	28^{0}35'	6.00	11.57
Constanta	44^{0}13'	28^{0}38'	12.80	11.74
Harsova	44^{0}41'	27^{0}57'	37.51	11.00
Jurilovca	44^{0}46'	28^{0}53'	37.65	11.01
Medgidia	44^{0}15'	28^{0}16'	69.54	11.04
Cernavoda	44^{0}21'	28^{0}03'	87.17	11.15
Adamclisi	44^{0}08'	28^{0}00'	158.00	10.86
Corugea	44^{0}44'	28^{0}20'	219.20	9.94

Fig.2 – Locate of climate station

RESULTS AND DISCUSSIONS

Climatic data

The variation of the annual mean temperature for each station (Fig. 3) reveals the succession of the cold and warm year over the study period. It can be remarked that at all the stations the same evolution is preserved, i.e. starting to 1997, the mean annual temperature is higher than the multi - annual mean temperature at each station.

The multi-annual mean temperatures vary in small limits (10-12^{0}C approximately), the highest values being registered on the coast. The temperature values decrease with the altitude. The smallest temperature was registered at Corugea – on the centre (9.94^{0}C at 219.2m), and the biggest at Constantza (11.740C at 12.8m) and Mangalia (11.57^{0}C at 6.0m) – on the coast, Tulcea and Sulina at Danube Delta, respectively at Cernavoda (11.15^{0}C at 87.17m), on the Danube part.

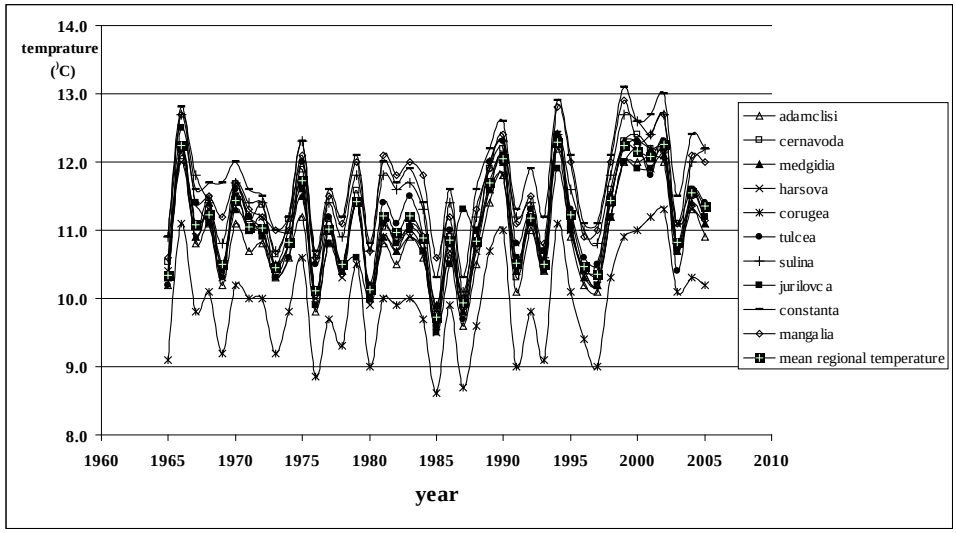


Fig.3 – The mean multi-annual temperature (period 1965-2005)

Evapotranspiration measured and calculated

The same behaviour is observed in the evapotranspiration measured evolution (Fig. 5). The annual mean evapotranspiration measured at Constanta station varies in the interval 691.4mm (in 1980) and 1028 mm (in 1990). In the period 1976-1988, the annual mean evapotranspiration is smallest than the multi-annual mean value (859.4mm). Starting to 1988, the annual mean evapotranspiration is higher than multi-annual mean value.

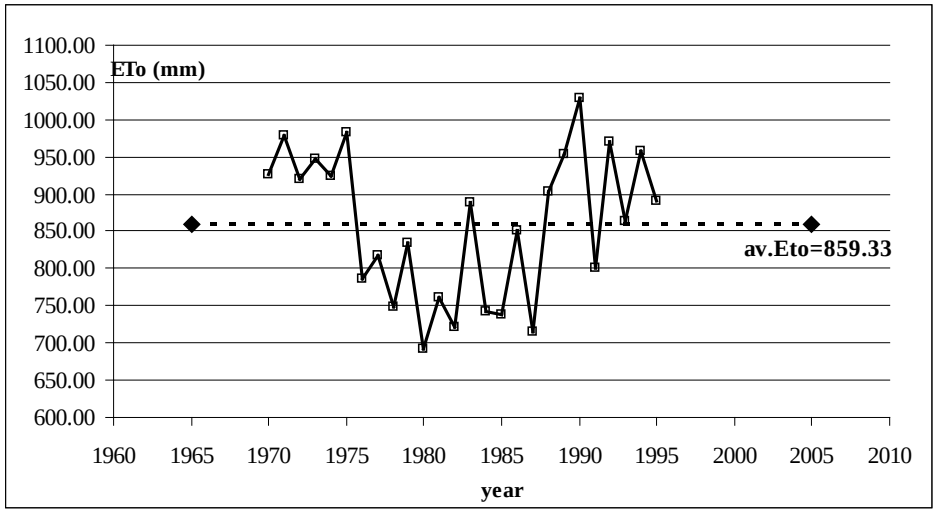


Fig.4 – The temporal evolution of the annual mean evapotranspiration measured

The parameters a_0, a_1, a_2, a_3 determinate by the program are:

a_0 -58.62700 a_1 3.368792 a_2 -0.06331 a_3 0.000399

We note the original Thornthwaite equation with Eto-TO and the modified Thornthwaite equation with Eto-TM.

The results obtained for the Constanta station utilising ETo-TM relieve a good approximation of the evapotranspiration for the summer (June-August) period comparatively to the results obtained with ETo-TO (fig. 5); for the winter period we can not concluded because in this period doesn't exist the values of the evapotranspiration measured.

In the period march-may and September-November, the evapotranspiration is underestimated.

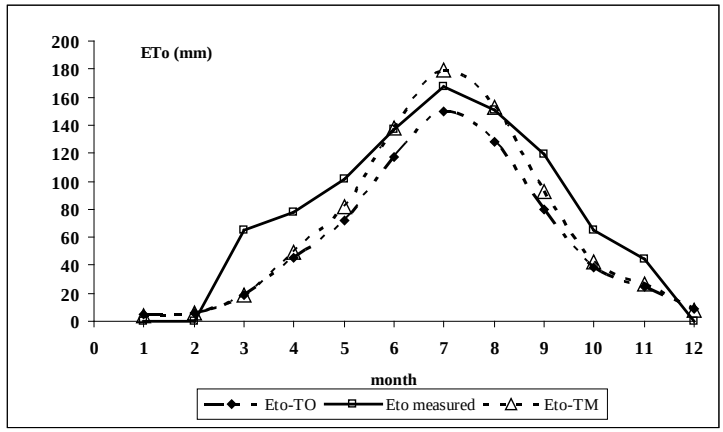


Fig.5 – Example

Table 1

Descriptive Statistics of the multi annual evapotranspiration distribution at 10 climate stations (units mm)

Station	Multi-annual mean	Maximum	Minimum	Cv
Adamclisi	700.4	861.8	378.5	0.154
Cernavoda	696.6	903.6	637.5	0.263
Medgida	718.4	861.8	455.3	0.140
Harsova	755.3	882.5	517.7	0.116
Corugea	519.8	813.3	161.8	0.358
Tulcea	760.1	889.9	560.7	0.106
Sulina	776.0	956.9	614.3	0.101
Jurilovca	726.6	890.4	418.6	0.149
Constanta	797.9	1013.7	642.6	0.097
Mangalia	753.6	890.5	532.7	0.118

Applying the ETo-TM formula for the all weather station, we note that the losses by evaporation (multi-annual mean) varies between 519.8mm at Corugea station and 797mm at Constanta station, the highest values being registered on the coast (Mangalia– 890.5mm, Sulina – 957mm, Tulcea- 889.9mm, Constanta – 1013.7mm).

Table 1 present the descriptive statistics of the multi - annual mean evapotranspiration at the wheatear stations. Since the coefficient of variation (Cv) are very small, it results that there is a very small dispersion of the multi – annual mean evapotranspiration in space.

CONCLUSIONS

In order to improve the Thornthwaite method performance the 26-years evaporation data derived from Constanta station was used for fitted the Thornthwaite formula. The parameter a_0, a_1, a_2, a_3 values were calculated using a Maple software program. Evapotranspiration monthly values for Constanta station were calculated using Thornthwaite original formula and Thornthwaite modified formula for the 1970-1995 periods. The Thornthwaite modified method appears to provide comparatively reasonable values during the summer for Constanta station, but underestimates ETo during the remainder of the year. The regional analysis of the evapotranspiration for the period 1965-2005 from 10 meteorological station prove that the smallest losses by evaporation was registered at Corugea, and the biggest on the coast, respectively on the Danube part, so the evapotranspiration decrease from the coast to interior and from the Danube (seat on the West side of the region) to the interior.

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GIS USED IN RECENT ANTHROPIC RELIEF ALTERATIONS ASSESSMENT WITHIN CĂLIMANI NATIONAL PARK

GIS UTILIZAT ÎN EVALUAREA MODIFICĂRILOR ANTROPICE RECENTE ASUPRA RELIEFULUI ÎN PERIMETRUL PARCULUI NAȚIONAL CĂLIMANI

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"Al. I. Cuza" University of Iaşi

Abstract. *Interesting mineral resources economic areas were always intensely humanized and are displaying, sometimes, dramatic changes of the landscape, especially on topography. The communist period, with centralized economy, the state desire to be independent energetically and resource pools at any costs often generated, huge transforming works on landscape, but with doubtful economic results. The impact on the original topography is devastating, with pollution phenomena in the environment, which bluntly modifies the rhythm, direction and the intensity of the relief normal evolution. A characteristic example is the large sulphur open quarry in the Călimani Mountains, now engulfed in the National Park with the same name. Are presented selected morphometrical and morphographical indices which are relevant to describe the actual status in two distinct moments before opening the mining works and after closing the exploitation. This kind of analysis is relevant and useful to scientific founding for all the actions that may be taken for ecological rehabilitation of this former mining area..*

Rezumat. *Arealele interesante din punctul de vedere al resurselor minerale au fost întotdeauna intens antropizate, prezentând , uneori, modificări radicale ale peisajului, în special ale reliefului. Perioada comunistă, cu economie centralizată, dorința statului de a deveni cu orice preț independent din punct de vedere energetic şi al rezervelor de resurse minerale a generat, deseori, lucrări transformante de mare amploare asupra reliefului, dar cu rezultate economice îndoielnice. Impactul asupra reliefului original este devastator, cu declanşarea unor procese geomorfologice intense, de fenomene de poluare asupra mediului, care modifică radical ritmul, sensul şi intensitatea sensului de evoluție a reliefului. Un exemplu relevant îl constituie imensa carieră de exploatare a sulfului din Masivul Călimani, acum inclusă în perimetrul Parcului Național Călimani. Sunt prezentate câteva aspecte morfometrice şi morfografice relevante în două situații distincte, înainte de deschiderea carierei şi după închiderea exploatării. Analiza este interesantă şi utilă pentru fundamentarea demersurilor care se fac pentru reabilitarea ecologică a acestui areal minier.*

GIS and RS can successfully be used for assessing anthropic impact on topography. Precision and the wealth of quantitative data can be used for many purposes and in this example may be useful for site ecological rehabilitation.

MATERIAL AND METHODS

Topographical, cadastral and GPS information were used in order to generate digital thematic maps for two distinct moments of the area: original topography, before the works had started and the second, when the quarry was closed and was put to technical conservation for future ecological rehabilitation. Base maps were at scale 1:5,000 (for 1964) and the mining topographical plan at the same scale (2002). Some additional information was obtained from CLC (Corine Land Cover Project) 2000 vector files and LANDSAT TM 5 imagery.

GPS readings for location of certain altitudes in the quarry and dump sites were made with a GARMIN GPSmap 76CSx device.

GIS classic techniques were used to create specific initial layers and spatial interpolation and classification were used to generate the final layers. The GIS software used was Microimages TNTMips v. 6.3.

Selected thematic maps regarding morphometry and morphography indices in the two moments are presented below.

RESULTS AND DISCUSSIONS

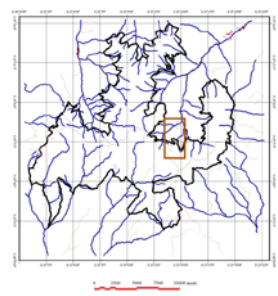

Fig. 1. - Geographical position of the studied area

The exploitation of the sulphur ore was conducted near Negoiu Românesc Peak (fig.1). Some technical parameters of the exploitation are: bottom of the quarry is at 1,420 m altitude; the borders of the quarry have various altitudes and are encompassed between Negoiu Românesc Peak at 1,860 m and goes down to 1,560 m, and on the opposite side of the quarry, fom 1,740m to 1,560 m. There were opened exploitation terraces with heights of 10 or 20 m, as follows: 20 m height terraces are between 1,560 and 1,820 m, regarded as optimal for the extraction of the sterile rocks that covered the ore; 10 m height terraces are between 1,560 m and 1,420 m, regarded as optimal for sulphur ore mining.

These works are reflected in alterations of the original topography as illustrated below:

Digital Elevation Model (DEM)

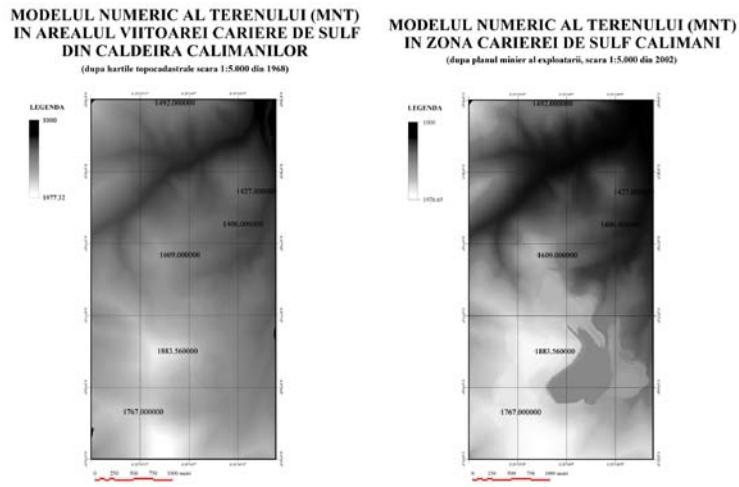

Fig.2 – Digital Elevation Models for the two situations (before and after closing the exploitation)

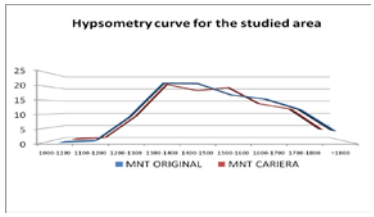

Fig. 3 – Hypsometry curve reflecting altitude changes in the area (in percents)

ALTITUDE	ORIGINAL DEM	QUARRY DEM (%)
1000-1100	0,06	0,01
1100-1200	0,6	0,6
1200-1300	9,07	9,07
1300-1400	21,08	21,47
1400-1500	21	19,03
1500-1600	16,88	20,25
1600-1700	15,41	13,87
1700-1800	11,74	11,87
>1800	4,16	3,84

As it can be noticed in the figures 2 and 3 the changes are between 1,400 and 1,800 m reflecting both the excavation and deposition of the sterile in the dump areas with dramatic fluctuations for 1,500-1,700 m. Original altitude values went down in the upper part of the mountain (due to the exploitation) and altitudes increased at lower altitudes (due to sterile dump sites).

Morphometry and morphography aspects

Slope. Derived from DEM slope values in the area were also dramatically altered that has a strong impact in the natural evolution of the landscape with large areas where slope was artificially increased (dump sites slopes, road works on the mountain, by-product dump lakes (that modifies local base level for some small creeks around the area, etc.)(Fig.4). The increase of the slope allow a

stronger surface erosion, in all areas where the original slope was modified, both inside the quarry and on the dump sites slopes with values exceeding 35-45°. Also, were created large artificial areas of quasi-horizontal surfaces on the dump sites where wind erosion is dominant, from the sterile deposited there (< 5°) (Fig.5).

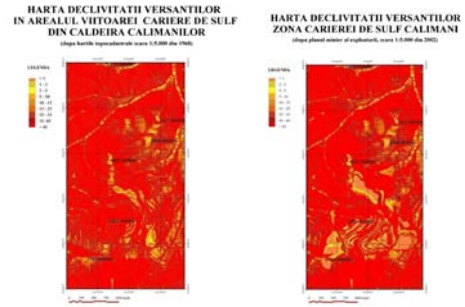

Fig.4 – Slope maps for the studied area, before and after closing the exploitation (it can be noticed the large alterations of the slope in central and south parts of the map)

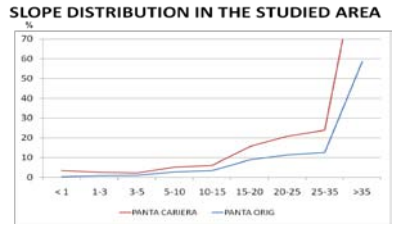

Fig.5 – Slope distribution (% of total area) on relevant geomorphological slope classes

Aspect. Was also intensely modified especially due to creation of the quarry (with large exploitation steps as shown above), large dump sites and of the deposition lakes, also from artificial levelling for plant construction, miners' colony and other infrastructure works (Fig.6).

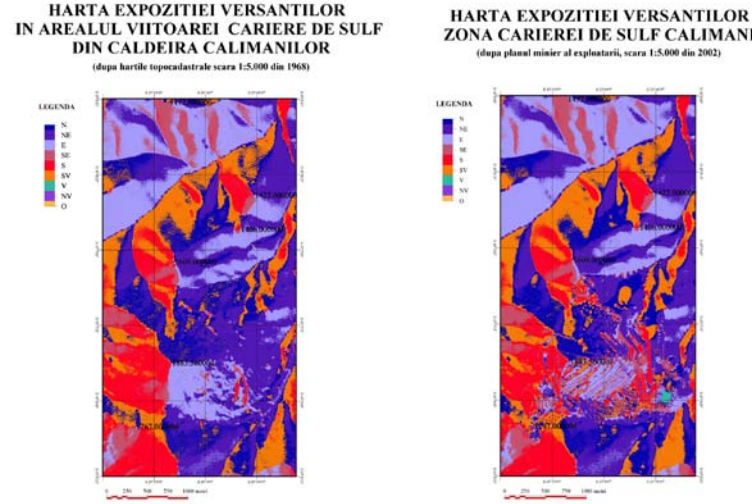

Fig.6 – Aspect maps of the studied areas with dramatic changes in south-central part (map in the right side)

Shading (Morphography maps). Are quite relevant for qualitative description of the studied area that may suggest to civil engineers involved in restoration ways to rehabilitate the affected areas (Fig.7-8).

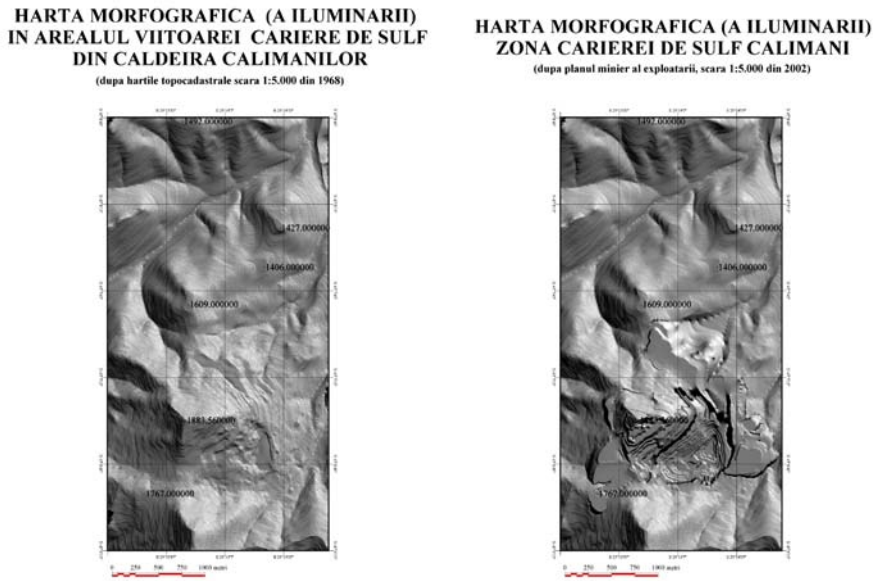

Fig.7 – Shading (Morphography maps) – useful for qualitative assessments

Fig.8 – Actual situation of the Calimani former sulphur quarry

CONCLUSIONS

The above mophometrical and morphographical are only selected thematic maps that can be generated for topography modifications assessment and for ecological rehabilitation can be produced many more, in respect of the data provided.

GIS / RS can be successfully used for scientific founding and modelling of the research projects in various scientific fields (biology, forestry, geology, ecology, etc)

When made at large or very large scales can become a useful pool for quantitative and qualitative data, as a basis for mining conservation/rehabilitation implementation actions for former mining areas and not only.

The technology permits modelling, prognosis and monitoring for various processes and phenomena from the sites envisaged to be ecologically rehabilitated and for choosing the best technical solution to do this.

Acknowlegdements

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ASPECTS OF USING ORTHOPHOTOPLANS IN THE INFORMATIONAL SYSTEM OF FARMING CADASTRAL SURVEY IN THE ADMINISTRATIVE TERITORY UNIT OF BÂLCA – SUCEAVA

ASPECTE ALE UTILIZĂRII ORTOFOTOPLANURILOR ÎN SISTEMUL INFORMAȚIONAL AL CADASTRULUI AGRICOL DIN UNITATEA ADMINISTRATIVĂ TERITORIALĂ BÂLCA - SUCEAVA

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Abstract. *Making a modern cadastral survey, compatible with the one from the European Union, requires the continuous improvement of measuring methods. Based on the new technologies of terrestrial measurements, the determination of area size and configuration according to destination, usage categories and landowners was assured. During 2003-2007, by using aerophotogrammetrical methods, the orthophotoplan was made at scale 1 : 10 000, in the stereographical projection - 1970, on base territorial units. These topographical plans have included space (boundary limits, physical blocks and cadastral plots) and descriptive data. The cadastral territory of the Bâlca Commune was mapedited on two sheets of the orthophotoplan at scale 1 : 10 000. The total area of* ***2000,43 ha*** *was delimited and framed on* ***315 physical blocks.*** *The areas of physical blocks calculated in this case study were between* ***0.11 ha*** *(block 74) and* ***49,20 ha*** *(block 378). For checking the way of calculating the areas of physical blocks and cadastral plots, they used the control areas of geodesic trapeziums at scales 1 : 10 000 and 1 : 5 000, determined both on Krasovski – 1940* ***(Ka-40)*** *reference ellipsoid and in the stereographical projection system- 1970.*

Keywords: *farming cadastral survey, aerophotogrammetrical methods, orthophotoplan, space and descriptive data, physical block, cadastral plots, control areas.*

Rezumat. *Realizarea unui cadastru modern, compatibil cu cel din statele Uniunii Europene, implică perfecționarea continuă a metodelor de măsurare. Pe baza noilor tehnologii de executare a măsurătorilor terestre se asigură determinarea configurației şi mărimii suprafețelor pe destinații, categorii de folosință şi proprietari. Prin utilizarea metodelor aerofotogrammetrice s-a realizat, în anii 2003-2007, ortofotoplanul, la scara 1 : 10 000, în proiecția stereografică - 1970, pe unitățile teritoriale de bază. Aceste planuri topografice cuprind datele spațiale (limite de hotar, de blocuri fizice şi parcele cadastrale) şi descriptive. Teritoriul cadastral al comunei Bâlca a fost cartoeditat pe două foi ale ortofotoplanului la scara 1 : 10 000. Suprafața totală de* ***2000,43 ha*** *a fost delimitată şi încadrată pe* ***315 blocuri fizice.*** *Ariile blocurilor fizice calculate în studiul de caz s-au situat între* ***0,11 ha*** *(blocul 74) şi* ***49,20 ha*** *(blocul 378). Pentru verificarea modului de calcul al ariilor blocurilor fizice şi ale parcelelor cadastrale componente au fost utilizate suprafețele de control ale trapezelor*

geodezice la scările 1 : 10 000 şi 1 : 5 000, determinate atât pe elipsoidul de referinţă Krasovski – 1940 ***(Ka-40),*** *cât şi în sistemul proiecţiei stereografice - 1970.*
Cuvinte cheie: *cadastru agricol, metode aerofotogrammetrice, ortofotoplan, date spațiale şi descriptive, bloc fizic, parcele cadastrale, suprafețe de control.*

The durable development of rural area of Romania requires development of a balance between economic growth and environment protection, depending on the soil quality and the possibility of using the land resources (2). Based on the present situation of using land resources it was worked out "**The National Program for Rural Development 2007-2013**" (5) of which we notice, first of all – the increase of competitiveness in the agriculture and forest sector. The implementation of rural developing strategies is based on the financing coming out from the **European Agriculture Fund for Rural Development (FEADR)** for period 2007-2013. At the local level, getting and managing of these funds is carried out by the **Payment Agency for Rural Developing and Fishing (APDRP)**, and respectively the **Payment and Intervention Agency for Agriculture (APIA – http://lpis.apia.org.ro/).**

The use by the Payment and Intervention Agency for Agriculture **(APIA)** of the digital plans in **"on-line**" system requires the knowledge of available resolutions affecting the graphic design and the data multitude (3). The multimedia elements determining the design and the content of the plan, influencing on their turn also the categories of multi-users beneficiaries (1, 4), where the information has to circulate and to be assimilated by each level.

MATERIAL AND METHOD

At the European Union level it was carried out a unitary reference basis of the regional statistics, named **Nomenclature of Statistical Territorial Units (Nomenclature des Unites Teritoriales Statistique – NUTS).** In Romania it was created **eight developing regions** by voluntary associations, without administrative status and without legal status. These regions make part of the European NUTS-2 system with an average population of 2.8 million inhabitants of each developing region.

In order to implement the rural developing measures that are financed by EU through the Payment and Intervention Agency for Agriculture (APIA) it was worked out at the territorial administrative units level of Romania the specific technical documentation. In this respect, in 2003-2007 it was executed aerophotogrammetric erections by the specialized company Estereofoto Geongenharia S.A., based on which the ortophotoplan was compiled in digital and analogical format with the resolution of map drawing representation to scale 1:10 000.

With the survey carried out on the content elements of the general plan on scale 1:10 000 of the Bâlca commune territory (**SIRUP code 147036**), Suceava district it was compiled a cadastral database. Of the digital plan content, the following primary data was extracted: physical block number, surface, usage category, medium slope and land destination.

RESULTS AND DISCUSSIONS

a. Geographical location and cartographic framing of Bâlca territory

The territorial administrative unit of Bâlca commune of Suceava district is geographically made up, mostly in Dragomirna Plateau and on a more restricted area in Radauti Depression. The territory under survey is bounded on the following administrative limits (figure 1):

- on the north, the border segment of the state frontier of Romania with Ukraine;
- on the east, the border segment with territory of Fratautii Noi commune;
- on the south, the border segments of the Galanesti and Vicovu de Sus communes;
- on the west, the border segment with territory of Vicovu de Sus commune;

Based on the technical norms of introducing the general land survey, the Balca commune territory can be framed on geodesic trapezes corresponding to the map and plan sheets of the official nomenclature of the Stereographic Protection System – 1970. In this way, for cartographical representation of general plan results the possibility of using the following trapeze categories: two map sheets for scale 1:50 000, 4 map sheets for scale 1:25 000; 5 plan sheets at scale 1:10 000 and 13 plan sheets at scale 1:5 000 (figure 1).

Topo-cadastral database of the digital orthophotoplans can be checked and compensated on the control areas of trapezes, of which it is exemplified the **plan sheet L-35-4-B-a-3-III** with surface of **540.9816 ha.**

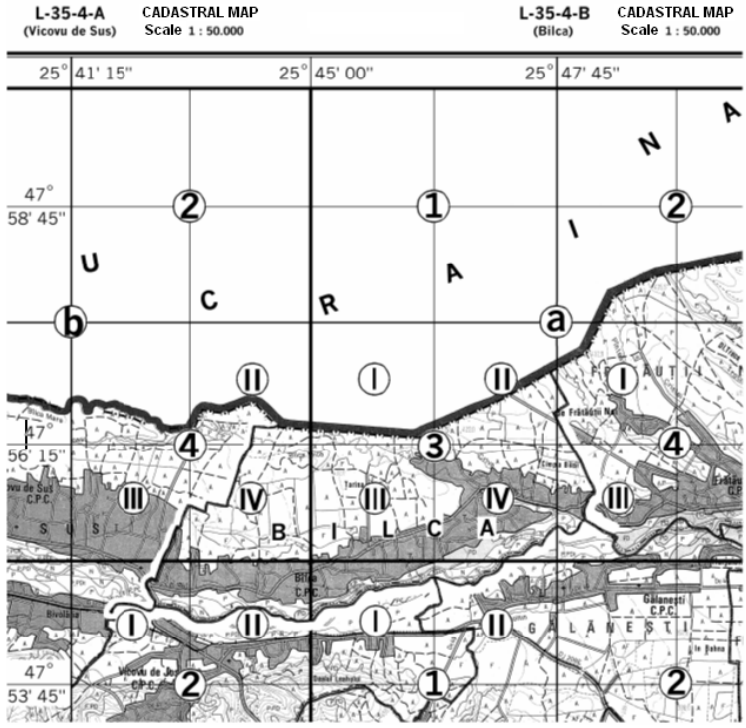

Fig. 1 – Geographical placement and cartographical framing on map and plan sheets of Balca – Suceava administrative unit territory

b. Land distribution on surface classes of physical blocks

In the survey carried out on general plan of Balca – Suceava territorial administrative unit there were accessed base data of 507 physical blocks, with full-empty surfaces between the considered territory and bordering territories.

Within the administrative limits of Balca territory there were identified a number of **315 physical blocks**, of which **189 physical blocks** outside the location land **(BA)** and **126 physical blocks** within the built-up area **(SA).** By taking out the information contained within each physical block numbered by codes from **147036-1** to **147036-507** resulted in primary base data of the agricultural cadastre. Of the digital support of the general plan at scale 1:10 000 accessed in **"on-line**" system, it is shown a sequence of graphical design with limits and numbering physical blocks, from outside Balca territory **(National Agency for Intervention in Agriculture-APIA**). For exemplification it is quoted the primary base data of physical blocks with code **147036-254** (figure 2).

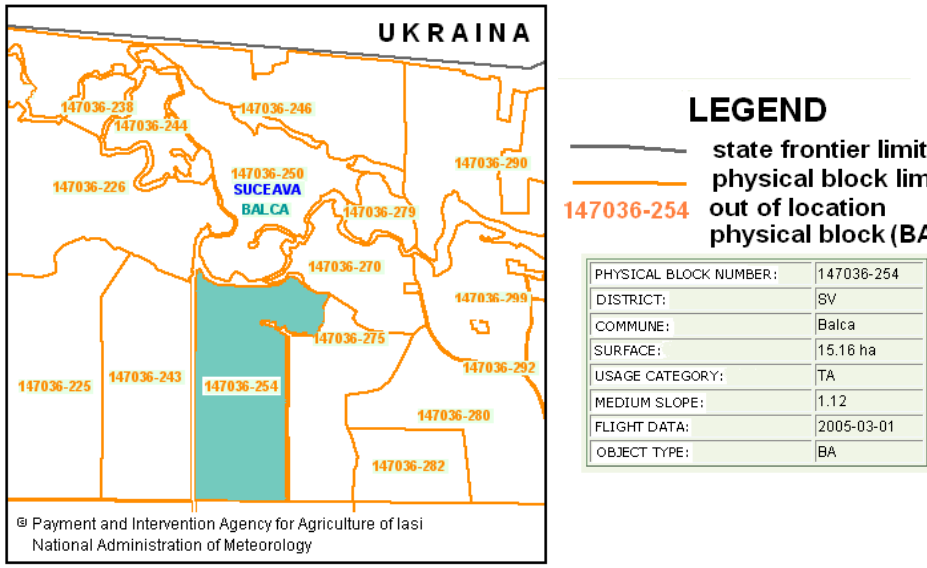

Fig. 2 – Sequence of general plan with limits and numbering of physical block of Balca Suceava administrative unit territory

Surface distribution covered on the **315 physical blocks** was analysed depending on their size on seven classes of framing. Of the resulted data it was remarked, first of all, the prevailing of physical blocks with very small and small surfaces, which on their turn cover the cadastral lots of the owners. In this respect, the existing situation of the carried out survey is presented: **112 physical blocks** with surface ranging within limits 0.10 – 1.00 ha; **83 physical blocks** with surfaces of 1.01 – 5.00 ha. In the surveyed case it were identified only six physical blocks with surfaces of 30.01 – 40.00 ha and **a block with surface of 49.20 ha** *(table 1)*.

Table 1

Land distribution on surface classes of physical blocks of the Balca-Suceava territorial administrative unit

Crt. no.	Surface class specification	Number of physical blocks on surface classes		Total surface on physical blocks classes	
	ha	-	%	ha	%
1	0.10 – 1.00	112	35.56	51.28	2.56
2	1.01 – 5.00	83	26.35	206.89	10.34
3	5.01 – 10.00	38	12.06	269.09	13.45
4	10.01 – 20.00	56	17.78	802.10	40.10
5	20.01 – 30.00	19	6.03	427.74	21.38
6	30.01 – 40.00	6	1.90	194.13	9.71
7	40.01 – 50.00	1	0.32	49.20	2.46
BALCA TOTAL TERRITORY		**315**	**100.00**	**2000.43**	**100.00**

c. Structure of usage categories of the land of physical blocks

Agriculture cadastre has the role to provide in any moment the economical and technical database on agriculture land resources on a national and local plane. By developing in the recent years of new digital maps one the entire agriculture surface of Romania it was obtained at the level of all territorial administrative units a base of primary data which provides land resources management.

The total surface of the administrative territory of Balca commune of **2000.43 ha** was distributed on the two distinct usages (out of location and within location) of the **315 physical blocks**. In this way, it was obtained a surface of **1853.81 ha** (92.7%) for out of location territory **(BA)** with usage on three usage categories and respectively **146.62 ha** (7.33%) for within location surface **(SA)** with usage of buildings and yards *(table 2)*.

Table 2

Land destination on usage categories of physical blocks of Balca-Suceava territorial administrative unit

Denomination and code of usage categories	Surface on out of location physical blocks (BA)		Surface on within location physical blocks (SA)		Surface on usage categories		Total of physical blocks	
	ha	%	ha	%	ha	%	-	%
Agriculture lands (TA)	1830.84	91.52	-	-	1830.84	91.52	180	57.14
Permanent pastures (PP)	21.68	1.08	-	-	21.68	1.08	8	2.54
Permanent cultures (CP)	1.29	0.07	-	-	1.29	0.07	1	0.32
Buildings and yards (CC)	-	-	146.62	7.33	146.62	7.33	126	40.00
GENERAL TOTAL	**1853.81**	**92.67**	**146.62**	**7.33**	**2000.43**	**100.0**	**315**	**100.00**

Of the current situation analysis of the way of usage the land in the out of location area resulted a percent of **91.52%** of agricultural lands **(TA)** that occupy a total surface of **1830.84 ha** distributed on **180 physical blocks**.

Area distribution on the **180 physical blocks** with the usage category of agricultural lands **(TA)** of the under survey territory showed up their framing within very small surfaces of **0.31 ha** (physical block **507**) and relatively large to **49.20 ha** (physical block **378**). Within these physical blocks with agriculture land usage would be identified and registered all the lots owned by the farmers. As for the other categories of usage of out of location land, the permanent pastures **(PP)** and permanent cultures **(CP)** it is remarked the fact that these occupy non-significant surfaces from the point of view of economical usage.

The cadastral technical documentation compiled based on the current primary data on a digital support level of the plain at scale 1:10 000, considering the system of "**land units – usage categories**" allows promotion of management and arrangement projects of agricultural land.

CONCLUSIONS

1. Based on the new execution technologies of aerophotogrammetric erections it was compiled the digital map of the entire agriculture surface of Romania covering the administrative limits of territorial units and those of the physical blocks necessary for agriculture land owners, aiming at identification and registering of the cadastral lots based on the data recorded by APIA.

2. Balca territorial administrative unit of Suceava district contains 315 physical blocks with a total surface of **2000.43 ha** which was framed on seven surface classes within minimal limits of **0.10-1.00 ha** with an area of **51.28 ha** and with a spatial distribution on **112 blocks** and maximal of **40.01-50.00 ha** where it was identified only the **block 378** with a surface of **49.20 ha**.

3. The surface covered by the agriculture lands is of **1830.84 ha** representing **91.52%** of the administrative unit territory, with a spatial distribution in **180 physical blocks** where to be identified cadastral lots on different owners, holders and users, in view of getting necessary funds for durable exploitation and development of agriculture farms.

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RESEARCHES REGARDING THE PRESENCE OF SOME MICROMYCETES ON CORN SEEDS (*ZEA MAYS* L.) MAINTAINED IN DIFFERENT STADIUMS AND WAYS OF STORAGES

CERCETĂRI PRIVIND PREZENȚA UNOR MICROMICETE PE CARIOPSELE DE PORUMB (ZEA MAYS L.) AFLATE ÎN DIFERITE STADII ŞI MODALITĂȚI DE DEPOZITARE

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Abstract. *The perform researches were made on corn seeds and cob of corn (Zea mays L.), maintained in different stadiums of storages from rural small farms and from other storages from Iaşi county, which belongs to some commercial firms. The corn storage after the harvest manifest a special interest for many researchers from Romania and from abroad which were made until now, studies to establish the optimal conditions for production storages and the most proper ways for those protection from the harvest period until the capitalization. The samples supported specific mycological tests in laboratory for determination of the micro fungus spectrum presents on theme. The paper follow to relieve the micro fungus spectrum presented on the corn, maintained in different conditions and ways of storages.*

Rezumat. *Cercetările efectuate, au avut ca material de studiu, ştiuleți şi cariopse de porumb (Zea mays L.), aflate în diferite stadii de depozitare din gospodăriile rurale şi din depozitele unor societăți comerciale ale județului Iaşi. Păstrarea porumbului după recoltare constituie preocuparea multor cercetători pe plan național şi mondial, care au efectuat în decursul anilor, studii pentru stabilirea condițiilor optime de păstrare a producțiilor şi mijloacele cele mai potrivite de protejare a acestora în perioada de la recoltare până la valorificare. Probele au fost supuse testelor micologice specifice de laborator în vederea determinării spectrului de micromicete prezente pe acestea. Lucrarea urmăreşte evidențierea spectrului de micromicete prezente pe porumbul destinat consumului, păstrat în diferite condiții şi moduri de depozitare.*

MATERIAL AND METHOD

For the accomplishment of these study, it been used corn cob and corn seeds from household warehouses and from some commercial societies storage, kept for a variable period of time. After mixing and homogenizing the quantity sampling from warehouse, the analyses samples are taken to the laboratory for mycological and fitopathological studies, to establish the micromicetes spectrum on the material.

The probes were homogenizing and a random count of 400 seed, using 4 repetitions contains each 100 seeds. The corn-grain were arranged to equal distances of 1 cm, then put to germinate on filter paper moistened with distillated water and put in thermostat trays for incubation at 22 º C for 5 days.

For an exact analyze we use a different method, the nutritive mediums methods, witch help us to identify the majority of pathogen species that exist on corn-grain, specially species of *Fusarium* sp. and *Helminthosporium* sp. .

The seeds have a healthy aspect from exterior look , the were also analyzed using the nutritive mediums methods, using PDA medium – potato-dextrose-agar, glucose-peptone-agar, dox-agar and malt extract.

Also using 100 seeds for each 4 variant (PDA medium – potato-dextrose-agar, glucose-peptone-agar, dox-agar and malt extract), each variant with 4 repetitions.

After putting the seeds in Petri dishes with nutritive medium, incubated at 22º C to determine the development and growth of existence micro flora.

The evaluation of infection was made with macroscopically examination of fungus colony on both faces of dishes and microscope examination.

RESULTS AND DISCUSSIONS

After laboratory analyses, there were evidence some parasite and saprophyte micromicetes, therefore, after a period of incubation on surface of seeds there were found an impressionant number of micromicetes, especially saprophyte fungus, as next:

Table 1

Micromicetes emphasis with filter paper method or standard test of germination method

No. crt.	Micromicetes	The ratio of micromicetes found in analysed probes
1	*Penicillium spp*	47,7%
2	*Fusarium spp*	27,1%
3	*Rhyzopus spp*.	25,2%

From 400 seeds put to germinate, only 48% germinate after 3 days incubation, and after 5 daysthe germination was 89 %.

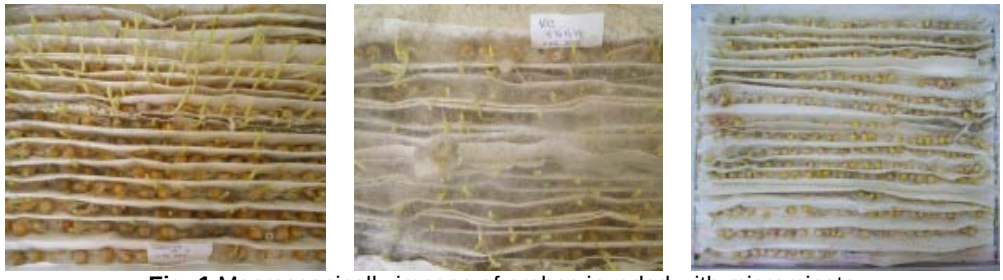

Fig. 1 Macroscopically images of probes invaded with micromicete

Tests result from malt extract medium

The results of tests made on nutritive medium of malt extract were next:
After a incubation of 7 days, the Petri dishes were analysed macroscopically and microscopically and we found the next saprophytic micromicetes witch apear in warehouses:

Table 2

Species of micomicetes found on corn seeds on malt extract medium

No.. crt.	Micromicetes	The ratio of micromicetes found in analysed probes (%)
1	*Aspergillus spp*	5,1
2	*Penicillium ssp*	32,8
3	*Rhizopus nigricans*	20,2
4	*Trichotecium roseum*	8,1
5	*Fusarium spp.*	16,7
6	*Alternaria alternata*	7,6
7	*Cladosporium spp.*	5,1
8	*Mucor spp*	4,4

On this medium, the micomicetes apear in a small number, and therefor the experience will be made using otheres nutritives mediums for an exact evaluation of micro flora.

Tests result from PDA (cartof-dextroză-agar) medium

After incubation in Petri dishes, and microscopiccaly and macroscopiccaly analyse, the micromicetes apear in a bigger proportions than on malt extract medium. There were found the next species:

Table 3

Species of micomicetes found on corn seeds on PDA nutritiv medium

No.crt	Micromicete	The ratio of micromicetes found in analysed probes (%)
1	*Aspergillus ssp*	2,6
2	*Penicillium ssp.*	38,3
3	*Rhizopus sp*	5,1
4	*Rhizopus nigricans*	35,7
5	*Trichotecium roseum*	2,6
6	*Alternaria alternata*	3,6
7	*Mucor spp*	3,6
8	*Cladosporium spp.*	2,5
9	*Fusarium spp.*	6

Tests results from glucose-peptone-agar, dox-agar

The test on PDA medium was less efficient, but on “glucose-peptone” şi “dox-agar” medium were found next species:

Table 4

Species of micomicetes found on corn seeds on medium glucose-peptone-agar, dox-agar

No. Crt.	Micromicetes	The ratio of micromicetes found in analysed probes (%) on:	
		glucose-peptone medium (%)	dox-agar medium (%)
1.	*Helminthosporium turcicum*	-	3,1
2	*Penicillium sp.*	18,6	17,2
3	*Rhizopus nigricans*	28,9	26,6
4	*Trichotecium roseum*	0,8	1,6
5	*Alternaria sp.*	14,5	15,6
6	*Cladosporium herbarum*	18,6	17,2
7	*Rhyzoctonia sp.*	8,3	7,2
8	*Aspergillus sp.*	2,1	0,6
9	*Stemphyllium graminis*	2,1	3,1
10	*Fusarium graminearum*	6,1	7,8

Macroscopical images of probes invaded with micromicete

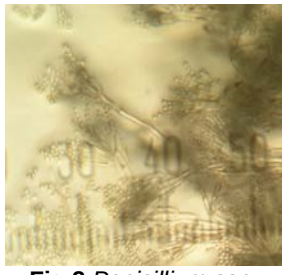

Fig.2 *Penicillium ssp.*

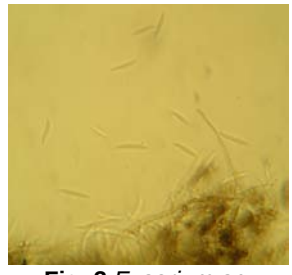

Fig. 3 *Fusarium sp.*

Fig. 4 *Rhizopus nigricans*

Fig. 5 *Trichotecium roseum*

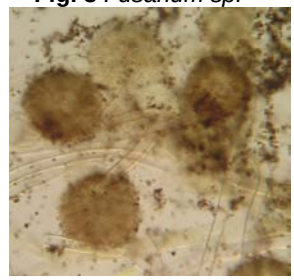

Fig. 6 *Aspergillus sp.*

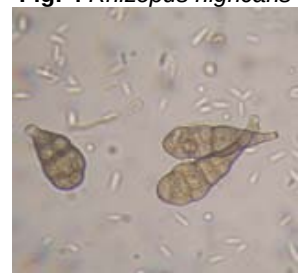

Fig. 7 *Alternaria sp.*

Fig. 8 *Cladosporium herbarum*

Fig. 9 *Mucor sp.*

Fig. 10 *Helminthosporium turcicum*

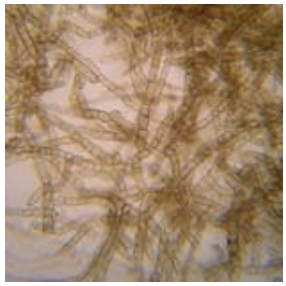

Fig.11 *Rhyzoctonia sp.*

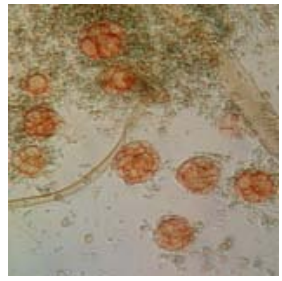

Fig. 12 *Stemphyllium graminis*

The results of this study shows the identification of 11 types of saprophytic micromicetes in analised probes, and also the increase procent of corn seeds invadet by micromicetes related to a improper storage.

CONCLUSIONS

1 – In this study we followed to distinguish and study the micro flora, especially the saprophytic one, in corn seeds from warehouses, to establish the most correct and efficient storage of corn seeds.

2 – The development and multiplication of saprophytic micromicetes was related to the humidity content of the stored products, also with the atmosphere temperature and humidity and the presence in a big number of pests in storage products.

3 – The refor, the principle that sustain the ideea of a good storage of agricol products is the menteinace of a lowest temperature in warehouses and in storaged products (a few degrease over the frozen point), and also the relative humidity of athmosphere to be in balance with the humidity content of product.

4 – In warehouses is know the fact that are optimal conditions for development and growth of micromicetes and is necessary the disinfection of warehouses before the storage of goods and also the fitosanitary control in all the storage period.

5. Species of *Penicillium sp., Aspergillus sp.* and *Fusarium sp* types are funguses which produce damaging micotoxine for humans and animals, so optimum storing conditions must be created in order to prevent the growing and developing of such micromycetes.

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THE MICROMYCETES PRESENTED ON DIFFERENT VEGETABLES SEEDS, STORED IN VARIOUS ATMOSPHERIC CONDITIONS

MICROMICETE PREZENTE PE SEMINȚELE DIFERITELOR SPECII DE LEGUME PĂSTRATE ÎN CONDIȚII ATMOSFERICE NECONTROLATE

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Abstract. *The scope of the presented researches is to determinate the micromycetes spectrum on the next various vegetables seeds genus: Daucus carota L., Capsicum annuum L., Petroselinum crispum (Mill), Lactuca sativa L., Citrullus lanatus (Thunb), Allium sativum L., Lycopersicum esculentum L., obtained from the small producers which were stored in various atmospheric conditions. The samples have supported specifically phytophatological and mycological tests in the laboratory for the determination of the micromycetes spectrum presented on them. In this paper we try to relieve the micromycetes presence on the vegetables seeds which are part responsible for diseases appearance in the vegetation period.*

Rezumat. *Cercetările de față au ca scop determinarea spectrului de micromicete prezente pe semințele diferitelor specii de legume şi anume: Daucus carota L., Capsicum annuum L., Petroselinum crispum (Mill), Lactuca sativa L., Citrullus lanatus (Thunb), Allium sativum L., Lycopersicon lycopersicum L., provenite de la micii producători şi care au fost păstrate in condiții atmosferice necontrolate. Asupra acestor probe s-au efectuat teste fitopatologice şi micologice specifice de laborator în vederea determinării spectrului de micromicete prezente pe acestea. Lucrarea urmăreşte evidențierea micromicetelor prezente pe aceste semințe de legume şi care, în mare măsură, sunt responsabile de apariția unor boli în cursul perioadei de vegetație*

MATERIAL AND METHOD

The study has been made on the seeds of 9 vegetable genuses, obtained from the small producers which were stored in various atmospheric conditions.

From the medium samples taken, there have been obtained the analyses samples for the detailed phytopatological and mycological specifically tests, in order to establish the fungus spectrum presented on those. As a work method, it has been used the method of PDA nutritive media cultivation (potato – dextrose – agar), (The Ulster – Malone and Muskett method – 1964 mentioned by Ovidiu Constantinescu in 1974). The samples have been homogenized and 150 were random counted, respectively 90 seeds from each genus, using 3 repetitions of 50, respectively 30 seeds.

Those have been arranged in Petri dishes with PDA nutritive media (potato – dextrose – agar), spread on approximate equal distances of 1 cm, and then introduced in the thermostat for a 5 days period at 22°C.

After the incubation period, the dishes have been microscopically analyzed to establish the number of fungus colonies and the area occupied by them, respectively microscopically, for the exact evaluation of the micromycetes spectrum presented.

RESULTS AND DISCUSSIONS

The presence of funguses on vegetables seeds, generate, in mostly situation the appearances of some diseases in vegetation period. That for, the present study, follows to determinate and establish the fungus from seeds teguments, for the possible measurements which must be take to prevent the crop infestation in vegetation period. After the specifically laboratory analyses, their were point out some saprophytic and parasitic funguses, that so, after the incubation period, on the seeds surfaces were found an impressive number of fungus, especially saprophytic as the next:

Table 1

Fungus present on carrot seeds (*Daucus carota* L.)

No.ct.	Signalized fungus	R_1 50 seeds (%)	R_2 50seeds(%)	R_3 50 seeds(%)
1	*Rhizopus nigricans*	61,1	65,8	67,5
2	*Penicillium sp*	27,5	26,3	32,5
3	*Cladosporium sp*	-	3,9	-
4	*Alternaria sp*	7,6	-	-
5	*Thamnidium elegans L.*	3,8	-	-
6	*Rhizoctonia solani*	-	4	-

Fig.1. Microscopic images of dishes with *Daucus carota* L. seeds occupied by funguses

In the analyses samples with *Daucus carota* L seeds, were signalized 6 genus of funguses, several of those registering a higher proportion, as *Rhizopus* and *Penicillium* genus, the rest of genus being founded in reduced proportion.

The fungus which has been develop on the seeds surface are saprophytic and cosmopolite, but in the vegetation period can produce disease which generate a quality and quantity decreases of the productions.

Table. 2

Fungus present on pepper seeds *(Capsicum annuum L.)*

No.ct.	Signalized fungus	R_1 50 seeds (%)	R_2 50seeds(%)	R_3 50 seeds(%)
1	*Penicillium sp*	89	86,2	86,9
2	*Cladosporium sp.*	11	13,8	13,1

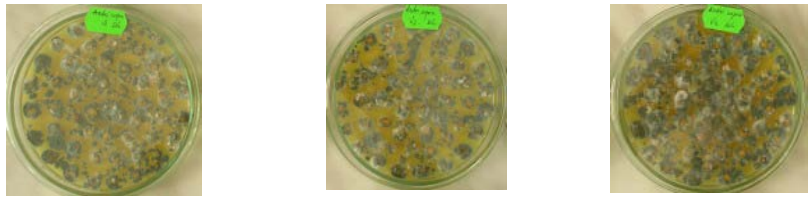

Fig.2. Microscopic images of dishes with *Capsicum annuum* L. seeds occupied by funguses

To the all three varieties of pepper *Capsicum annuum* L, were signalized only two genus of saprophytic and cosmopolite fungus, but the Penicillium genus has been develop extremely fast occupied the analyzed dishes, starting with the first days from the incubation.

Table. 3

Fungus present on tomato seeds (*Lycopersicum esculentum* L.)

No.ct.	Signalized fungus	R_1 50 seeds (%)	R_2 50seeds(%)	R_3 50 seeds(%)
1	*Rhizopus sp.*	42,1	49,2	66,7
2	*Penicillium sp.*	26,5	23,3	20
3	*Mucor sp.*	4,4	4,1	2,7
4	*Alternaria sp.*	15,5	10,4	6.7
5	*Trichotecium sp*	-	2,6	-
6	*Fusarium sp.*	4,4	-	3,9
7	*Cladosporium sp.*	7,1	5,2	-
8	*Rhizoctonia sp.*	-	2,6	-
9	*Stemphyllium herbarum*	-	1,6	-
10	*Scopulariopsis sp.*	-	1	-

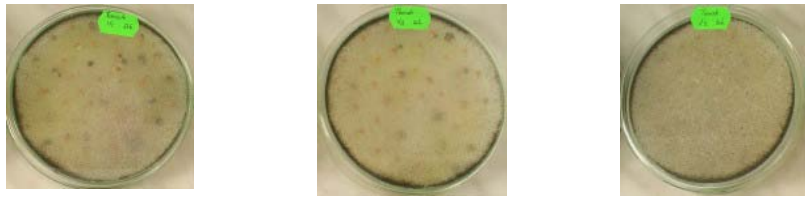

Fig.3. Microscopic images of dishes with *Lycopersicon esculentum* L. seeds occupied by funguses

On *Lycopersicum esculentum* L. has been development a big variety of fungus, but in reduced proportion, except two genuses, respective Rhizopus and Penicillium, which had an evolution much more intense than the rest of the fungus.

Table. 4

Fungus present on pimpernel seeds (*Petroselinum crispum* (Mill)

No.ct.	Signalized fungus	R_1 50 seeds (%)	R_2 50seeds(%)	R_3 50 seeds(%)
1	*Rhizopus sp.*	74,6	69,4	15,4
2	*Aspergillus sp.*	1,5	1,4	7,7
3	*Penicillium sp*	5,9	16,7	26,9
4	*Alternaria sp.*	2,9	5,6	19,2
5	*Cladosporium sp.*	4,5	2,8	15,4
6	*Rhizoctonia sp.*	1,5	2,8	-
7	*Mucor sp.*	5,9	-	15,4
8	*Fusarium sp.*	3,2	-	-
9	*Stemphyllium sp.*	-	1,3	-

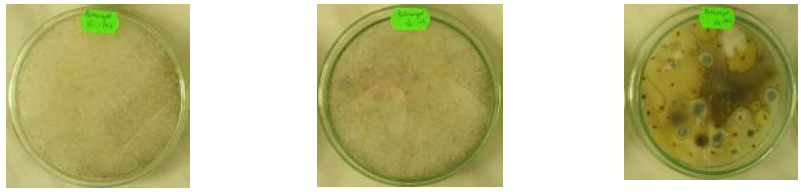

Fig.4. Microscopic images of dishes with (*Petroselinum crispum* (Mill), seeds occupied by funguses

In the experiences with *Petroselinum crispum* seeds, were relived that the fungus spectrum was big, being signalize 9 genus of saprophytic fungus. Many of those have been develop in reduced proportion except *Rhizopus* genus, which had occupied complete the dishes starting with first three days.

Table. 5

Fungus present on salad seeds (*Lactuca sativa L.*) - var. capitata

No.ct.	Signalized fungus	R_1 50 seeds (%)	R_2 50seeds(%)	R_3 50 seeds(%)
1	*Alternaria sp.*	37,7	33,3	26
2	*Mucor sp.*	14,2	17,9	16,3
3	*Cladosporium sp.*	33	25,6	29,2
4	*Fusarium sp.*	9,4	17,9	19,5
5	*Stemphyllium sp.*	3,8	3,1	5,2
6	*Trichotecium sp*	1,9	2,2	3,8

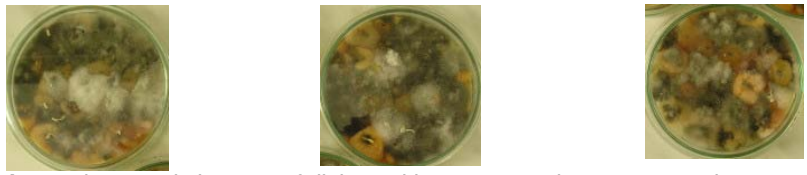

Fig. 5 Microscopic images of dishes with Lactuca sativa L.- var. capitata seeds occupied by funguses

On salad (*Lactuca sativa* L), the fungus spectrum was variable, being identified 6 genus, but in highly proportion only the next: Alternaria, Cladosporium, Fusarium, Mucor, which can produce significant problems, in the germination stadium, if it is use to disseminate untreated seeds.

Table 6

Fungus present on water melon seeds (*Citrullus lanatus* (Thunb)

No.ct.	Signalized fungus	R_1 30 seeds (%)	R_2 30seeds(%)	R_3 30 seeds(%)
1	*Alternaria sp.*	37,5	34,5	35,5
2	*Rhizopus sp.*	15	14,4	12,9
3	*Mucor sp.*	7	11,5	11,6
4	*Cladosporium sp.*	30	25,9	27,1
5	*Fusarium sp.*	8	-	-
6	*Stemphyllium sp.*	2,5	4,6	3,9
7	*Rhizoctonia sp.*	-	-	2,6
8	*Penicillium sp*	-	9,1	6,4

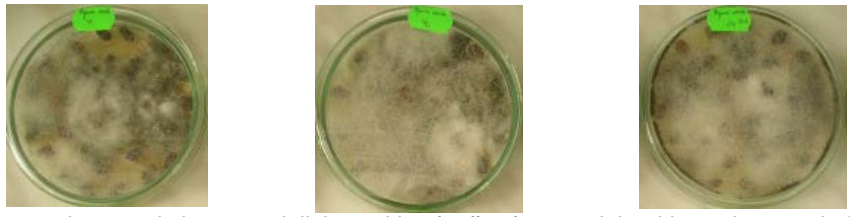

Fig.6. Microscopic images of dishes with *Citrullus lanatus* (Thunb) seeds occupied by funguses

The saprophytic fungus genus, founded in analysis samples with *Citrullus lanatus* (Thunb) were: Alternaria, Rhizopus, Mucor, Cladosporium, Penicillium, Fusarium, Rhizoctonia, in different proportion, but the most dangerous diseases on cucurbitaceae are produced by the species which belong to Alternaria, Cladosporium and Fusarium genus, because of the quantity and quality decreases of production in vegetation period, if those found favorable conditions for development.

Table. 7

Fungus present on garlic seeds (*Allium sativum* L.)

No.ct.	Signalized fungus	R_1 30 seeds (%)	R_2 30seeds(%)	R_3 30 seeds(%)
1	*Trichotecium sp*	12,5	10,3	6,4
2	*Alternaria sp.*	79,2	77,6	78,4
3	*Mucor sp.*	5	6,9	3,2
4	*Stemphyllium sp*	3,3	5,2	8
5	*Rhizopus sp.*	-	-	4

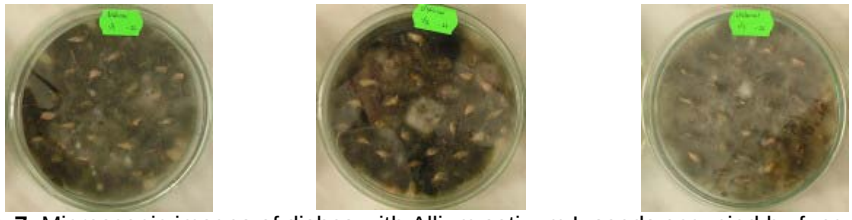

Fig.7. Microscopic images of dishes with Allium sativum L seeds occupied by funguses

In the analysis dishes with *Allium sativum* L. seeds were pointed out 5 species of fungus. Two species which belong to Alternaria and Trichotecium genus were founded in big proportion, and Mucor, Stemphyllium and Rhizopus genus were signalize in reduced or insignificant proportion.

CONCLUSIONS

1. It is know the fact that *Allium sativum* L.), is resistant to some pathogenic agents attack, but if to the dissemination are used untreated seeds, the risk of diseases appearance in vegetation period is highest and also if are not respected the cultural hygiene measurements.

2. To the all three varieties of pepper *Capsicum annuum* L, were signalized only two genus of saprophytic and cosmopolite fungus, but the Penicillium genus has been develop extremely fast occupied the analyzed dishes, starting with the first days from the incubation.

3. On salad (*Lactuca sativa* L), the fungus spectrum was variable, being identified 6 genus, but in highly proportion only the next: Alternaria, Cladosporium, Fusarium, Mucor, which can produce significant problems, in the germination stadium, if it is use to disseminate untreated seeds.

4. The vegetables cultures from the rural small farms, are many times disseminated using seeds from own production, which were stored in different places and improper conditions.

5. Because of this fact, we recommend that the seeds to be treated before dissemination to have a crop without pathogenic agents, or it are recommended to be use certificated and treated seeds, which is spread trough the specialized units.

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TESTS OF SOME FUNGICIDES USED FOR GRAPE VINE GRAY MOLD CONTROL, IN S.D.E. "V. ADAMACHI" IAŞI CONDITIONS

TESTAREA UNOR FUNGICIDE UTILIZATE ÎN COMBATEREA PUTREGAIULUI CENUŞIU AL VIŢEI DE VIE, ÎN CONDIŢIILE S.D.E. "V. ADAMACHI" IAŞI

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Abstract. *Against grape vine gray mold has been elaborated different combat plans of this one. Most researchers discovered that the treatments had the highest efficiency when were applied in the next phenological moments: to the flower shake-up; to the grape compaction and to the grape greenness stadium. To accomplish the experiences contained in this paper, we attend to the phenological phases of Fetească regală genus, following the optimization of the treatments plan, applied against grape vine gray mold. In the paper are presented 3 new treatments plan, starting with the basic plan which included 3 treatments and continued with a cyclic elimination of treatments in every phenological moment.*

Rezumat. *Împotriva putregaiului cenuşiu al viţei de vie, au fost elaborate diferite scheme de combatere a acestuia. Cei mai mulţi cercetători au constatat că tratamentele au avut eficienţa cea mai ridicată atunci când s-au aplicat în următoarele momente fenologice: la scuturarea florilor; la compactarea strugurilor; şi la intrarea în pârgă a strugurilor. La realizarea experienţelor cuprinse în această lucrare, s-a ţinut cont de fazele fenologice ale soiului Fetească regală, urmărind optimizarea schemei de tratamente, aplicate împotriva putregaiului cenuşiu al viţei de vie. În cadrul lucrării sunt prezentate 3 scheme noi de tratamente, plecând de la schema de bază cu 3 tratamente şi eliminând succesiv câte un tratament în fiecare moment fenologic.*

MATERIAL AND METHOD

The experiences established in 2007 followed two factors, being placed using "aleatory blocks" methods. The followed factors were: the moment when the treatments were applied and the fungicides used. Every experience contained 80 vines grouped in 4 variants each of them with 4 repetitions. In the experiences were used 4 fungicides: Teldor 500 SC (A1), Topsin 70 PU (A2), Dithane M-45 (A3), and Carbendazim 500 SC (A4). The fungicides were used successively in the experiences so that all fungicides could be applied in every variant and phenologic moment.

Every experience contained 80 vines grouped in 4 variants (V1, V2, V3, V4), each of them with 4 repetitions (R1, R2, R3, R4).

Every variant contained 5 vines totalized 20 vines per variant for each experience.

Inside of the 4 repetition from first experience, at the first moment T_1 (*when the flower shake-up*), the fungicides were used in this way: A_1 fungicide was applied in V_1 variant, A_2 in V_4, A_3 in V_3 and A_4 in V_2.

The second moment T_2 (*to the grape compaction*), A_1 fungicide was applied in V_2 variant, A_2 in V_1, A_3 in V_4 and A_4 in V_3.

The third moment T_3 (to *the grape greenness stadium*), A1 in V3, A2 in V2, A3 in V1 and A4 in V4.

RESULTS AND DISCUSSIONS

From the 4 used fungicides in the experiences the most expensive was Teldor 500 SC product and the cheaper was Dithane M_{45} product.

References prices of the tested products were the products presented by Alcedo firm in *Technical and financial offer for phyto-sanitary products, fertilizers and seeds – 2007.*

Table 1

The cost and quantity of fungicides used in experiences in 2007 year

The fungicide	The price (lei/1l)	The quantity used at one treatment	The total quantity used - kg./l	Total cost of the treatments in the 4 experiences (lei)	The price (lei / ha)
A_1-Teldor 500 SC	191	0,02	0,18	34,38	191
A_2-Topsin 70 PU	50	0,024	0,22	10,80	60
A_3-Dithane M-45	19	0,04	0,36	6,84	38
A_4-Carbendazim 500 SC	43	0,03	0,27	11,61	64,5

Forward we will calculate the economically efficiency of the tested products using burden method, correlated with the attack level produced by *Botryotinia fuckeliana* fungus.

Analyzing the result regarding the obtained productions in the experiences (fig. no. 1), we observed that the highest production spore was obtained in 3 and 4 variants, inside of 3 from 4 analyzed experiences.

Because of the climatic conditions existent in 2007 year summer (excessive drought conditions), gray mold disease doesn't develop until the grapes maturation. In those conditions the most important moment for treatments to be applied against gray mold and in the same time the most relevant to establish the efficiency in field of the used substances, become T_3. At the T_3 moment, in 3 and 4 variant we applied Teldor 500 SC and Carbendazim 500 SC fungicides.

Besides the anterior presented situation, where the economically efficiency of fungicides was presented reported to the production level obtained, to establish the economical efficiency we also count on the attack level produced by the pathogenic agent *Botryotinia fuckeliana* (fig. no. 2).

Because of the existent climatic conditions from 2007 year summer, the pathogenic agent has develop lately (to the grapes maturation) acting mostly like a noble mold.

It is new the fact that noble mold can determinate a quantitative reducing of productions till 40%. So can be explained the fact that the production obtained in some variants where was registered a highest attack level was smaller. The variants where was registered the lowest attack level were 3 and 4 variants.

Analyzing the obtained productions and also the attack level in the four experiences, we can conclude that the most efficient tested fungicides are Teldor 500 SC and Carbendazim 500 SC.

Between that two, Teldor 500 SC fungicide presented the highest efficiency, but the approximately 3 percents differences compared with Carbendazim 500 SC doesn't justify the highest price of Teldor 500 SC fungicide.

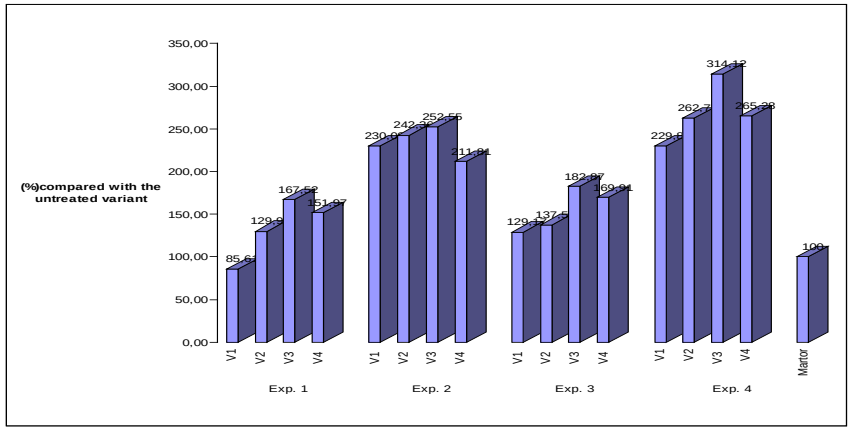

Fig. 1 – *The obtained productions in the experimental variants (%)*

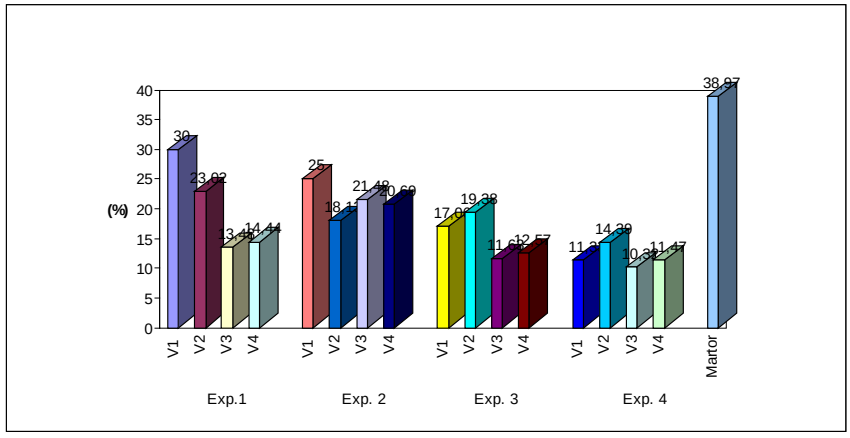

Fig. 2 - *The attack level registered in the experimental variants (%)*

CONCLUSIONS

Corroborating all the factors involved in the experiences development, we can concluded:

- because of the existent climatic conditions from 2007 year summer, the pathogenic agent has developed lately (to the grapes maturation) acting mostly like a noble mold, so even that treatments were made at the 3 phenological moments, were efficient only the treatments applied at T_3 moment (*the grape greenness stadium*).

- Teldor 500 SC fungicide presented the highest efficiency, but the approximately 3 percents differences compared with Carbendazim 500 SC doesn't justify the highest price of Teldor 500 SC fungicide

- between the tested fungicides from experiences in 2006-2007 agricol year, the highest economically efficiency in gray mold control was manifested by Carbendazim 500 SC fungicide.

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SOME ASPECTS CONCERNING THE INFECTED PLANTS FREQUENCIES WITH SEVERE VIRUSES, AS FOLLOW OF THE INTERACTION BETWEEN DIFFERENT CULTIVATION MEASURES, AT THE POTATO FOR SEEDS

CONSIDERENTE PRIVIND FRECVENŞA PLANTELOR INFECTATE CU VIROZE GRAVE, CA URMARE A INTERACŢIUNII DINTRE DIFERITE MĂSURI CULTURALE LA CARTOFUL PENTRU SĂMÂNŢĂ

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ARDS. Suceava

Abstract: *The effected determinations in the years 2005-2007 emphasized that the infested shrub frequency with serious viruses (Y, PLRV) was bigger at the cultivar Desirèe in comparison with cultivar Santè. Therewith, the obtained results emphasized that in the Suceava conditions the importance of the early planting and of the vegetation interruption at the warning, increased significant at one time with unrolling of the multiplication process from the biologic category „super elite- bases" at the category „certified A".*

Rezumat: *Determinările efectuate în anii 2005-2007 au scos în evidenţă că rata creşterii frecvenţei tufelor infectate cu virusuri grave (Y, PLRV) a fost mai mare la soiul Desirèe comparativ cu Santè. Totodată a rezultat că în condiţiile Sucevei importanţa plantării timpurii şi a întreruperii vegetaţiei la avertizare, a sporit semnificativ odată cu derularea procesului de multiplicare de la categoria biologică „bază-superelită" la categoria „certificată A".*

Key words: seed potatoes, viruses, technological measures

INTRODUCTION

In Europe, among the 20 identified viruses at the potato only 6-8 viruses shows a special economic importance. In conditions of our country the biggest importance shows Y *Virus* and *Leaf roll of potato*, which produced the serious decays at potato and therefore the increased reduction of the infected plants yield (Cojocaru N., 1995).

The yields lost vary between 5-80%, depending by infection degree with viruses, viruses types, environmental conditions and by applied crop technology.

It could not destroy the viruses with conventional fighting method. The only one possibility for diminishing of the yields lost is the utilization of planting material which is free of viruses. It is known that the main factor in the realization of the high yield with a good quality is utilization of the planting material of high quality from biological, phytosanitary and physical point of view (Draica C. şi Caciuc C., 1998).

The cultivar like the biologic source is the most important factor in obtaining of the high yields. Because of the specific traits, each cultivar is capable to fight against viruses in a different manner function by used crop technology or because of the aphides. The early planting it is considered a preventive measure against viruses infection because the plants are vigorous in the moment of aphides attack and in this case the access of the insects at the shrub is difficult.

The early interruption of the vegetation at the potato for seed, diminish the risk of settlement of the potato crops by the population of aphides which are in a numeric increasing and stop the viruses migration from the epigee part of the plants to the tubers (Gontariu I.,1998).

MATERIAL AND RESEARCH METHOD

All the works of the experiment, during years 2005-2007, were made. At the beginning of the experiments we used the cultivars Santè and Desirèe from the biologic category pre bases (clones D), and at the end of the experiments, after three years, we obtained the biologic category "certified, class A". In the field, the experiment was placed in the filed for producing of planting material (ARDS of Suceava), in four replications. We taken into consideration the following factors:

- **A Factor** - cultivar:
a1 - cultivar Santè
a2 - cultivar Desirèe
- **B Factor** – planting time:
b1 - early planting
b2 - after 30 days
- C Factor – vegetation interruption:
c1 - at warning
c2 - after 20 days

The potato planting was accomplished with planting machine for experimental fields. The distances between tubers was 21 cm and between rows, 70 cm. The experiments was placed on the common chernozem.

Fertilization of the potato plots with N:P:K, 100:100:100 kg s.a /ha, in a balanced rapport, was accomplished, in a proper manner so that the viruses infection symptoms could not be masked.

For destruction of the aphides it used the insecticides Mospilan 60 g/ha, Calypso 80ml/ha, Actara 0,06 kg/ha(2 tr.), the spell between two treatments was 12 days. In order to destroy of the potato herbage the first treatment was made mechanically, at warning – after 70 days from the plant sprouting, using Diquat (Reglone forte) 5 l /ha, and second treatment was made after 90 days from the plant sprouting. During vegetation period all works for producing of planting material were accomplished.

The notation of the grave viruses in three stages were accomplished. First notation, when the height plant was on 35-40 cm, the following notations twice weeks were accomplished. For a better emphasize of the infestation level of the shrubs with grave viroses, during vegetation period, the "sick" shrubs did not eliminate.

RESULTS AND DISSCUSIONS

Between those two extremes represented by cultivar Santè (Super elite category) and cultivar Desirèe („certified A" category), the frequency of the infested shrubs with grave viroses grown on 8,1-13,3 times (table 1).

The data from table 3 emphasize that the relatively reduced infestations at both cultivars were registered, but it is necessary to mention that the cultivar Desirèe, must to have a superior level of the biological category in comparison with biological category of the cultivar Santè.

Table 1

The frequency of the infested shrubs with grave viruses

Planting time	The vegetation interruption	Biological category /year		
		basis	basis	
		SE class	E class	Certified A
		(2005)	(2006)	(2007)
The cultivar Santè				
Early	At warning	0,30	0,41	1,58
	After 20 days from the warning	0,50	0,90	1,73
After 30 days	At warning	0,40	0,67	2,66
	After 20 days from the warning	0,54	0,90	3,40
The cultivar Desirèe				
Early	At warning	0,74	2,10	4,00
	After 20 days from the warning	0,80	2,97	4,08
After 30 days	At warning	0,75	3,03	4,77
	After 20 days from the warning	0,86	3,45	5,46
	Dl 5%	0,12	0,21	0,19
	DL 1%	0,19	0,30	0,29
	DL 0,1%	0,27	0,39	0,38

Table 2.

The dependence variations of the shrubs infection frequency with grave viroses function by the association types of the „biological" components with technological measures types

Frequencies class	Cultivar		The planted biological category			Planted		The vegetation interruption	
	Santè	Desirèe	pre basis	super elite	elite	early	after 30 days	at warning	after 20 days
0,30-0,55%	*			*		*		*	
	*		*			*	*	*	*
0,56-0,80%	*			*			*	*	
		*	*			*	*	*	*
0,81-1,05%	*			*		*	*		*
		*	*				*		*
1,56-1,80%	*				*	*		*	*
2,06-2,30%		*		*		*		*	
2,56-2,80%	*				*		*	*	
2,81-3,05%		*		*		*	*	*	*
3,31-3,55%	*				*		*		*
		*		*			*		*
3,81-4,05%		*			*	*		*	*
4,56-4,80%		*			*		*	*	
5,31-5,55%		*			*		*		*

At the cultivar Desirèe in comparison with cultivar Santè were registered the significant growing of the infestations frequency with grave viroses indifferently by graduations of the technological measures (planting time, the vegetation interruption

stage). The most important differences between that two cultivars in the third year of the multiplication of the planting material were registered. This phenomenon in the year 2007, was happened, when at the end of the vegetation period the biological category „certified A" was obtained (table 3).

Table 3

Differentiations of two cultivars from infested shrubs frequency point of view with grave viruses

Planting time	Vegetation interruption	Biological category (year)	Santè % (mt)	Desirèe		
				%	dif.	signif
Early	At warning	SE basis (2005)	0,30	0,74	0,44	**
		E basis (2006)	0,41	2,10	1,69	***
		Certif. A (2007)	1,58	4,00	2,42	***
	After 20 days from warning	SE basis (2005)	0,50	0,80	0,30	*
		E basis (2006)	0,90	2,97	2,07	***
		Certif. A (2007)	1,73	4,08	2,35	***
After 30 days	At warning	SE basis (2005)	0,40	0,75	0,35	**
		E basis (2006)	0,67	3,03	2,36	***
		Certif. A (2007)	2,66	4,77	2,11	***
	After 20 days from warning	SE basis (2005)	0,54	0,86	0,32	*
		E basis (2006)	0,90	3,45	2,55	***
		Certif. A (2007)	3,40	5,46	2,06	***
	Dl 5%				0,23	
	DL 1%				0,32	
	DL 0,1%				0,42	

Table 4

The variation of the infested shrubs frequency with grave viroses at three biological categories

Plantin g time	Vegetation interruption	Cultivar	Biological category (year)			Diferences significance					
			Basis SE class (2005)	Basis E class (2006)	Certified A (2007)	E-SE		A-SE		A-E	
Early	At warning	Santè	0,30	0,41	1,58	0,11		1,28	***	1,17	***
		Desirèe	0,74	2,10	4,00	1,36	***	3,26	***	1,90	***
	After 20 days from warning	Santè	0,50	0,90	1,73	0,40	**	1,23	***	0,83	***
		Desirèe	0,80	2,97	4,08	2,17	***	3,28	***	1,11	***
After 30 days	At warning	Santè	0,40	0,67	2,66	0,27		2,26	***	1,99	***
		Desirèe	0,75	3,03	4,77	2,28	***	4,02	***	1,74	***
	After 20 days from warning	Santè	0,54	0,90	3,40	0,36	*	2,86	***	2,50	***
		Desirèe	0,86	3,45	5,46	2,59	***	4,60	***	2,01	***
	Dl 5%					0,27		0,23		0,36	
	DL 1%					0,36		0,32		0,47	
	DL 0,1%					0,47		0,42		0,60	

Form the data of the table 5 results that the infested plants frequency with grave viroses grown in the second multiplication year in comparison with first year (super elite basis category) with 1,19 percents, and at the certified A category, from the precedent year, in the third multiplication year, the infested plants frequency with grave

viroses grown with 1,66, percents in comparison with elite basis category from the precedent year. Thus, the growing of the infestation frequency with grave viroses on 2,85% in the third multiplication year is due of the viroses induction with 40% in the first year and with 60% in the second multiplication year, becoming visible, in the third multiplication year. If we analyze the above data, with help of the multiplication coefficient of the virosed plants frequency, the data below presented, proves that two cultivars closely values, were registered, such as:

	cultivar Santè	cultivar Desirèe	the average of cultivars
- at the E category in comparison with SE category	1,7	3,6	3,0
- at the certified A category in comparison with E category	3,2	1,6	2,0
- at the certified A category in comparison with SE category	5,4	6,0	5,7

Thus in the third multiplication year of the planting material, a growing *Leaf roll of potato*, on 5,4-6,0 times, was registered. Some inadvertences in the evolution of the multiplication coefficients of the grave viroses frequency is due of the differences of the references values. Thus the apparent sensibility of the cultivar Santè in the "certified A" stage, illustrated through a multiplication coefficient on two times bigger (3,3) then cultivar Desirèe (1,6), is due of the fact that the frequency of the infested shrubs with grave viroses grown at the cultivar Santè, from 0,725% ("elite" stage) to 2,34% at the biological category "certified A". But at cultivar Desirèe the frequency of the infested shrubs with grave viroses grown from 2,89% to 4,54%. Referring to the delayed planting effects upon viroses infestation, it emphasized that these effects were insignificants when, for planting we used the tubers originated from clone D (pre basis). The negative influence of the delayed planting with one month, even is indirectly, it emphasized, constantly and significant in the biological category "certified A", that mean, for planting, we used tubers from the "elite" category (Table 5).

Table 5

The dependence of the infested shrubs frequency with grave viruses by planting time

Vegetation interruption	Biological category (year)	Cultivar	Planting time			
			early	after 30 days		
			%(st.)	%	dif.	sign.
At warning	SE basis (2005)	Santè	0,30	0,40	0,13	
	E basis (2006)		0,41	0,67	0,26	*
	Certif. A (2007)		1,58	2,66	1,08	***
	SE basis (2005)	Desirèe	0,74	0,75	0,01	
	E basis (2006)		2,10	3,03	0,93	***
	Certif. A (2007)		4,00	4,77	0,77	***
After 20 days from warning	SE basis (2005)	Santè	0,50	0,54	0,04	
	E basis (2006)		0,90	0,90	0,00	
	Certif. A (2007)		1,73	3,40	1,67	***
	SE basis (2005)	Desirèe	0,80	0,86	0,06	
	E basis (2006)		2,97	3,45	0,48	**
	Certif. A (2007)		4,08	5,46	1,38	***
Dl 5%					0,20	
DL 1%					0,43	
DL 0,1%					0,57	

Also, at the „elite" category, the indirectly induction of the delayed planting (one month), only at the cultivar Desirèe, was observed (tab.5). Concerning the influence

of the vegetation interruption, the observations effected during three years noted that, generally the delaying of the vegetation interruption with three weeks from warning, was associated with growing of the shrubs viroses degree, especially when the planting was accomplished later too (tab.6).

Table 6

Influence of the vegetation interruption upon the infested shrubs frequency with grave viroses

Planting time	Cultivar	Biological category (year)	Vegetation interruption after 20 days from warning			
			%(st.)	%	dif.	signif.
Early	Santè	SE basis	0,30	0,50	0,20	*
		E basis	0,41	0,90	0,49	***
		Certified A	1,58	1,73	0,15	*
	Desirèe	SE basis	0,74	0,80	0,06	
		E basis	2,10	2,97	0,87	***
		Certificată A	4,00	4,08	0,08	
After 30 days	Santè	SE basis	0,40	0,54	0.14	
		E basis	0,67	0,90	0,23	**
		Certified A	2,66	3,40	0,74	***
	Desirèe	SE basis	0,75	0,86	0,11	
		E basis	3,03	3,45	0,42	***
		Certified A	4,77	5,46	0,69	***
		Dl 5%			0,14	
		1%			0,22	
		0,1%			0,30	

CONCLUSIONS

Taking into consideration the amplification time of the infestations with grave viroses, is it possible, during one year, the multiplication of the planting material, without the „viroses purification", but, at establishment of the potato crop, it is necessary to use tubers which belong SE basis category.

The main roles in the diminishing of the viroses infestation have the early planting and the vegetation interruption at warning becoming so significant as the multiplication is made for many times

The importance of the technological measures is significant if we used the cultivars with small tolerance at the grave viroses.

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RESEARCHES CONCERNING THE INFECTION DEGREE WITH VIRUSES PVS AND PVX, AS A CONSEQUENCE OF THE TECHNOLOGICAL MEASURES INFLUENCE AT THE SEED POTATOES

CERCETĂRI PRIVIND GRADUL DE INFECȚIE CU VIRUSURILE PVS ŞI PVX, CA URMARE A INFLUENȚEI UNOR MĂSURI TEHNOLOGICE LA CARTOFUL DE SĂMÂNȚĂ

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ARDS. Suceava

Abstract: *Referring to role emphasizing of some technological measures (planting time, the treatments number against aphides and the moment of the vegetation interruption) in producing of the potato planting material, during years 2004-2006 the researches at the semi earlier cultivars (Astral and Rapsodia) were continued. These two cultivars were created at the Agricultural Research and Development Station of Suceava. Multiplication of the planting material, at the cultivar Astral, from the Base category (SE category) until the certified A category, was accompanied by a significant grows of the shrubs infestation level with X viruses. This tendency was presented only in Suceava when the vegetation interruption was realized with 20 days after warning. The obtained results emphasizes that the cultivar Rapsodia presented the biggest rate of the infected plants frequency with viruses S (PVS). This phenomenon was determined by multiplication process of the planting material and by later interruption of the vegetation period.*

Rezumat: *În vederea unei mai ample evidenţieri a rolului unor măsuri tehnologice (epoca de plantare, numărul de tratamente împotriva afidelor şi momentul întreruperii vegetaţiei) în producerea materialului de plantat la cartof, au fost continuate cercetările în perioada 2004 – 2006 la unele soiuri semitimpurii (Astral şi Rapsodia) create la Staţiunea de Cercetare Dezvoltare Agricolă Suceava. Multiplicarea materialului de plantat de la categoria Bază (Clasa SE) până la Certificată A, a fost însoţită de o creştere semnificativă a infestării tufelor cu virusul X la soiul Astral. Această tendinţă a fost mai pregnantă numai la Suceava şi în mod deosebit când întreruperea vegetaţiei s-a realizat cu o întârziere de 20 zile de la data avertizării. Sinteza datelor, relevă că cele mai mari rate ale creşterii frecvenţei plantelor infectate cu virusul S (PVS) la soiul Rapsodia, s-au datorat parcurgerii procesului de înmulţire a materialului de plantat şi întreruperii întârziate a vegetaţiei.*

Key words: seed potatoes, viruses, technological measures

Virosis diseases are produced by viruses which are entities without own metabolism. The propagation of the viruses depends by metabolism of the host organism. The agriculture lost because of plants infection with viruses could be very high. In the last years a lot of virosis at plants were registered. The fluency of the vegetal material transport and the vectors presence have been determined the virosis outspread in all over the world.

Table 1

The yield lost because of viruses

[*Cojocaru N., 1995; Iacob Viorica 2002; Pop V.I., 1986*]

Plant	Pathogen agent	The yield lost (%)
Wheat	1.Wheat streak mosaic virus	50 – 80
Barley	1.Barley yellow dwarf virus	20
	2.Barley yellow mosaic virus	50
Maize	1. European maize mosaic virus	40 - 44
Potato	1. Potato leaf roll virus	10 - 95
	2. Potato virus Y	10 - 80
	3. Potato virus X	10 - 20
Tomatoes	1. Tobacco mosaic virus in tomato	100
Grapevine	1. Grapevine mosaic	100

Easy virosis (or mosaics) are determined by infection one of the viruses: X, S. M and A. These viruses produce the easy symptoms on leafs mosaics, affecting the leaf size and plants high [BOȚOMAN Ghe., 2005]. The typical symptom of the infection with virus S is considered the easy recession of the veins from the superior part of the leaflets, in the same time, producing an easy rugosity of the leaf surface. At the secondary infection (when the plants derived from the infected tubers) the shrubs are tenuous, have a scattered grows, the leafs are down curved. Sometimes on the superior part of the leafs could appear the necrotic spots [IANOȘI S., 2005].

The virus X (PVX) is considered the most outspread virus because we meet him in all areas where grow potato. The main infection source is represented by infected tubers, therefore the disease is transmitted year by year. During vegetation period this virus is transmitted through directly touch between sick and health plants. The main agent is the wind, but indirectly can be the men and machines who pass through the potato land. The virus X has a lot host species of weeds such as: *Amaranthus sp.* and *Chenopodium album*. In the dissemination of this virus the species of aphides and the other insects have a small role.Having their importance, all yield factors are considered the links of the technological chain which can not be substituited. In this context for a better emphasizing of the technological measures role (planting time, the treatments number against aphides and the moment of the vegetation interruption), the researches for producing of the potato planting material, during period 2004-2006, for new created cultivars, were continued at the ARDS Suceava.

MATERIAL AND RESEARCH METHOD

The experiments on type 2x2x2x2 , in four replications, were placed in field, after subdivided plots method, (ARDS of Suceava and Experimental Center of Lucina) taking into consideration the following factors:

- A factor - the cultivar: a_1 – cultivar Astral (earlier cultivar); a_2 – cultivar Rapsodia (semi earlier cultivar);
- B factor – planting time: b_1 – the earlier spring; b_2 – after 30 days;
- C factor – vectors destruction: c_1 – with three treatments; c_2 – with five treatments;

■ D factor – vegetation interruption: d_1 – at warning; d_2 – after 20 days;

The complex effect of all studied factors was researched and interpreted in all experimental years at those two cultivars, going to basis (SE class), prebasis (E class) and certified A biological categories, for the following aspects:

- the infestation degree, with X virus, of the potato shrubs which belong of the cultivar Astral;
- the infestation degree, with S virus, of the potato shrubs which belong of the cultivar Rapsodia

In order to accomplish these determinations it used the E.L.I.S.A. equipment (Enzyme – Linked – Immune – Sorbet – Assay) which permitted us, the rapidly detection of the viruses, in the leaflets of the potato plant. In order to detect these viroses we collected the leafs samples from the potato plant, during the flowering period.

Fertilization of the potato plots with N:P:K, 100:100:100 kg s.a /ha, in a balanced rapport, was accomplished, in a proper manner so that the viruses infection symptoms could not be masked. The tubers were planted mechanically at a distance on 21,5 cm between tubers and 70 cm between rows, using the fraction on 30-45 mm. For destruction of the aphides it used the insecticide Actara 25 WG (thiametoxam 25 %) in doses on 0,08 kg /ha, the spell between two treatments was 12 days. In order to destroy of the potato herbage the first treatment was made mechanically, at warning – after 70 days from the plant sprouting. The second treatment was made with Diquat (Reglone forte) 5 l /ha. After three weeks from the vegetation interruption, the harvesting of the tubers was accomplished.

RESULTS AND DISSCUSIONS

The date from the table 2, emphasizes that at the cultivar Astral, the annual values of the infected shrubs frequency with virus X were not influenced by the place of the experiment or by the technological interventions graduations (planting time, treatment types and stage of the vegetation interruption).

We could notice that the only significant differences at the Basis (SE class – 2004), and bases (E class -2004) categories were registered at Suceava, when the vegetation interruption was made 20 days later against the warning time.

If the infestation level with viruses at the bases (E calss) and certified A categories did not register the significant differences, instead, the multiplication of the planting material from the basis category (SE class) to certified A category, was accompanied by a significant grows of the shrubs infestation level with viroses (X virus). This tendency was stronger at Suceava when the vegetation interruption was made 20 days later from the warning time.

The data from the table 3, emphasize that the most significant inductions upon the infections frequency with X virus (*PVX*), is due to utilization of the biological category *certified A,* environmental conditions and the stage of the vegetation interruption (table 4)

Thus in comparison with basis category – class SE at the basis category class E and certified A category the infection frequency amplification rate was at Lucina 2,2 and respectively 4,1, but in Suceava the infection frequency amplification rate was 4,1 and respectively 7,5 (tab. 4)

Table 2

The infected plants frequency with X virus –PVX - the cultivar ASTRAL, 2004 –2006

S P E C I F I C A T I O N			Y E A R S			Differences against 2004	
Planting Time	**Treatment Numbers**	**Vegetation Interruption**	**2004**	**2005**	**2006**	**2005**	**2006**
S U C E A V A %							
Earlier	3	*At warning*	0,00	0,30	0,44	0,30	0,44
	5		0,00	0,13	0,30	0,13	0,30
	3	*After 20 days from the warning*	0,13	0,74	1,23	0,61 x	1,10 xx
	5		0,12	0,74	1,22	0,62 x	1,10 xx
*After 30 days**	3	*At warning*	0,18	0,48	0,92	0,30	0,74 x
	5		0,18	0,45	1,08	0,27	0,90 x
	3	*After 20 days from the warning*	0,35	0,97	1,63	0,62 x	1,28 xx
	5		0,23	0,77	1,65	0,54 x	1,42 xxx
DL 5 %			0,40	0,69	1,04	0,52	0,71
DL 1 %			0,54	0,93	1,42	0,73	0,97
DL 0,1 %			0,73	1,26	1,91	1,00	1,32
L U C I N A %							
Earlier	3	*At warning*	0,00	0,12	0,29	0,12	0,29
	5		0,00	0,00	0,27	0,00	0,27
	3	*After 20 days from the warning*	0,11	0,26	0,45	0,15	0,34
	5		0,11	0,24	0,61	0,13	0,50
*After 30 days**	3	*At warning*	0,13	0,30	0,57	0,17	0,44
	5		0,12	0,17	0,43	0,05	0,31
	3	*After 20 days from the warning*	0,30	0,49	0,35	0,19	0,05
	5		0,17	0,33	0,68	0,16	0,51
DL 5 %			0,33	0,52	0,71	0,42	0,52
DL 1 %			0,45	0,71	0,96	0,58	0,71
DL 0,1 %			0,61	0,96	1,30	0,80	0,96

* - from the earlier planting

Table 3

The frequency dependence of the infested shrubs with X virus, by effect of the technological measures - cultivar ASTRAL

S P E C I F I C Ă T I O N		infected plants (%)	Differences	Significance
Location	SUCEAVA	0,59	0,29	**X**
	LUCINA	0,30	Standard	
Biological category	Basis(SE class)	0,13	Standard	
	Basis (E class)	0,41	0,28	**X**
	Certified A	0,78	0,65	**Xxx**
Planting time	Earlier	0,36	Standard	
	After 30 days *	0,52	0,16	
Treatment numbers	Three	0,47	0,05	
	Five	0,42	Standard	
Vegetation interruption	At warning	0,30	Standard	
	After 20 days **	0,59	0,29	**X**

DL 5 % 0,21
1 % 0,30
0,1 % 0,41

* - from the earlier planting
** - from the warning

Table 4

The amplification rates variation of the infections frequency with X virus, because of the main actions

S P E C I F I C A T I O N		S U C E A V A	L U C I N A
Biological category	Basis (SE class) - 1997	standard	Standard
	Basis (E class) - 1998	4,1	2,2
	certified A - 1999	7,6	4,1
Vegetation interruption	At warning	standard	Standard
	After 20 days *	2,0	1,7

* at warning

Table 5

The infected plants frequency with S virus - the cultivar RAPSODIA, 2004-2006

S P E C I F I C A T I O N			Y E A R S			Differences against 2004	
Planting Time	**Treatment numbers**	**Vegetation interruption**	**2004**	**2005**	**2006**	**2005**	**2006**
S U C E A V A %							
Earlier	3	*At warning*	1,41	2,50	4,69	1,09 ^{x}	3,28 ^{xx}
	5		1,10	1,88	4,69	0,78	3,59 ^{xxx}
	3	*After 20 days from warning*	2,50	4,85	7,04	2,48 ^{xxx}	4,54 ^{xxx}
	5		2,50	4,85	7,19	2,35 ^{xxx}	4,69 ^{xxx}
*After 30 days**	3	*At warning*	2,04	3,91	6,72	1,87 ^{xxx}	4,68 ^{xxx}
	5		1,57	2,97	6,41	1,40 ^{xx}	4,84 ^{xxx}
	3	*After 20 days from warning*	2.03	5,63	8,29	3,60 ^{xxx}	6,26 ^{xxx}
	5		2,35	5,63	7,97	3,28 ^{xxx}	5,62 ^{xxx}
DL 5 %			1,31	0,50	2,52	0,88	1,89
DL 1 %			1,78	0,68	3,42	1,17	2,54
DL 0,1 %			2,41	0,92	4,62	1,60	3,40
L U C I N A %							
Earlier	3	*At warning*	0,94	1,57	3,28	0,63	2,34^{xxx}
	5		0,94	1,57	3,28	0,63	2,34^{xxx}
	3	*After 20 days from warning*	2,19	3,44	5,32	1,25 ^{xx}	3,13 ^{xxx}
	5		1,72	3,28	5,47	1,56 ^{xx}	3,75 ^{xxx}
*After 30 days**	3	*At warning*	1,10	3,13	4,22	2,03 ^{xxx}	3,12 ^{xxx}
	5		0,94	2,82	4,07	1,88 ^{xx}	3,13 ^{xxx}
	3	*After 20 days from warning*	2,25	4,53	5,78	2,28 ^{xxx}	3,53 ^{xxx}
	5		2,66	4,07	5,94	1,41 ^{xx}	3,28 ^{xxx}
DL 5 %			0,83	1,39	1,12	1,01	0,92
DL 1 %			1,13	1,90	1,53	1,41	1,23
DL 0,1 %			1,53	2,56	2,06	1,94	1,70

- \- from the earlier planting

From the table 5, it observed that the biggest rates of the infected plants frequency grows with S virus (PVS) it registered at cultivar Rapsodia, because of multiplication of planting material and vegetation interruption 20 days later.

Thus, in comparison with basis category (SE class) the infection frequency with this virus grew on 2,2 times, after one year (at class E), and grew on 3,21 times (certified A), after two years (tab. 6).

Table 6

The infected plants frequency dependence with S virus, by the average action of the technological measures – cultivar Rapsodia, years 2004-2006

S P E C I F I C Ă T I O N		Infected plants (%)	Differences	Significance
Place	SUCEAVA	4,20	1,10	Xxx
	LUCINA	3,10	Standard	
Biological category	Basis (SE class)	1,76	Standard	
	Basis (E class)	3,55	1,79	Xxx
	Certified A	5,65	3,89	Xxx
Planting time	Earlier	3,26	Standard	
	After 30 days *	4,04	0,78	Xx
Treatment numbers	Three	3,73	Standard	
	Five	3,58	- 0,15	
Vegetation interruption	At warning	2,82	Standard	
	After 20 days **	4,48	1,66	Xxx

DL 5 % 0,71
1 % 0,98
0,1 % 1,37

* from the earlier planting
** from the warning

Also, it is noticed that the growing of the treatment numbers (from three to five), against aphides, did not influenced the evolution of the infection level with S virus (table 6).

CONCLUSIONS

The planting and interruption vegetation delaying did not determine the significant modification of the degeneration viruses capacity in comparison with estimated rates when we realized an early planting and the vegetation interruption was made at the warning moment;

Concerning the infection level with X virus, it observed that because of multiplication of the planting material, the biggest amplification capacity was at cultivar Astral;

Concerning the infection level with S virus (cultivar Rapsodia), it observed that the biggest amplification capacity both Lucina and Suceava, is due planting and interruption vegetation delaying.

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NEW PARASITIC AND SAPROPHYTIC MICROMYCETES ON CULTIVATED HORTICULTURAL PLANTS FROM MOLDAVIA

NOI MICROMICETE PARAZITE ŞI SAPROFITE PE PLANTELE DE CULTURĂ HORTICOLE DIN MOLDOVA

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Abstract. *The results of the mycological research during 2005 – 2007 made by the authors on different cultivated horticultural plants, pointed out the appearance of new micromycetes for Romania, or new host-plants for already known micromycetes or rarely described. The authors studied the frequency of the pathogenically agents on cultivated horticultural plants reporting 3 new micromycetes for Romania, 4 new host-plants for already known micromycetes and 3 micromycetes rarely described in Romania or Moldavia.*

Rezumat. *Rezultatele cercetărilor micologice realizate de autori în perioada 2005-2007 asupra diferitelor plante horticole cultivate sau spontane scot în evidenţă apariţia de noi micromicete pentru România, sau plante gazde noi pentru micromicete deja cunoscute sau rar descrise. Autorii studiază frecvenţa agenţilor patogeni pe plantele horticole cultivate sau pe plantele din flora spontană raportând 2 micromicete şi o formă noi pentru România, 4 plante gazdă noi pentru micromicete deja cunoscute şi 3 micromicete rar descrise în ţară sau în Moldova.*

MATERIAL AND METHOD

The special climatic condition from 2006 especially 2007 permits the appearance and evolution of multiples pathogenic agents which attacks the fruiter leafs. The infected material was extracted from field, brought in to laboratory where they supported special mycology tests until the right determination of the micro fungus genus which has produced the attack symptoms.

The microscopic samples and the attack symptoms were picture it for a better exemplification caused by the attack.

RESULTS AND DISCUSSIONS

As a result of the researches were signalized saprophytic and parasitic micro funguses which we present the mycological files.

1.***Oidium gaillardiae*** Iacob

The leaves, floral peduncle and even the ligulate flowers of *Gaillardia puchella* Foug., sampling from Iaşi on 2.X.2007, were covered by the ectoparasitic mycelium where will appear the conidia chains of Oidium. The conidia's forms confirm the fact regarding their *Euoidium* origins as S. Blumer says and also Eugenia Eliade. The conidia's dimensions are between 25-35 x 18-22 µm.

The micro fungus is new for Romania and also his host plant *Gaillardia puchella* Foug.

2.***Oidium chelidonii*** Iacob

The basal leaves of *Chelidonium majus L*. plants sampling from Iaşi on 2.X.2007 are covered by a whitish mycelium which becomes ashen. On the surface of the ectoparasitic mycelium appear typically chains of Oidium which terminal mature conidia's have dimensions between 31,25-34,37 x 15-15,6 µm. The mycelium rising is radial, and the under tissue become necrotic. The form of the only terminal conidia includes the micro fungus in Pseudoidium types.

The micro fungus is new for Romania and also his host plant *Chelidonium majus L*.

3. ***Alternaria dauci*** (Kühn) Gr. et Sk***.*** *f. sp. Endiviae* (Nattr.) Janezic**,** Kmecka knjiga, Lubliana (1957); Patrick Joly, Le genre Alternaria, p.189 (1964); Ellis M.B. Dematiaceous Hyphomycetes, p. 491 (1971)

Sin.: *Alternaria cichorii* Natrass.

The leaves of *Chelidonium majus L*. plants sampling from Iaşi on 10.X.2007 presents amphigenous colonies of brown-darkness mycelium which support single conidia's easy curved, obclavate olive-brown, smoothness of 90-120 x 15-20 µm.

Alternaria dauci (Kühn) Gr. et Sk. f. sp. Endiviae (Nattr.) Janezic it's a specialty new form for Romania and also his host plant Cichorium endiviae L.

4. ***Erysiphe cichoracearum*** (D.C.) Fuss., f. *cichorii* Lèv., Fl. Fr. II, p. 74 (1805) em Salmon, Monogr. Erysiph. Mem.Toor. Bot. Club., IX, p. 193 (1900); Winter, Rab. Kr. Fl. Deutsch., II, p. 33 (1887); Săvulescu et Sandu, Erysiph. Rumaniens, Ann., Acad. Agron., Buc., p. 89-91(1933); Sandu-Ville, Beitr. Z. Kenntnis der Erysiph. Rumaniens, in Mem. Sect. Acad. Roum., Ser. III, tom XI, mem 5, p.50 (1936); Sandu-Ville, Ciup. Erysiph. din România, p. 130 (1967); Eugenia Eliade, Monogr. Erysiph. din România, p. 364 (1990).

Cichorium endiviae L. leaves sampling from Iaşi on 10.X.2007 were covered by the whitish characteristic mycelium of *Erysiphe*, with pulverulent aspects because of the conidia's chains. The mycelium becomes ashes when the cleistothecium's appear and the leaves tissues become yellow and than necrotic. The dimensions of the spherical cleistothecium's are between 76-130 µm.

Cichorium endiviae L. is a new host plant for Romania for this well known micro fungus.

5. ***Thielaviopsis basicola*** (Berk. et Br.) Ferraris, Flora Italica, Hyphales, p. 233-234 (1912); Ellis M.B., Dematiaceous Hyphomycetes, p. 31 (1971)

Sin: *Thielaviopsis paradoxa* (Dade) C. Moreau, 1952

The micro fungus appeared on *Cichorium endiviae* L. sampling from Iaşi on 10.X.2007, formed short chains of conidia's. The fialides which support

conidia's have dimensions between 100 x 5-8 µm. The conidia's are almost spherical, brown, smoothness between 7-10 x 10-15 µm.

Cichorium endiviae L. is a new host plant for Romania for this micro fungus.

6. ***Phoma ramealis*** Desm. 18 Not. p. 7 (1825); Sacc. Syll. Fung. III, p. 71 (1884); Sacc. Syll. Fung., XIII, p. 939 (1898); Allesch., Die Pize, Fung. IV, p. 208 (1901); Diedicke, Kr. Fl., Pilze VII, p. 254 (1915);

On deathly tiller of *Armeniaca vulgaris* Lam. *var. amarelle* Rchb., sampling from Iaşi on 1.II.2007, can be observed whitish area with pronounced small points. The pycnidia's are almost spherical rising vesicle on epidermis and there dimensions are between 150-190 x 110-140 µm. The groups of pycnidiospore are compact eliminated like a brown cordon, but the isolated pycnidiospores are almost hyalines with 2 oily drops, and their dimensions are between 10 x 2,5-3 µm.

The micro fungus is mention only once in Romania on *Euonymus japonica* Th. so that *Armeniaca vulgaris* Lam. *var. amarelle* Rchb., is a new host plant for Romania

7. ***Penicillium corylophilum*** Dierckx, Soc. Sci. Brux., XXV, p. 806 (1901); et Biuourge, Monogr., La Cellule, XXXIII, fasc. 1, p.266-267; Col. Pl. IX and Pl. XIV, fig. 83 (1923); Thom, The Penicillia, p. 254-255 (1930); Gilman, A Manual of Soil Fungi, p. 251(1959); Raper and Thom, A Manual of Penicillia, p. 341-344, fig. 90 A and 91 A, B, C (1968).

At the surface of potatoes tubercle *Solanum tuberosum* L. sampling from Butea storages, Iaşi County on 6.XII.2006 can be observed the appearance of some mycelia white points composed from the micro fungus thallus. When were cultivated on Czapek nutritive media the micro fungus develop silky colony's which are growing slowly at the room temperature (20˚C). At the colonies surface appear conidiophores of 3 - 4,5 µm., typical with one verticil, with longs fialides of 10 µm and 2-2,5 µm beams which release smooth conidia's, spherical of 3 µm.

The micro fungus is mention from the soil, but *Solanum tuberosum* L. is a new host plant for Romania

8. ***Cercosporina cichorii*** (Dav.) Sacc. Syll. Fung. XXV, p. 898 (1931) *f. romanica* Sandu-Ville şi Serea, Micromicete noi din R.P.R, Lucr. şt. Inst. Agronomic Iaşi, p. 86-96 (1962).

Sin: *Cercospora cichorii* Dav.

The leaves of *Cichorium endivia* L., sampling from Iaşi on 10.X.2007, present circular brown spots, having the diameter of a few millimeters. The central zone of the spots is beige colored and present delicate brown points represented by the conidiophores groups. The dimension of the conidiophores are between 40-45 x 5,5 µm, and support hyaline conidia's longs of 26-77 x 3,5-4,5 µm.

The micro fungus is rare, he wasn't mention since 1962 from Iaşi.

9. ***Septoria petroselini*** (lib) Desm., N.F. nr.1174(1827); Sacc. Syll. Fung.III, p.531(1884); Sacc., Rev, Myc. XVI, p. 12 (1884); Br. et Cav., Fgi. parass. nr.114 (1898); Sacc., Syll. Fung., XIV, p. 972 (1899); Allesch., Rab. Kr. Fl., VI, p. 857 (1901); Diedicke, Kr. Fl. M. Br., IX, p. 511 (1915); Migula, Pilze III, p. 431 (1921); Săvul. et Sandu, Beitrz. Kenn, Hedwigia, LXX, p. 91 (1933); Grove, Brit. Fungi I, p. 409 (1935); E. Rădulescu, Trat. de Fitopat. vol. III, p. 217 (1970); E. Rădulescu şi colab., Septoriozele din România, p.173 (1973).

The parasitic micro fungus on *Petroselinum hortense* Hoffm., mention for the first time in Romania by C. Sandu-Ville şi C. Serea, it is signalized rarely in Romania

On the parsley leaves appear at the start yellow spots, than becomes brown well bounded with central zone beige colored, where can be observed small black points, represented by the fungus picnidia's. The picnidia's are spherical or lenticulars have 75-120 µm and release filiform pycnidiospores straights, hyalines of 35-40 x 1-2 µm.

In Moldavia the last mention were in 1948, so we mention the fungus being rarely in this area.

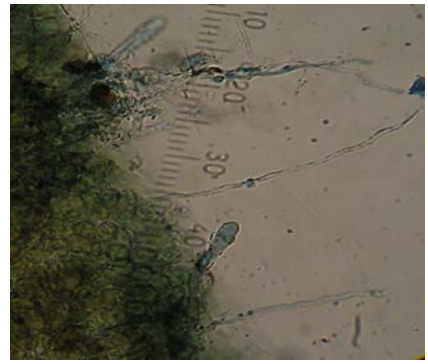
10.***Podosphaera tridactyla*** (Wallr.) de Bary, Beitr. y. Morph. u. Phzsiol. d. Pilze I, XIII, p.48 (1870); Winter, Rab. Kr. Fl. Deutsch., II, p. 28 (1887); Neger, Kr. Fl. Mark Branden.,VII/1,p.110(1905); Pollacci, Attir. Ist. Bot. Pavia, p. 156 (1911); Klika, Monogr. Ceskych. Padii, p. 45 (1924); Skjorik, Ann Exper. Forest., p. 90 (1926); Jacevski, Karmanny opred. Grib., II, p. 123 (1927); Săvulescu et Sandu-Ville, Annal. Agronom. Buc. I, p. 59 (1929); Blumer, Erysiph. Mitteleuropaas in Beitrz. Kr. Fl. d Schweiz, VII/1, p. 145, fig. 428 (1933); Sandu-Ville. Mem. Sci., Acad., Roum., tom XI, mem 5, p. 185 (1936) Golovin, Mucinisto-rosnanîigribî, p. 66 (1960); Mendorca et Sequeira, Agron. Lusitania XXIV/1, p. 92 (1963); Sandu-Ville, Ciup. Erysiph. din România, p. 120 (1967); Eugenia Eliade, Monogr. Erysiph. din România, p. 277 (1990).

The micro fungus is signalized on different species of *Prunus*, *Cerasus* and *Armeniaca* genus, but regarding the systematic framing of the micro fungus which produce the mildew on cherry - *Cerasus avium* (L.) Mnch., exist many contradictory opinions. Some researches (Dobrescu, Volcinschi) framing the micro fungus to *Phyllactinia guttata*, but C. Sandu-Ville and E. Eliade, framing the micro fungus to *Podosphaera tridactyla*.

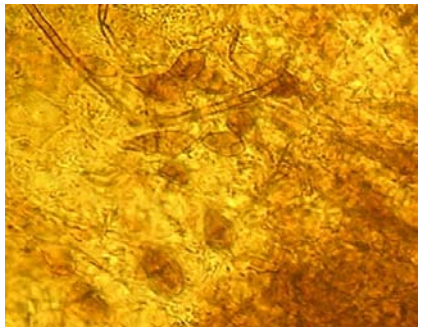
On the cherry leaves sampling from Iaşi on 2.X.2007 has been observed the mycelium presence but also the cleistothecium presence which has 3 appendages of 300-350 x 5-6 µm. The appendages are dichotomy branched on head and ascus with dimension between 70-80 x 60 µm, so that framing the fungus to the *Podosphaera* genus is certainly.

Because the micro fungus is founded only 2 times in Romania, we mention like a rarely micro fungus for Romania.

Oidium gaillardiae Iacob

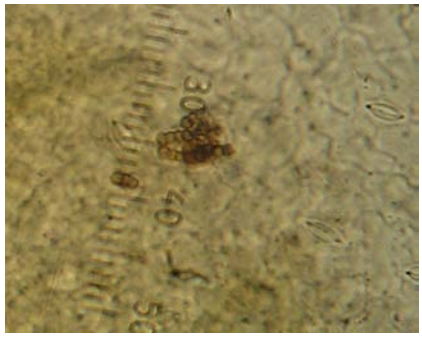


Oidium chelidonii Iacob

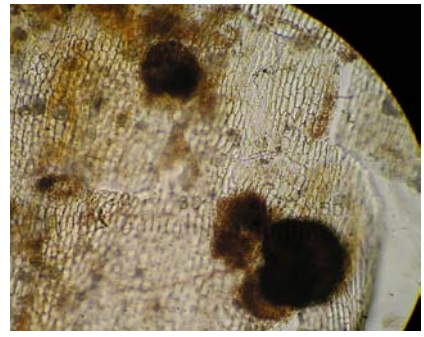


Alternaria dauci *f.sp. Endiviae*

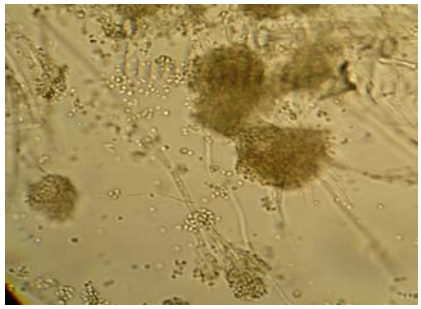
Erysiphe cichoracearum f. *cichorii*



Thielaviopsis basicola

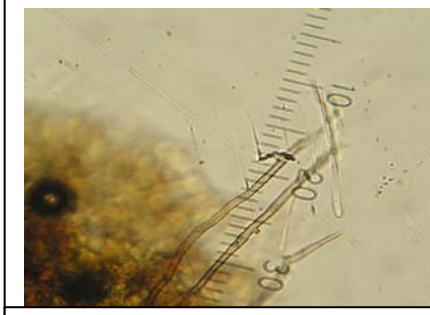


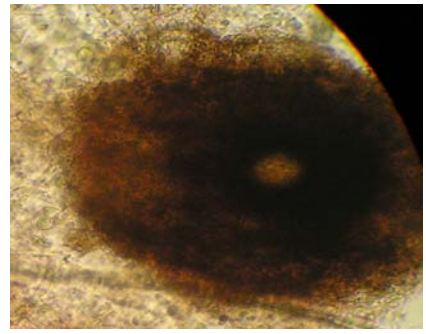
Phoma ramealis



Penicillium corylophilum

Podosphaera tridactyla





Septoria petroselini

CONCLUSIONS

In conclusion, the paper present 10 micro fungus: 2 funguses and one special form new for the country, 4 new host plants for micro fungus already known in country and 3 funguses rarely described.

The analyzed materials were included in Mycological Herbar of Moldavia "*C. Sandu-Ville*".

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PARASITIC AND SAPROPHYTE MICROMYCETES ON THE TREES AND ORNAMENTAL SHRUBS FROM THE DENDROLOGICAL NURSERY OF SCDP IASY AND PLANTATIONS

MICROMICETE PARAZITE ŞI SAPROFITE PE ARBORII ŞI ARBUŞTII ORNAMENTALI DIN PEPINIERA DENDROLOGICĂ A S.C.D.P. IAŞI

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Abstract: *The paper presents 11 parasitic or saprophyte micromycetes on the ornamental shrubs from the dendrological nursery of SCDP Iaşi One micromycete Corineopsis lirella is new for Romania and for other 10 micromycetes known in the country there are new host plants. The study of parasitic or saprophyte micromycetes on the trees or shrubs from the dendrological nurseries or parks is of great importance in terms of their protection or the prevention of pathogen attack. The studies must be deployed throughout the year to highlight the appearance of the forms of vegetative or asexual reproduction, forms that appear usually during the vegetation period. During the vegetative rest, micromycetes form their last sexual products that we may find in spring on the parasitized organs.*

Rezumat: *Lucrarea prezinta 11 micromicete parazite sau saprofite pe arbustii ornamentali din pepiniera dendrologica a SCDP Iasi. O micromiceta Corineopsis lirella este noua pentru Romania iar pentru alte 10 micromicete cunoscute in tara se prezinta plante gazde noi. Studiul micromicetelor saprofite sau parazite de pe arborii sau arbustii din pepinierele dendrologice sau parcuri este de mare importanta in ceea ce priveste protectia acestora sau prevenirea atacului patogenilor. Studiile trebuie sa se desfasoare pe tot parcursul anului pentru evidentierea apritiei formelor de inmultire vegetativa sau asexuata, forme ce apar in mod obisnuit in timpul perioadei de vegetatie. In timpul repausului vegetativ micromicetele isi formeaza ultimii produsi de sexualitate care ii putem gasi pe organele parazitate in primavara.*

MATERIAL AND METHOD

In the dendrological nursery of the Station for Research-Development in Fruit-growing Iasi we noticed the premature drying of offshoots of different species of ornamental shrubs. The branches or the dried and attacked fruits were harvested on June 15th 2007 and then taken to a laboratory for determinations. We went though all the stages of a mycological determination, then we photographed and annexed them to the descriptions of the micromycetes signaled.

RESULTS AND DISCUSSIONS

Following the determinations, we noticed the following micromycetes:

1. Phoma Thujana Thüm., Symb. Myc. Austr., III, no.62(1878); Sacc., Syll. *Fung. III*, p.102(1884); C.C.Georgescu, *Bolile criptogamice din pepiniere si plantatii*, I.C.E.S., ser.II-a, p.6(1955); C.C.Georgescu, P. Marinescu, P. Ene, M. Stefanescu si V. Miron, - *Bolile si daunatorii padurilor*, p. 197(1957); Aurelia Crisan – *Observatii asupra catorva micromicete de pe specii de Thuja*-Contr. Bot., Univ.Babes-Bolyai Cluj, p. 35-421(1966); Olga Savulescu, Eugenia Eliade, M. Nägler, Viorica Bontea, *Ciuperci parazite si saprofite din Ramania*, p. 72(19850; M. Mititiuc, Viorica Iacob – *Ciuperci parazite pe arborii şi arbuştii din pădurile noastre*, Ed. Al. I. Cuza Iaşi, p. 296 (1997).

In the dendrological nursery of S.C.D.P. Miroslava - Iaşi we noticed during 2007 an attack on the needles of *Chamaecyparis pisifera Sieb. Et Zucc.* The needles bleach, dry off and then on their surface we may see (with a magnifying glass) little black spots represented by pycnidia. They are approximately spherical, black, of 110-140 x110-130 µm, with a circular ostiole of 20 µm in diameter. Through the ostiole there appear little hyaline pycniospores without oily drops, and oval of 2,5-3 x 2µm.

In 2007, due to the mild winter followed by low temperatures for short periods and long drought with high temperatures, the shrubs grew weak and were easily attacked by micromycetes. The same thing is also affirmed by C.C. Georgescu in his papers on the climatic conditions that weaken shrubs.

Micromycetes were first signaled in Romania by C.C. Georgescu on *Thuja sp*. in 1955 and by Aurelia Crişan on *Thuja occidentalis L*. in 1966.

Chamaecyparis pisifera Sieb. et Zucc. is a new host plant for Romania.

2. Phoma spiraeina Paser., diagn. F. N. IV, No. 72(1888); Sacc. Syll. Fung. X. P. 143(1892); allescher, Pilze VI, ab, p. 249(1901).

On the dry branches of *Spiraea chamaedryfolia L. Em. Jacq.(sin. S. Ulmifolia Scop.),* there appear very small spots that swell the epidermis by pustules. These are pycnidia having brown walls and are 100 µm in diameter. From the inside of pycnidium appear the unicellular hyaline pycniospores without oily drops of 5 x 2,5 µm. The sizes make this micromycete different from *Ph. Spiraea Desm*. whose pycnidia are smaller but with bigger pycniospores (8-10x3 µm) and two oily drops. This micromycete is new for Romania.

Chamaecyparis pisifera Sieb. Et Zucc. is a new host plant in Romania due to this micromycete.

3. Pestalozzia funerea Desm., Ann. Sc. Nat. XIX p.335(18430; Sacc., *Fung.* Ital., tab. 115(1873) Sacc., Syll. *Fung. III*, p. 791(1884); Sacc. Syll. *Fung.XIII*, P. 1234(1898); Allescher – rabenhorst Kr. Fl., Die Pilze, *Fungi imperfecti, VII*, p. 681(1903); Migula, Kr. Fl. Bd. III, Pilze 4/2, *Fungi imperfecti*, p. 597(1934): C.C. Georgescu, M. Petrescu, P. Ene, M. Stefanescu si V. Miron – *Bolile si daunatorii padurilor,* p. 198(1957): M. Petrescu, *Contributii la cunoasterea micromicetelor din Rezervatia dendrologica Simeria*, Rev. Padurilor,

nr. 77, 1, p. 41-461(1962); M. Petrescu – *Aspecte fitopatologice din padurile R.S.R.*, Ed. Agrosilvica Bucuresti (1966); Olga Savulescu, Eugenia Eliade, M. Nägler, Veronica Tudosescu, *Bolile plantelor ornamentale din Romania*, p. 28(1969); A. Volcinschi – *Contributii la cunoasterea micromicetelor din Rezervatia naturala Padurea Hagieni* – Constanta. Analele Univ. Al.I. Cuza Iasi, XXII. p. 13-18(1977); M. Mititiuc, Viorica Iacob – *Ciuperci parazite pe arborii si arbustii din padurile noastre.* Ed. Al.I. Cuza Iasi, p. 281 (1997).

This micromycete is quite spread in Europe, Russia and even North America.

In our country it was first mentioned at Cluj by Tr. Savulescu and Al. Negru on *Thuja sp*. In his papers, M.Petrescu signaled it on *Juniperus virginiana L.*, on *Thuja Plicata Don*. and on *Chamaecyparis pisifera Sieb. et Zucc.* They noticed a premature drying accompanied by the appearance of some black spots wherefrom appear conidia in a different shape. The spots have 160 - 200 x 140-180 µm, and conidia are spindle-shaped, with four transversal walls of 22-30 x 9 µm, out of the 5 cells, the median cells are brown whereas the terminal ones are hyaline and have 3 terminal cilia.

Chamaecyparis pisifera Sieb. Et Zucc. is a new host plant in Romania due to this micromycete.

4. Camarosporium pini (West.) Sacc. Syll. *Fung., III*, p. 465(1884). Allescher – Die Pilze, VII ab., *Fungi imperfecti*, p. 259(1903); Diedicke – Kr. Fl. Mark. Br., bd.IX, p. 667(1915); Migula – Kr. Fl. Bd. III, Pilze 4/1, p. 369(1021); *Grove, British stem and leaf fungi, vol II*, p. 93(1967).

Syn. *Henderosonia pini west.*

The micromycete parasitizes the needles of *Chamaecyparis pisifera Sieb. Et Zucc.* weakened by the low temperatures of the winter of 2006-2007 and the drought from the spring-summer of 2007. On the dry needles, one may notice with difficulty (under the magnifying glass) little back spots arranged linearly and in parallel with the nervure. These spots represent pycnidia of 180-300 µm in diameter, black, spherical swelling the epidermis by pustules. Through the pycnidium pore there come out numerous oval brown conidia with three transversal walls and 1-2 vertical walls of sizes ranging between 18-20 x 9-10 µm.

The micromycete we signaled on *Chamaecyparis pisifera Sieb.et Zucc.* harvested on June 15th 2007 from the dendrological nursery of S.C.D.P. Miroslva Iasi, is new for the Romanian microflora.

5. Alternaria tenuissima (Kunze ex. Pers) Wiltshire, Trans. Br. Mycol. Soc. XVIII. p. 157(1933); Ellis, Denatiaceous Hyphomycetes, p. 477(1917).

Syn: *Helminthgosporium tenuissima Kunze* (1818);

Macrosporium tenuissimum Fr.

The micromycete develops on the annual weakened offshoots a hyaline mycelium on which there appear grouped, simple, easy, flexuous, cylinder,

septupled, brown and smooth conidiophores. These conidiophores normally sustain a single conidium. Conidia are shortly pedicellar, obclavate with rounded end, smooth, brown-golden with 3-4 transversal walls and an oblique-longitudinal wall of 22-27 x12-13 µm. The pedicel in the shape of a helmet measures 24 µm and is smooth.

This micromycete is known as a cosmopolitan species that appears on tissues previously parasitized or even on the fructifications of some parasitic fungi.

In Romania the fungus is quoted by numerous authors on 35 host plants to which we also add from 2007 *Chamaecyparis pisifera Sieb. et Zucc.* harvested at Miroslava-Iasi, on June 15th as a new host plant in our country.

6. Cladosporium herbarum (Pers.) Link., Mag. Ges. Naturf. Fr. Berlin, VII, p.37(1816); Lindau, Rab, Kr. FL. Deutsch. VIII, p. 800(1907); Migula Kr. Deutsch. III, 4/2, p. 300(1934); Sandu-Ville, *Contr. A la conn. Des Micrmyc. Moldavie*, Bull., Polit. Gh. Asachi I., p. 395 (1946); ellis, dematiaceous Hyphomycetes p. 313, fig. 217(1971).

On the margin of the needles of *Chamaecyparis pisifera Sieb. et Zucc.* harvested at Miroslava-Iasy on June 15th 2007, we may notice a grey efflorescence made from flexuous, greenish-brown, smooth conidiophores of 200x5 µm, sustaining conidia arranged in chains. These are finely warty, non-septupled or with a septum and measuring 5-20x5 µm. *Chamaecyparis pisifera Sieb. et Zucc*. represents a new host plant in our country for this micromycete.

7.Cladosporium herbarum (Pers.)Link

The fruits of *Spiraea chamaedrypholia L. Em.Jack.* that passed the winter get a blackish colour due to the presence of a black layer made from brown thalli from where rise many flexuous, brown, geniculate, smooth conidiophores up to 250 µm high and 3-6 µm thick. Conidia are elongated, brown-greenish, distinctly warty, 0-1 septupled, of 5-23 x 3-8 µm. This micromycete is cosmopolitan, but *Spiraea chamaedrypholia L. em. Jacq*. represents a new plant in our country.

8. Fumago vagans Pers.,Myc. Eur. I, p.9(1822); Tul., S.F. Carp. II. P. 280(1863); Sacc., Syll. *Fung, IV*, p.547(1886); Lindau, in rab., Kr. Fl.(ed.II) IX, p.268(1910).

Sin: *Cladosporium fumago Link*
Torula fumago Cheval
Dematium salicinum Alb. Et Schw.

The surface of the fruits of *Spiraea chamaedrypholia L. em. Jacq* covered by a black mycelium presents black sterile hyphae belonging to the micromycete *Fumago vegans* and from them appear a series of conidiophores sustaining conidia arranged in short chains, with 2-3 cells of dark green or even black-greenish colour of 5-15 µm long.

This micromycete may be found together with *Cladosporium herbarum (pers.) Link.*, it is cosmopolitan and yet *Spiraea chamaedrypholia L. em.Jacq*. is a new host plant for Romania.

9. Phomopsis occulta(Sacc.) Trav. Var. Thujae Grove, sec Migula, Kr. Fl. Bd. III, pilze 4 teil, 1 ab., p. 170(1021); C.C. Georgescu, *Bolile criptogamice din pepiniere si plantatii*, Ed. Agrosilvica de stat. Ser. II. P. 112(1957); Olga Savulescu, *Bolile plantelor ornamentale din Romania*, p. 27(1969).

Sin. *Phomopsis thujae Diedicke*

On *Thujopsis dolobrata Sieb. et Zucc.* appear small, spherical pycnidia with black peridium that swells the epidermis by pustules. The pore of pycnidia is 7-8 µm in diameter, and through it come out, at their maturity, elliptical spores with sharp ends of 5-8 x 2 µm and two oily drops. C.C. Georgescu as well as Olga Săvulescu quotes this micromycete as being possible to appear on *Thuja plicata* don or pe *Thuja orientalis L*. In the old mycological literature of our country it is quoted on *Thuja occidentalis L.*, so that *Tujopsis dolobrata Sieb. Et Zucc*. is a new host plant for Romania.

10. Pringsheiumia sepincola (fr.) v.Höhnel, sec. Munk, danish *Pyrenomicetes,* p. 471, fig.200(1957); C. Sandu Ville, *Ciuperci Pyrenomicetes – sphaeriales din Romania*, p. 152(1971).

Sin. *Sphaeria sepincola fr.*

Spahaerulina intermixta (Berk. et.Br.) Sacc.

Leptosphaeria sepincola(Fr.) Winter

The dry offshoots of *Spiraea bumalda Kohne "Anthony Waterer"* have large white areas on which we may see black spots represented by the micromycete perithecia. They are arranged in short rows, have thin walls and a pore of 25-30 µm. The asci come out in bunches, are oblong with sizes up to 90-100 µm, and spores arranged on 1,5-2 rows. The ascospores are oblong, spindle-shaped, easily strangled, of yellowish colour and sizes that vary between 10-15 x 5-7,5 µm, with 3 transversal walls. The fungus is rarely quoted in Moldavia (only once in Iasy on *Evonymus europaea L*.) and in other areas of the country only on Rosa, Rubus or Spiraea ulmifolia scop. so that *Spiraea bumalda Koehne "Anthony Waterer"*, is a new host plant for Romania.

11. Corineopsis Lirella comb. Nov. Grove W.B. *British Stem and Leaf Fungi, vol. II*, p. 331(1967).

The surface of the dry offshoots of *Spiraea bumalda Koehne "Anthony Waterer"*, presents pustules with linear deposits. The type *Corineopsis* is characterized by the lack of periderm as compared to other *Coelomycetes*. The spores from deposits are fusiform with 3 septa. The basal cell of conidiophore is less intensely coloured up to being hyaline. The spores measure 14-17,5x5 µm.

Spiraea bumalda Koehne "Anthony Waterer" is a new host plant in our country for this micromycete.

The material analyzed was included, after being catalogued, in the *„Mycological Herbarium of Moldavia* "C. Sandu Ville".

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RESEARCHES REGARDING MICROFLORA ON SOME PERENNIAL ORNAMENTAL PLANTS

CERCETĂRI PRIVIND MICROFLORA CARE SE DEZVOLTĂ PE UNELE PLANTE ORNAMENTALE PERENE

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Abstract. *Researches were carried out on two species of perennial ornamental plants, Thuja orientalis L. (commonly known as tree of life or thuja) and Buxus sempervirens L. (common names include box or boxwood) cultivated in the greenhouse of the Didactic Station Iasi. Anatomical and physiological characters of the root and leaf surface and their physic -chemical environments substantially influence the density and diversity of phyllosphere- and rhizosphere-inhabiting microorganisms, which may include natural antagonists of important pathogens. The objective of this investigation was to quantify the phyllosphere (i.e. leaf surface) and rhizosphere (i.e. root surface) microbial population from two species of perennial ornamental plants and to identify the genus of fungi for a better differentiation between species and for the same species between the rhizosphere and phyllosphere.*

Rezumat. *Cercetările au fost efectuate pe plante ornamentale perene de tuia (Thuja orientalis L.) şi buxus (Buxus sempervirens L.), cultivate în sera Staţiunii Didactice Iaşi. Au fost determinate principalele grupe de microorganisme care colonizează rizosfera şi filosfera acestora. Determinările au vizat numărul total de microorganisme la gramul de sol (în cazul rizosferei) şi la unitatea de suprafaţă (în cazul filosferei - cm^2),bacteriile gram pozitive, bacteriile gram negative şi ciupercile. În plus, pentru o mai bună evidenţiere a diferenţelor care există între cele două specii de plante ornamentale perene la nivel microbiologic, iar în cadrul aceleaşi specii între rizosferă şi filosferă, în cazul ciupercilor au fost determinate şi genurile acestora.*

In the rhizosphere area is present a very high number of microorganisms, which appertain to different taxonomic groups, and their density decrease with the increasing of distance from roots area. In greenhouse soil we have studied the rhizosphere microbiological composition of two ornamental plant species (thuja and boxwood) as structure and rate of participation.

The leaves are populated with different type of microorganism (bacteria, fungus, yeasts, and seaweeds). Natural medium represented by the leaves surface is exposed directly to sun light, climate and temperature variations, humidity and dryness, and also factors related with leaves age. The habitat adjacent to leave is called phyllosphere (gr. „phyllon" – leave) in analogy to the rhizosphere, and the environment direct associated with the leaves, is called phyloplan. The microorganism dispersion from phyllosphere is supported by rains, draught, dust and insects.

In glasshouse, the soil and environment conditions are different in compares to the natural environments, and these differences can produce modifications of the microbiological composition. The aim of this study was to present the results regarding

the microbial variety from the rhizosphere and phyllosphere of two ornamental plants cultivated in glasshouse conditions.

MATERIAL AND METHOD

The material necessary for microbiological analysis regarding the rhizosphere and phyllosphere area for the perennial ornamental plants of thuja and boxwood was harvest from the greenhouse belonging to "V. Adamachi" Didactic Farm in January 2008.

For the study of the rhizospheric microflora, the method of Petri dishes culture was used. The plants selected aleatory were harvest entirely, fact that permitted to take the roots with a quantity of soil corresponding to the three zone of rhizosphere. The samples were put in sterile bags for transportation to laboratory. In the same day the external and periradicular soil from plants rhizosphera was discarded and the soil from the internal area was collected on a sterile paper and used for future analysis. After this moment, the soil dilutions were prepared using the successive dilutions method, and the medium from the Petri dishes was contaminated using the inclusion method.

For the study of the phyllospheric microflora leaves from middle of plants, avoiding youngest or older leaves, were harvested. Also, a very important fact is that the leaves must be healthy and characteristic for each plant species. After harvesting, the leaves were putted into sterile bags for transportation to laboratory. There, the leaves were placed on medium culture and imprinted for a short period of time.

For an easy identification of different groups of microorganisms, a different specific medium culture was used. Thus, to determine the total number of microorganism/g soil we used the PDA medium (potato-dextrose-agar), for identification of gram positive bacteria the PDA medium with streptomycin (35 ppm) and for determination of micromycetes number PDA medium with Bengal rose (33 ppm). The inoculation was made, introducing 1 ml of soil dilutions in each Petri dish with molten and cooled medium at 45°C. The inseminated Petri dishes and that with the leavesprint are incubated at 37°C for bacteria and 28°C for fungus. The bacteria colony number was counted after 24 hours, and the fungus colony after 5 days.

RESULTS AND DISCUSSIONS

Rhizosphere

According to the descriptions of different types of symbiosis, they substitute some deficiencies of respective partners and environment, providing an interchange of nutrients, an essential interaction mechanism for the most of symbionts; devices of recognition, defense and plundering aid; protection; ecologic advantages.

Due to these influences, in natural environments, host organisms for the symbionts have a physiology and behavior different from that of axenic organisms, induced by the presence of the symbionts. Symbionts work frequently as autonomic entity and not as different organisms.

A close examination of the biological activity from the rhizosphere of thuja and boxwood show a great variability of the number of microorganisms that carry out their activity in the rhizosphere zone (Table1).

Table 1

Biological activity at rhizosphere level for thuja and boxwood cultivated in greenhouse conditions

Variant	Total microorganism/g soil	Fungi (%)	G^+ bacteria (%)	G^- bacteria (%)
Martor	127600	3.1	9.9	87
Thuja orientalis L.	316500	25.6	12.4	62.0
Buxus sempervirens L.	138450	3.6	5.7	90.7

The results interpretation about the biological activity on thuja (*Thuja orientalis* L.) rhizosphere soils show that the microbial activity is more intense than of boxwood, and even when compared to the witness, represented by an untilled soil specimen.

The total number of microorganisms determined in the rhizosphere of thuja was 316500 for each gram of soil, compared to 127600 determined on control soil sample. The same aspect appears in the case of fungi where the biological activity is a few times bigger than the control sample.

It should be noticed that the relation between microorganisms is completely different; thus, fungi from the rhizosphere of thuja represent 25.6% and the bacteria 74.4%. Among bacteria, the G^- species overcome the G^+ species with 83.3% to 16.7%.

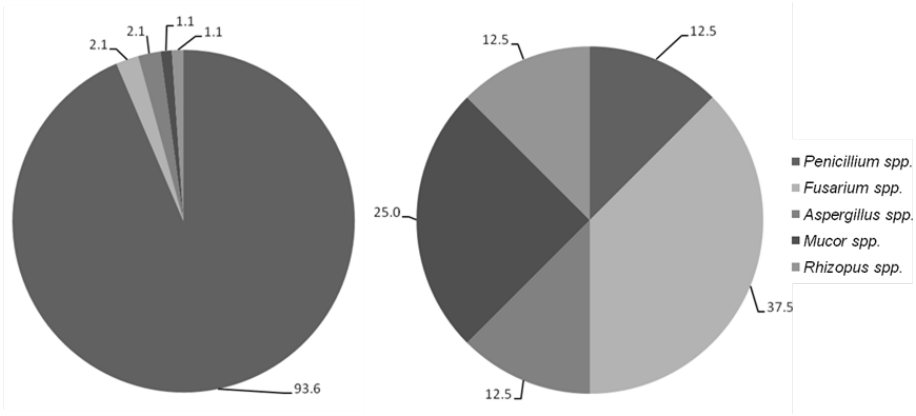
The identification of micromycetes in the rhizosphere area of thuja shrubs shows a relative small number of genera: *Rhizopus, Penicillium, Mucor, Fusarium* and *Aspergillus*. However, the ratio between these groups is very different, with *Penicillium* spp. as dominant genus with 93.6%. The other genera *Rhizopus, Mucor, Fusarium* and *Aspergillus* cumulate together only 6.4% from all fungi (Figure 1).

At boxwood (*Buxus sempervirens* L.) the synthesis of results shows a microbial activity less intense than that of thuja, but greater than that of the control soil sample. Thus, the total number of microorganisms determined in the rhizosphere area was 138450 for one gram of soil compared with 127600 founded in case of control sample.

The best represented microorganisms in the rhizosphere of boxwood shrubs are the G^- bacteria, which represent 90.7% from total and 94.1% from all bacteria. Compared to bacteria (98.2%), the fungi represent a small percent (1.8%) of the microbial activity of boxwoods.

The identification of fungi genera which activates in the rhizosphere of boxwood shows the same spectrum of genera as for thuja, but compares with thuja (25.6%) the percent of micromycetes is very small (3.6%). There have been determined species from the following genera: *Penicillium, Rhizopus, Mucor, Fusarium* and *Aspergillus*.

The ratio between genera is more equilibrated compared to thuja, with a advantage for *Fusarium* spp. (37.5%) followed by *Rhizopus* spp. (25%), *Penicillium* spp. (12.5%), *Mucor* spp. (12.5%) and *Aspergillus* spp. (12.5%) (Figure 1).



Thuja orientalis L. *Buxus sempervirens* L.

Fig. 1. Distribution of rhizospheric fungi genera for *Thuja orientalis* L. şi *Buxus sempervirens* L.

The existence of the same genera of fungi population, reduced as number, in the rhizospherical area of this two shrubs species can be explained through the long period of their time living in the greenhouse soil, fact that permitted a selection of micromycete genera. The selection was made on basis of biochemical proprieties of the radicular secretion via elimination of the genera that could not use them for their vital processes.

Phyllosphere

The study of microbiological activity from thuja and boxwood phyllosphere cultivated in the glasshouse of "V. Adamachi" Didactical Station Iasi, with the determination of the number of colonies of microorganisms/cm^2 leaf, shows differences between the species, but this are correlated with literature data.

On thuja (*Thuja orientalis* L.) phyllosphere a total number of 5.7 colonies/cm^2 were counted, and from this total 3.8 were micromycete, 0.1 G^+ bacteria and 1.8 G^- bacteria colonies (Table 2).

Table 2

Biological activity at phyllosphere level for thuja and boxwood cultivated in greenhouse conditions

Variant	Total microorganism/g soil	Fungi (%)	G^+ bacteria (%)	G^- bacteria (%)
Thuja orientalis L.	5.7	66.7	1.8	31.6
Buxus sempervirens L.	7.8	79.5	1.3	

The analysis of the isolated micromycete from the surface of thuja leaves show a dominancy of *Cladosporium* genera with 62.1 % from total, follow at a great distance by: *Fusarium* spp. (12.3%), *Penicillium* spp. (10 %), *Alternaria* spp. (7.7 %), *Botrytis* spp. (7.0%) and *Rhizopus* spp. (0.4 %).

The presented genera, excepting *Botrytis* spp., are characterized by a strong antagonism against the colonising species, fact which will explain why these shrubs have a strong resistance at diseases in comparison with other species. That means that phyllosphere plays an important role in plant's life, influenced their health.

Surprising was the small number of bacteria colonies with only 1.9 microorganisms/cm^2, knowing the fact that the greenhouse glass stops the UV radiations. We expected a bigger number, but the results shows us that the symbioses is the results of a long time evolution and the influence of the environmental factors do not cancel, even for a short time, the relationship established between the plants and the microorganism.

At boxwood (*Buxus sempervirens* L.) situation is quite the same as at thuja, a number of 7.8 colonies/cm^2 were isolated, from which 6.2 are micromycete, 0,1 are G^+ bacteria and 1.5 are G^- bacteria.

Regarding the micromycete diversity on boxwood leaves the *Cladosporium* genera represent 72.5% from the total. In boxwood phyllosphere, compares to thuja, new genus of fungi were found: *Aspergilllus* 1.7%, *Verticillium* 2.3%, *Melanospora* 0.6%, *Trichoderma* 0.9%, two genus have been disappeared (*Rhizopus*, *Botrytis*) and the participation rate of *Penicillium* (1.1%) şi *Fusarium* (4.3%) was reduced (Figure 2).

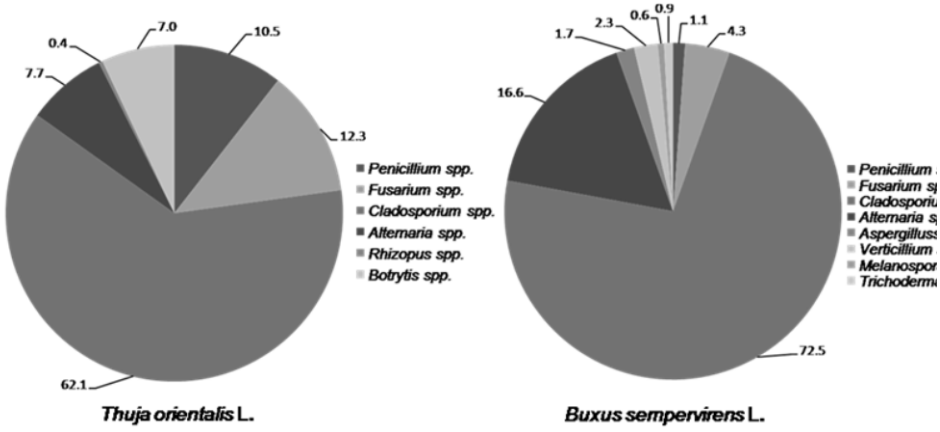


Fig. 2. Distribution of phyllospheric fungi genera for *Thuja orientalis* L. şi *Buxus sempervirens* **L**

CONCLUSIONS

The observations of the microbiological activity at rhizospheric and phyllospheric area on thuja and boxwood shrubs cultivated in glasshouse lead us to the following conclusions:

1. Microbial activity on rhizosphere area for the analyzed species is variable; the rate of participation for the principal groups is characteristic to each species.

2. At rhizospheric level bacteria are the dominant species from the microbial genera, the micromycete representing only a small percentage.

3. At phyllospheric level were isolated species of *Trichoderma* genus, known as antagonists, which maintain the pathogen species in the glasshouse environment under control.

4. The non-cultivated soil has a lower biological activity compare to the rhizosphere, regarding the total number of microorganism and the micromycete diversity.

5. The isolated micromycete from the analyzed shrubs rhizosphere are identical in the same environment conditions; the difference between the thuja and boxwood is on the participation rate and number of micromycete/g soil.

6. From all micromycete isolated in the phyllosphere of both species *Cladosporium* spp. dominate with over 60% from all genera, followed by: *Fusarium* spp., *Penicillium* spp., *Alternaria* spp., *Aspergilus* spp., *Verticillium* spp., *Melanospora* spp., *Trichoderma* spp., *Rhizopus* spp.

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PARASITIC AND SAPROPHYTIC MICROMYCETES IN SOIL OF GREENHOUSES WITH TOMATOES(I)

MICROMICETE PARAZITE ŞI SAPROFITE DIN SOLUL SERELOR CU TOMATE

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Abstract. *The work presents the result of investigations made upon micromycetes soil in greenhouses cultivated with tomatoes. Were been recorded, at various dilutions, between 8800 and 18000 conidia/g soil. The author presents the diagnostic at five species of Penicillium, two species of Aspergillus, and one species of Cladosporium, Scopulariopsis, Verticillium, Alternaria, Rhizopus and Ceratocystis.*

The spectrum of the micromycetes from soil varies very much in the cultivated lots, because interfere the influence of the working made for planting and the plants influence during their growth. Towards the previous situation of planting, it can be seen the alteration of the micromycetes spectrum both in quantily and in variability of isolated species.

MATERIAL AND METHOD

After tomatoes have been planted, have been gathered tests from soil which were brought to lab for analyses. In order to determine the micromycetes from soil, the petries were sterilized in which was put Czapek medium which has following compozition: NaNO3 - 3 g ; K2 HPO4 - 1 g ;MgSO4 .7 H2O - 0,5 g ; KCl - 0,5 g ; FeSO4 .7H2O - 0,01 g ; Sucroze - 30 g; Agar - 15 g; distiled water -1000 ml. The petries were sterilized. The seeding was made on 20-th June 2007 and have been Thermostated at 220C. Two dillutions have been made: 10-4 and 10-6 , for this were used five petries for each dillution and test. After the colonies of micromycetes have appeared, there were photographied on 25-th June 2007.

RESULTS AND DISCUSSIONS

After counting the colonies, we found the following results:

- at test I, at dillution 10-4 at V-1- have been registred an average of 88,00 germs /g solil and at dillution 10-6 at V-1 an average 32,000 germs /g solil;
- at test II, at dillution 10-4 at V-2- an average of 52,000 germs micotici/g solil and at dillution -6 V-2- an average of 18,000 germeni micotici/g sol.

In Petri vassels have been identified the following micromycetes:

Test I

1 0-4 V-1R – 1 = 16 colonies:

8 colonies *Penicillium coryophilum*
1 colony *Cladosporium lignicolum*
1 colony *Mucor sp.*
1 colony *Scopulariopsis brevicaulis*
2 colony *Aspergillus fumigatus*
1 colony *Micelii sterile*

R – 2 = 6 colonies:

4 colonies *Penicillium brevi-compactum*
2 colonies *Penicillium coryophilum*

R – 3 = 8 colonies:

5 colonies *Penicillium coryophilum*
2 colonies *Mucor sp*
1 colony Micelii sterile

R – 4 = 7 colonies:

3 colonies *Penicillium brevi-compactum*
1 colony *Penicillium coryophilum*
1 colony *Penicillium rugulosum*
1 colony *Cladosporium lignicolum*
1 colony Micelii sterile

R – 5 = 7 colonies:

2 colonies *Penicillium brevi-compactum*
3 colonies *Penicillium coryophilum*
1 colony *Penicillium rugulosum*
1 colony *Micelii sterile*

10-6 V-1

R – 1 = 4 colonies:

2 colonies *Verticillium lateritium*
2 colonies *Alternaria humicola*

R – 2 = 3 colonies:

1 colony *Penicillium coryophilum*
2 colonies *Rhizopus nigricans*

R – 3 = 4 colonies:

1 colony *Penicillium coryophilum*
1 colony *Penicillium rugulosum*
2 colonies *Verticillium lateritium*

R – 4 = 2 colonies:

1 colony *Penicillium brevi-compactum*
1 colony *Ceratocystis paradoxa*.

R – 5 = 3 colonies:

3 colonies *Penicillium frequetans*

Test II

10-4 V-2R – 1 = 7 colonies:

1 colony *Alternaria tenuis*

1 colony Aspergillus terreus
4 colonies *Cladosporium lignicolum*
1 colony *Penicillium rugulosum*
R – 2 = 6 colonies:
1 colonie *Aspergillus funiculosus*
3 colonies *Penicillium brevi-compactum*
2 colonies *Verticillium lateritium*
R – 3 = 4 colonies:
2 colonies *Penicillium rugulosum*
2 colonies *Micelii sterile*
R – 4 = 4 colonies:
3 colonies *Penicillium brevi-compactum*
1 colony *Humicoloa grisea*
R – 5 = 4 colonies:
1 colony *Penicillium brevi-compactum*
2 colonies *Penicillium ochraceum*
1 colony *Cladosporium lignicolum*
10-6 V-2 R - 1 = 1 colony:
1 colony *Penicillium coryophilum*
R - 2 = 2 colonies:
Penicillium rugulosum + Paecilomyces marqandii
R – 3 = 1 colony:
1 colony *Penicillium coryophilum*
R – 4 = 3 colonies:
3 colonies *Penicillium coryophilum*
R – 5 = 1 colony:
1 colony *Micelii sterile*

The analyses of the tests from the soil in June, prove the fact that the presence of high temperatures and of bigger plants made that the spectrum of micromycetes from soil to divesify and so have been isolated: 5 species of *Penicillium*, 2 species of *Aspergillus* and 1 specie of *Cladosporium*, *Scopulariopsis, Verticillium, Alternaria, Rhizopus* and *Ceratocystis*.

In the soil tests have been observed 5 species of *Penicillium*: *Penicillium coryophilum, Penicillium brevi-compactum, Penicillium rugulosum and Penicillium frequetans*, species which have been descried in the prewions work and *Penicillium ochraceum.*

In the folloing we will diagnost only the new species observed in the soil tests analized in June 2007.

1. ***Penicillium ochraceum*** (Bainier) Thom, The Penicillia, p. 309-310 (1930); Gilman, A manual of Soil Fungi, p. 272 (1959);

The colonies developed on medium Czapek agar reach 3 cm in diameter after 10 days. They have the surface more or little floccos and 2-3 mm hight. At first the colonies are velvety, and then floccos, with white margins and wrinkles. On the superior side appear drops and the other side is yellow to olive in colour.

The conidiophores have 150 x 4 μm and thick walles. The heads form colums. The conidiophores have branches of 15-17,5 x 3 μm, metulas of 10 x 2,5 μm and fialides of 8-10 μm. The conidies are subglobose of 3 μm with thick walles.

Micromyceta is qnoted only once in the country be Racoviță A and colab from Transylvania in 1969 from salame, and we qnote it first from soil.

Have been pointed 2 species of *Aspergillus: Aspergillus funiculosus* and *Aspergillus terreus*. Because the full description of this species *Aspergillus funiculosus* has been made prewionsly we will give the full data only for the other species.

2. Aspergillus terreus Thom, Thom and Church, Ann. J. Botany V, p. 85-86 (1918); Gilman, A Manual of Soil fungi, p. 225 (1959); Raper and Fennell, The genus Aspergillus, p. 568, fig. 128 (1965).

The colony developed on Czapek medium agar has a pink colour with shades of cinamon bark and yellow brown on the other side. The conidiophores give the fluffy aspect of the surface of the colony. Conidiophores have 150 - 200 x 5 μm, by pliant and ends with a bladder of de 12,5 - 15 μm in diameter, which support, a two row of fialides at end. The first layer of fialides has 7 - 9 x 2 - 2,5 μm, and those exterior has 5 -7 x 2μm. These are compact and eliminate the conidiouses of elliptical to globose, de 2 -2,5 μm with smooth surface.

Micromyceta has been pointed before on tanned skin by Ioniță and colab. in 1976 and from soil by Niță L. and Balinschi Irina in 1966, Lucia Turcu in 1971, 1974 şi 1975 from Cluj and Viorica Iacob from Iaşi in 1973.

3. Cladosporium lignicolum Corda, Icon. I, fig. 2067, p. 14 (1837); Massee, Brit. Fung. Fl. III, p. 394 (1885); Gilman, A Manual of Soil Fungi, p. 334 (1959).

Micromyceta develops on Czapek medium agar a black colony, circular, with the central zone bulging, of 1 -1,5 cm in diameter. The conidiophores are short, branched and sustain conidiouses ellipsoidal put in short chains or only by two. Their colour is brown- black of 8-10 x 5 μm. Micromyceta is new for România .

4. Scopulariopsis brevicaulis (Sacc.) Bainier, Bull. Trimest. Soc. Mycol. Fr. XXIII, (1907); Ellis, Dematiaceous Hyphomycetes, p. 327, fig. 224 A (1971).

On Czapek medium agar, after five days of thermostated, the colony is withe , with short conidiophores of 10 - 15 μm. At the beginning, conidiouses are withe-beije and then become slight brown. They are put in short chains, the shape is almost spheric, smooth at the beginning, then become slight and have 7 x 8 μm.

Micromyceta is cosmopolit, has been observed on defferent mediums: on frescoes (Alice Săvulescu, 1960), on paper (Alice Săvulescu, 1971), on tanned skin (Viorica Lazăr, l967 and Alice Săvulescu 1970) walls of the coves (Lörenti, 1966) and soil Lucia Turcu, 1974,1975).

We mention it from the soil of greenhauses cultivated with tomatoes.

5. Alternaria alternata (Fr.) Keissler, Beih. Bot. Zbl., 29, p. 434 (l912); Ellis, Dematiaceous Hyphomycetes, p. 465, fig. 330 (1971).

Micromyceta develops colonies brown-black, covered by conidiophores which are short, brown septate. The conidiouses appear in chains, they are appearance of blackberry, brown-black, very varied as dimmension and has 30-36 x 15 μm.

In literature is pointed on plants and leftovers of the plants in the soil.

6. Verticillium lateritium Berkeley, Cooke, Brit. Fgi., p. 635 (1871); Gilman, A Manual of Soil Fungi, p. 304 (1959).

Micromyceta develops on Czapek medium agar circular colonies, hemisferice, of red-brown at maturity but delimitted by a white zone. The conidiophores are very fine, with rare branches that sustain long fialides of 7,5 x 2 μm which broadcast many conidiouses ovate, of 2-3 x 2 μm, smooth.

The micromyceta a found by Negru Al. on different vegetables cultivated (l966, 1972), by C. Sandu-Ville şi colab. on dalii and by researcher from Cluj which has been determine the fungus of soil, Lörinczi (1970) and Lucia Turcu (1974, 1975). We point this fungus from the soil the greenhausse cultivated with tomatoes.

7. Rizophus nigricans Ehrenb., Nova Acta Acad. Leop. X, p. 198 (1820); Sacc., Syll. Fung. VII, p. 212 (1888);

Micromyceta develops very quickly a coloniy made of hialines hyphe, very fine on which appear hialines sporangioforouses that sustin the sporipheric heads of black colour. The sporangioforouses that are 1-1,5 cm appear by two and have a diameter of 25-40 μm. The columelas has 70 x 90 μm and sustains the round or oval spores of 10 x 7,5 μm.

The fungus is cosmopolit and we find it very ofen on different layers from the soil.

8. Ceratocystis paradoxa (Dade) C. Moreau, Rev., Mycol., XVII, p. 22 (1952); Ellis, Dematiaceous Hyphomycetes, p. 31, fig. 5A (1971) .

Micelian colony is brown at the maturity become black. The conidiophores are shorts of 50 x 5 μm. On the micelian hyphes appared the artroconidiouses are light brown, with double walles, longer than wider of 12-17,5 x 5-6 μm. The conidian stadium belongs to Thielaviopsis.

The fungus is qnoted in the bibliografy from the parte of dead plants cultivated in the tropical area. In our country is qnoted only one specie *Ceratocystis longilostellata* from the roots of the oak. In the soil of the greenhauses this year have been registred high temperatures which favorized the appearance of micromycete.

9. Humicola grisea Traaen, Nyt. Mag. Naturvid., 52, p. 31 (1914); Gilman, A Manual of Soil Fungi, p. 6o, fig. 29B (1971).

The fungus forms at the surface of the medium hypheae septate, hialines of 4 μm in diameter. The micelian colony covers a mass of yellow-brown conidiouses. The conidiophores have short aside branches that sustain the conidiouses with double walles and a granular surface of de 9 - 15 μm.

Micromyceta has been qnoted before from soil by Viorica Iacob din sol de at Podu Iloaiei - Iaşi, in 1973 and by Ioachimescu Dinulescu Mariana from rotten wood in mines in 1978.

10. Paecilomyces marquandii (Massee) Hughes, Studies in microfungi, Mxcol. Pap. 38,1-8 (1951); Domsch K., Gams W., Pilze aus Agrar, p. 93 (1970).

In order to determine micromyceta, Petri vassels have been refrigerated. After 3 monts the colonies of Penicillium rugulosum have been covered by a micelium of beije colour that belongs to this micromycete. Differenthy from the fructifies of the penicillium or spicaria, the appearance of branches and fialides is irregular. Singular fialides or grouped eliminate conidiouses which are spheric of 2 -2,5 μm. Micromyceta is new for România.

We attach the photos and the microscophic lamellas have been included in micologic Herbal of Moldavia „C. Sandu-Ville".

CONCLUSIONS

1.The study of micromycetas from soil is very useful taking into account the fact that follows the plantation of rasads which at first phases of development , are extremely sensible.

2.The presence of parasitic micromycetas has an economic implication because it can compromise the culture and so a new disinfection of the soil is needed and of course another replantation which modifiens the period of development of plants, delayning the valorification of obtained production.

3.The analyses of the tests from soil harvested in June 2007 proves the fact that the presence of high temperatures and of more developed plants made that the spectrum of micromycetas from soil to modify both in quantily and of variability of isolated species. It is noticed the presence of new species for România or qnoted for the first time in the soil cultivated with tomatoes like: Cladosporium lignicolum, Paecilomyces marquandii, Ceratocystis paradoxa, Verticillium lateritium, Scopulariopsis brevicaulis, Penicillium ochraceum.

4.Out of the sum of izolated species, 16,2% represent micromycetes new for our country or qnoted for the first time in soil.

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PARASITIC AND SAPROPHYTIC MICROMYCETES IN SOIL OF GREENHOUSES DESTINATED TO CULTIVATION WITH TOMATOES (II)

MICROMICETE PARAZITE ŞI SAPROFITE DIN SOLUL SERELOR DESTINAT CULTIVĂRII CU TOMATE

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Abstract. *This work performs the results of the observations made upon the spectre of parasitic and saprophytic micromycetes in soil destined to the cultivation with tomatoes.Its were been isolated and identificated species of followed genus: Fusarium, Gliocladium, Cladosporium, Aspergillus, Penicillium, Trichoderma, Acremoniella, Cylindrocarpon, Verticillium and colonies of steril mycelium.. It was been remark the massive occurrence (46,2% of total) of Penicillium species.*

The study of micromycetas from soil is relly interesting and useful at the some time taking into account the fact that new plants are planting which in first phasez of development are very sensible. The presence of parasitic micromycetas may compromise the culturebeing necessary a new dezinfection of the soil and a replantation which modifies the period of development of plants delayng the valorification of obtained production.

MATERIAL AND METHOD

Before planting the tomatoes plants, have been gathered tests from soil which were brought to lab for analyses. In order to determine micromycetas from soil the petries were sterilized in which was put Czapek mediulm which has the following composition: NaNO3 - 3 g ; K2 HPO4 - 1 g ;MgSO4 .7 H2O - 0,5 g ; KCl - 0,5 g ; FeSO4 .7H2O - 0,01 g; Sucroze - 30 g; Agar -15 g; distiled water -1000 ml. The petries with medium were sterilized. The sowing of these has been made on 14-th February 2007 and have been thermostated at 220 C. Two dillution have been made: 10-4 şi 10-6, five petries for each test and dillution. At the appearance of micelions colonies (21.02.2007), these have been numbered and photographied.

RESULTS AND DISCUSSIONS

After counting the colonies, we found the following rezults:

- at test I, at dillution 10-4 at V-1- have been registred an average of 88,00 germs /g solil and at dillution 10-6 at V-1 an average 32,000 germs /g solil;

The numbering of the colonies has been made on 21-st February 2007- at tests I and II 10^{-4} V-1 an average on 5 repetitions - 96000 germs/g soil.
10^{-6} V-1 an average on 5 repetitions - 50000 germs/g soil

10^{-4} V-2 an average on 5 repetitions - 99000 germs/g soil
10^{-6} V-2 an average on 5 repetitions - 26000 germs/g soil

1. ACREMONIELLA ATRA Sacc. Syll. Fung., IV, p. 302 (1886); Ellis, Dematiaceous Hyphomycetes, p. 79, fig. 44 (1971).

The colony developed on Czapek medium at maturity is coloured in light brown. The talus fibrous is it and superficial and imers, is of 2-7 µm width. The conidiophores are simple or branches, with smooth walls and have 100 x 4-8 µm. The conidias which forms at the end of one short branch is nonseptate, oval, slightly yellow, smooth with 2 walls of 20-30 x 15-25 µm. The tomatoes soil is a new host for the country.

2. *ASPERGILLUS FLAVUS* Link., Observationes, p. 16 (1809); Raper end Fennel, The Genus Aspergillus, p. 361, (1965);

The colony developed on Czapek medium agar are well delimited and colours the medium on verso colonies, in yellow. The conidiophores are straight of 400-500 x 5 µm with a bladder ending of 25-30 µm in diameter, which sometimes prezents a single row of fialides of 12 x 3 µm that eliminates the conidiouses globose, which are slightly yellow, smooth, of 2,5 x 3,5 µm in diameter.The tomatoes soil is a new host for the country.

3. *ASPERGILLUS FUNICULOSUS* Smith, Brit. Mycol. Soc., XXXIX, p.111(1956); Raper end Fennel, The Genus Aspergillus, p. 440, fig. 91 F, H (1965);

The colonies of this fungus are green-yellow, granular, with a white margin, with the surface funiculosa. The bach side of the colony is olive in colour with reddishspots on. The heads sporipheric are globose of up to 120-140 µm in diameter. The miceylum, has 4-6 µm in diameter, and sporangiophorous ends with a sphere of 15 µm in diameter, on which we can find fialides tall of 6-7 X 2,5 µm, which eliminates the conidiouses globose of, 3-5 µm. The tomatoes soil is a new host for the country.

4. *CLADOSPORIUM HERBARUM* Link ex. Gray(1821); Domsch end Gams, Pilze aus Agrarböden, p. 28 (1970).

The colonies developed by this micromyceta are blach and the medium on verso is dark grey. On the surface of the colony are straight conidiophores rarely with branches, septed , brown-olive with diameter of 5-7,5 µm. The conidiouses appear at extremity are oval, unicelular, cyllindric-elliptical, sometimes with 2 cells and at lest throttle in front the sept. The tomatoes soil is a new host, the fungus being qnoted as saprophitic.

5. *CYLINDROCARPON CANDIDUM* var. *majus* Wollenweber, J. Gilman, A Manual of Soil Fungi, p. 396 (1957);

The micromyceta develops on the medium a colony white and circular on which appear microconydiouses oval-cylinders free or in false heads sporipheric of 4-12 x 2,5 µm that nonseptate or of 9-20 x 3 µm, the bicelulars. The macroconidias are cylindric-clavariforme, slightly curved, ellipsoidales or obtuse at base, with multiple transversal walls(5-7).The conidiophores at the beginning

are simple and in the end have branches arranged in the verticils. The fungus is qnotqd just once from mountain soils.

6. *FUSARIUM SP.*

The micromyceta develops on the medium a fluffy micellium of white colour at the beginning and then pink, colouring the medium under the colony in redalish shades. The conidiophores are branches and sustain the heads soripheric made of many conydiouses with pointed heads and many transversal walls, conydiouses of *Fusarium.* The determination of the specie hasn't been done because is necessary smashing on standard mediums for *Fusarium* type. The fungus is common on cultivated soils.

7. GLIOCLADIUM DELIQUESCENS Sopp., Monogr. Der Pilzgruppe, p.89 (1912); Raper and Thom, p. 686(1968).

The micromyceta develops on Czapek medium a colony, at the beginning made up of sterile hifes, and then in the moments the fructify**,** the colony becomes dark green and the medium under it is coloured. The conidiophores are easy to notice and have 100-200 x 10 µm. The fructifications are many levels, branches, secondary branches, metulas, fialides and soripheric head globols from which the conydiouses can hardly detach even at heating the microscophic preparation. The primary branches have 15 x 3-3,5 µm, the secondary branches have 13-15 x 3 µm, the metulas 8-9 x 2 µm, the fialides 6-8 x 2-2,5 µm, and the conidias are elliptical, light green with smooth wall of 3 x 2-2,5 µm. These elements remain crowded being densed by a sticky exudat. The micromyceta has been qnoted once from the soil with *Hippophae.*

8. PENICILLIUM BREVI-COMPACTUM Dierckx,Soc. Scien. Brux. 25, p.88(1901);Gilman,

A Manual of Soil Fungi, p. 255 (1957); Raper and Thom, p. 407-409, fig.106,(1968). The colonies that appear on the medium are limited, velvety, green-grey with the medium under the colony yellow-grey. The diameter of the colony is 2-3 cm after 10-12 days from its appearance. The conidiophores are variable in lenght and shorter than at other species *Penicillium*, compact, forming zones fares on the surface of the colony which has the center raised and spots slightly coloured in yellow. Under the colony the micellium is coloured in yellow. The conidiophores have 300 x 3,5µm, rarley with branches with smooth walls. The branchets are of 20 x 3 the metulas 12 x 2,5µm, the fialides 10 x 2,5µm, and eliminate the smooth conidias, ovate to subglobose of, 2,5 x 2,5-3µm. Micromyceta has been qnoted from the soils cultivated with wheat, maise, salad and beech wood kept in the soils.

9. *PENICILLIUM CORYOPHILUM* Dierckx, in Soc. Sci. Brux. XXV, p. 86 (1901);Raper and Thom, p. 341, fig. 91 (1968).

The colonies developed on Czapek medium agar, have 2,5-3 cm in diameter at 10 days after their appearance. The surface of the colonies is velvety, wrinkled, of green- blue colour with small spots and with the back side sightly coloured in brown. The penicillies are variable, lop-sided, with monoverticilate structures, with 2-3 metulas of 15 x 3 µm, the fialides of 10-12 x 2,5 µm that eliminate the

conidias subglobose of 2,5 µm with smooth walls in divergent chains. The fungus has been qnoted from soil with salad, and from opium poppy and potatoes tuberculas.

10. PENICILLIUM FREQUENTANS Westling, Arkiv för Botanik, XI, 58, p.133 (1911); Gilman, A Manual of Soil Fungi, p. 241 (1957); Domsch end Gams, Pilze aus Agrar., p. 103 (1970).

The colonies that appear on Czapek medium agar have rays, are velvety and green-blue in colour. The conidiophores have 200-300 x 3 µm lenght. Under the colony, the medium is slightly coloured in brown. The conidyas chains come from fialides of 7,5-10 x 2,5µm, and the conidyas are spheric, smooth of de 2,5-4 µm in diameter. Micromyceta has been qnoted from soil cultivated with weat and frezias.

11. *PENICILLIUM FUNICULOSUM* Thom, in U.S. Dept. Agr., Bur. Anim. Ind., Bul. 118, p. 69(1910); Gilman, A Manual of Soil Fungi, p. 280 (1957); Raper and Thom, p. 616 (1968);

The colonies that appear on Czapek medium agar have a funiculose surface colouring the medium in dark red. The conidiophores that appear on the medium are grouped and are short of de 20-80 µm. The heads sporipheric have 3 floors with fialides of 10-12 x 2-3 µm that eliminate elliptical conidyas, smooth, green of 3 x 2-3 µm in colums. Micromyceta has been qnoted from soil with salad and pine-tree wood kept in the soil.

12. *PENICILLIUM LILACINUM* Thom,U.S.Dept. Agr., Bur. Anim. 118, p. 73 (1910); Raper and Thom, p. 285, (1968);

The colonies that appear on Czapek medium agar have the surface white at the beginning, floccose, after begun their fructifyed gets to lilac, without colouring the medium under the colony. The heads sporipheric are found at a light of 100 µm, and the fialides of 12 x 3 µm, eliminate the conidyas of 3-5 x 3 µm, elliptical or oval. Micromyceta is qnoted from the soils cultivated with wheat, maise, frezias and salad.

13. *PENICILLIUM PALLIDUM* Smith, in Bot. Mycol. Soc. Trans. XVIII, 88-89, Pl. IV, fig. 1, 2 (1933); Raper and Thom, p. 459, 460, fig. 120 A, B (1968);

The colonies that develop on Czapek medium agar grow fast (6-7 cm in 10-14 days), have a funiculose surface because of the groups of conidiophores coloured in beije, without exudat. The penicillias are lop-sided with thick walls, metulas of per 12 x 2,5 µm and fialides of 11-12 x 2 µm that eliminate the long conidyas, smooth, of 3-4 x 2 µm. The tomatoes soil is a new host for the country.

14. *PENICILLIUM RUGULOSUM* Thom, in U.S. Dept. Agr., Bur. Anim. Ind., Bul. 118, p. 60-61, fig. 21 (1910); Raper and Thom, The Penicillia p. 648-650, fig. 164-A, B, C (1968);

The colonies that develop on Czapek medium agar can reach 2,5 cm at two weeks from their appearance do, are flufly, of dark green colour and a white margin. The conidiophores have 200 x 2,5 µm with fialides of 9-12 x 2 µm, that eliminate the elliptical conidyas green arranged in long chains, divergent. Micromyceta is a qnoted fron soil cultivated with wheat maise and frezias.

15. ***PENICILLIUM TERRESTRE*** Jensen, in Cornell University Exp. Sta. Bul. 315, p. 486, (1912); Raper and Thom, The Penicillia p. 450-452, fig. 116 - A, B, fig. 117 (1968);

The colonies of micromyceta develop on Czapek medium agar under a circular form of dark green in colour, and presence characteristic conidiophores with thick walls. The vegetative hyphae , the tall have 2-5µm in diameter and the conidiophores that are 70-300 µm high, are septate with branches that end with metulas of 10-15 µm, and fialides de 7-10 µm. The conidyas that are spheric, hialines are grouped in long chains and are 2-3 µm, in diameter. Micromyceta is qnoted from soils from the mountain.

16. ***PENICILLIUM VARIABILE*** Sopp, Monogr., p.169, (1912); Raper and Thom,The Penicillia p. 642, fig. 163 (1968);

The colonies reach 2-3 cm in diameter on Czapek medium agar at two weeks from their appearance. The surface of the colony is velvety-granulated with micellium that is 200 µm height. The colour of the colony varies from orange to pink and then carmine. On the back side the medium colours in pink. The conidiophores septed, brown with smooth walls, have the verticille of 2-4 metulas and cylindric fialides that free the elliptical conidias of 3-4 µm. The fungus is qnoted from montaineous and mine soils.

17. TRICHODERMA GLAUCUM Abbott, Tax. St. of soil fungi (1926);Gilman, A Manual of Soil Fungi, p. 213 (1957);

Micromyceta forms on the medium a colony which is diffuse and extends very rapiddly, of yellow colour with shades in the sporiphaeric area. The tallus is 3-6 µm, is more-septation and on it raises the conidiophores irregular branched of. The heads sporipheric have 7,5-10 µm and the conidyas are smooth, hialine, oval of 4-5 x 3µm. The fungus has been qnoted from soils cultivated with wheat, mayse and *Chrysanthemum.*

18. ***VERTICILLIUM TENERUM*** (Nees ex Pers.) Link., J.Gilman, A Manual of Soil Fungi, p. 304 (1957).

Micromyceta develops a colony covered bya delicate micellium of brick-coloured. The conidiophores are dicothomic-branched, of yellow-reddish shades and of 2-3µm in diameter. The conidyas very small, numerouses, brick-coloured have 2-3 x 2 µm. Micromyceta has been qnoted from soils of wheat and maise. We attach the photos and the microscophic lamellas have been included in micologic Herbal of Moldavia „C. Sandu-Ville".

CONCLUSIONS

1.The study of micromycetas from soil is very useful taking into account the fact that follows the plantation of rasads which at first phases of development , are extremely sensible.

2.The presence of parasitic micromycetas has an economic implication because it can compromise the culture and so a new disinfection of the soil is

needed and of course another replantation which modifiens the period of development of plants, delayning the valorification of obtained production.

3.The analyses of the tests from soil harvested in June 2007 proves the fact that the presence of high temperatures and of more developed plants made that the spectrum of micromycetas from soil to modify both in quantily and of variability of isolated species. It is noticed the presence of new species for România or qnoted for the first time in the soil cultivated with tomatoes like: Cladosporium lignicolum, Paecilomyces marquandii, Ceratocystis paradoxa, Verticillium lateritium, Scopulariopsis brevicaulis, Penicillium ochraceum.

4.Out of the sum of izolated species, 16,2% represent micromycetes new for our country or qnoted for the first time in soil.

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ASPECTS EN CONCERNANT LA PRÉVENTION ET LE COMBAT DE L`ATTAQUE DU CHAMPIGNON *PSEUDOPERONOSPORA CUBENSIS*, QUI PRODUIT LE MILDIOU DES CUCURBITACÉES, AU MELON, DANS LES CONDITIONS DE LA PLAINE BARAGAN PENDANT L'ANNÉE 2005

ASPECTE CU PRIVIRE LA PREVENIREA ŞI COMBATEREA ATACULUI CIUPERCII *PSEUDOPERONOSPORA CUBENSIS* CE PRODUCE MANA CUCURBITACEELOR, LA PEPENELE GALBEN, ÎN CONDIȚIILE CÂMPIEI BĂRĂGANULUI, ÎN ANUL 2005

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Abstract. *One the most dangerous pathogenic agents that affect the melons is the fungus Pseudoperonospora cubensis wich produces the cucurbitaceae manna. The pathogenic agent appears every year with various intensities and rates, first of all depending on the climatic factors. In the view on decreasing the damage brought about by this pathogenic agent, the factor wich encourage the appearance and development of its attack have been reaserched. Some charts of integrated fighting against this pathogenic agent have been worked out, too. In this respect the efficiency of some phytosanitary products have been tested. A special attention has been given particularly to deciding upon the best moment of providing the first tratament, wich is the most important of all. Great attention has been given to the evolution of the meteorological factors. Following the test made in 2005 (a very rainyand cool year) good results have been obtained providing and extremely practical help to the farmers of melons. The have been obtained obvious differences between the treated variants and the untreated witness as regards the attack rate of the disease.*

Rezumat. *Unul din cei mai periculoşi agenți patogeni, care afectează pepenii galbeni, este ciuperca P. cubensis care produce mana cucurbitaceelor. Patogenul apare în fiecare an cu intensități şi grade de atac diferite, în primul rând în funcție de factorii meteorologici. În scopul reducerii pagubelor provocate de acest patogen, s-au studiat factorii care favorizează apariția şi evoluția atacului. S-a urmărit elaborarea unor scheme de combatere integrată a patogenului. În acest scop a fost testată eficacitatea unor produse de uz fitosanitar specifice combaterii manei. O importanță deosebită, a fost acordată mai ales stabilirii momentului optim de aplicare a primului tratament, care este cel mai important. Pentru aceasta, a fost urmărită cu mare atenție evoluția factorilor meteorologici. În urma experiențelor executate în anul 2005 (an foarte ploios) s-au obținut rezultate ce prezintă o importanță practică deosebită pentru cultivatorii de pepeni galbeni. Între variantele tratate şi martorul netratat s-au obținut diferențe clare în ceea ce priveşte GA de atac al bolii.*

Dans notre pays, le mildiou des cucurbitacées a été observé pour la première fois de Traian Savulescu et mentionnée dans L`état Phytosanitaire pendant les années 1928-1929 à la courge (*Cucurbita pepo).*

Sur le plan mondial la dispersion du pathogène contient un vaste région aréique, la même que celle de culture des plantes cucurbitacées maîtresses.

Par conséquent, il est signalé comme parasite sur les concombres en 70 pays, sur les melons en 50 pays, sur le courge en 40 pays, et sur les pastèques en 25 pays, pays positionés sous 30 degré.

Les attaques produites dans tout le monde sont les principales causes des pertes spécialement aux concombrs et aux melons.

La maladie apparaît seulement sur les feuilles, sans égard à la phase phénologique dans laquelle sont les plantes.

Sur la partie supérieure des feulles on observe des taches sous la forme couverte d` aspérités, jaunâtre, delimitées par les nervures des feulles secondaires qui dans les évolutions suivants devient bruns. En face des taches, sur la partie inférieure des feulles on forme un duvet cedré-violacé formé parmi les condies (zoospores caduqus) et le siphon du champignon.

Dans les conditions favorables pour l`attaque les taches s`élargissent et confluent en enveloppant complètement la surface du limbe des feuilles, qui séche, et les plantes sont défoliées rapidemment.

OBJECTIF ET MÉTHODE

Les expériences ont été fait à Braila. On a été utilise les variété de melon Titus, création de l` Institut de Recherche Scientifique et du Développement de Légumes et de Fleurs Vidra.

Cette expériece a été créé avec l`angagement strict de la technologie de culture spécifiquement au melon.

Á la collection, analyse et interprétation des dates météorlogiques on a utilisé le système ,,Agroexpert,, de l` Unité Phytosanitaire du Département d`Agriculture Braila.

L` apparition et l`évolution de l`attaque du champignon *Pseudoperonospora cubensis* a été observé à la variété: temoin sans traitement.

Pour l`évaluation de l`attaque on a été utilisé le sytème de notation qui exige le calcul suivantes valeurs: F%(la fréquence de l`attaque) I%(l`intensité de l`attaque) et G.A.(le degré de l`attque).

Pour le calcul des valeurs signalées, on a été analysées par 21 de feuilles à la chaque parcelle expérimentée.

On a été exécuté échelonement les récoltes sur chaque sorté en partie, à maturité parfaite des fruits. La production a été exprimée par tonne à l`hectare.

Les expériences on a été formées chacun par 8 variétés (7 produits fongicides +1 temoin sans traitement). Celles-ci on a été positionnées en 3 répétitions, d` après le procédé intitulé ,,blocs de randomisation,, conformément à la technique experimentale.

Les résultats pilotes on a été interprétés aussi conformément à la technique experimentale, par l`analyse statistique (la méthode de différences limits- DL 5 % et DL 1 %).

Les variantes de traitement étudiées en 2003 et 2004 ont été:

-V1- Temoin sans traitement

-V2- Manoxin Total 60 P.U.(mancozeb + oxiclorure de Cu + oxadixyl) – 0,25%
-V3- Exp 11047(fosetyl de Al + propamocarb) – 0,20%
-V4- Kif W.D.G.(pyraclostrobin) – 0,15%
-V5- Electis 75 W.G.(mancozeb + zoxamide) – 0,20%
-V6- Quadris (azoxistrobin) – 0,08 %.
-V7- Bravo 500 (clorotalonil) – 0,20 %
-V8- Melody Duo (propineb + iprovalicarb) – 0,30%

En 2005 un nombre de 5 traitements ont été executes aux dates: au mois de 17 juin, au mois de 28 juin, au mois de 9 juillet, au mois de 17 juillet et au mois de 28 juillet.

Le moment de l`exécution du premier traitement, le nombre et l`intervalle entre celles-ci on été établi en fonction de facteurs météorologiques favorables: température, l`humidité moyenne d`air, rosée et précipitations.

RÉSULTATS ET DISCUTIONS

L'attaque du champignon *Pseudoperonospora cubensis* aux melons, en 2005, a commencé le 8 juillet, vis-à-vis de 23 juin en 2004. Le degré de l'attaque du pathogène au debut a été 0,71 %.

L'apparition plus tardive qu'en 2004 du mildiou, dans les conditions que les mois mai, juin et juillet de l' année 2005 ont été plus pluvieux (519 l/m^2), que en 2004 (194 l/m^2), on peut être dû aux témperatures plus baissées des ces mois – ci de l' années 2005.

Ainsi, la témperature moyenne a été plus baissé comme d'habitude enregistrées dans la première décade (15,6^{o}C) et dans la deuxième décade (15^{o}C) au mois du mai et la première décade au mois de juin (16,7^{o}C).

Aussi, les températures minimes moyennes enregistrées, ont été baissées, celles – ci en étant de: 10,1 ^{o}C, 9,7 ^{o}C, 7,8 ^{o}C et 9,0 ^{o}C.

Parce que, la température optimale pour l'apparition et la croissance des infections avec *P. cubensis* est de 20 ±2^{o}C, les valeurs de température mentionnée, on peut expliquer l' apparition plus tardive avec 15 jours du mildiou en 2005, vis – à – vis de 2004.

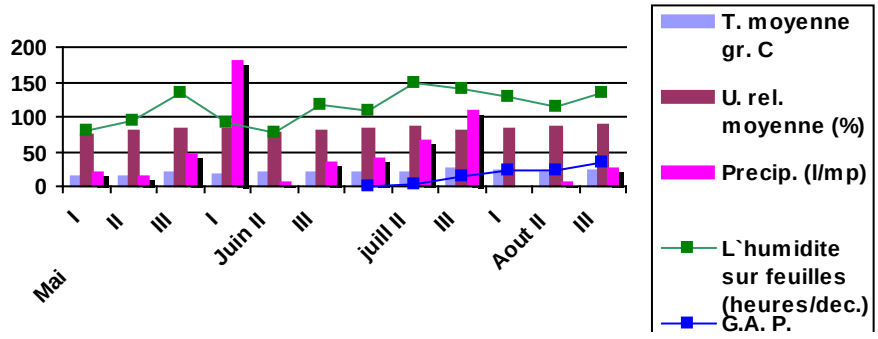

Fig. 1. L'evolution d'attaque du *Pseudoperonospora cubensis* au melon, à la variété Titus, en fonction de condition cliamtiques en 2005.

Celle – ci dans les conditions dans laquelle l'humidité a été assurée au niveau plus haut qu'en 2004.

Après l'apparition des premières symptômes (le 8 juillet), l'attaque du champignon a eu une évolution relativement rapide, à la fin de mois de juillet – la degré de l'attaque (G.A.) en etant de 13, 42 %.

Ce fait – ci, on peut être dû aussi aux précipitations abondantes au mois de juillet (216 l/m^2), tant que aux températures moyennes des décades la première (21,0 ^{o}C) et deuxième (21,9 ^{o}) au mois de juillet.

Grâce à l'apparition d'une température moyenne plus haute dans la troisième décade (26,7 ^{o}C) au mois de juillet, et aux précipitations très faibles dans les premières deux décades au mois d'août (0 l/m^2 la première décade et 5 l/m^2 – la deuxième décade), l'èvolution de l'attaque du champignon a été plus lentement dans la première partie au mois d'août (G.A. – 21,66% dans la première décade et 23,8 % dans la deuxième décade).

Dans la troisième décade au mois d'août, ont eu enreggistrés des précipitations relativement faibles (26 l/m^2), ce qu'on a déterminé qu'à la fin du mois d'août, le degré de l'attaque du champignon doit être 34,2 %.

Celle – ci représente une valeur plus petite qu'en même temps en 2004, quand la sorte Titus a enregistré un degré de l'attaque du mildiou de 68,5 %.

Les pertes provoquées aux melons, grâ à l'apparition du mildiou aux cucurbitacées en 2005, ont été plus réduit qu'en 2004.

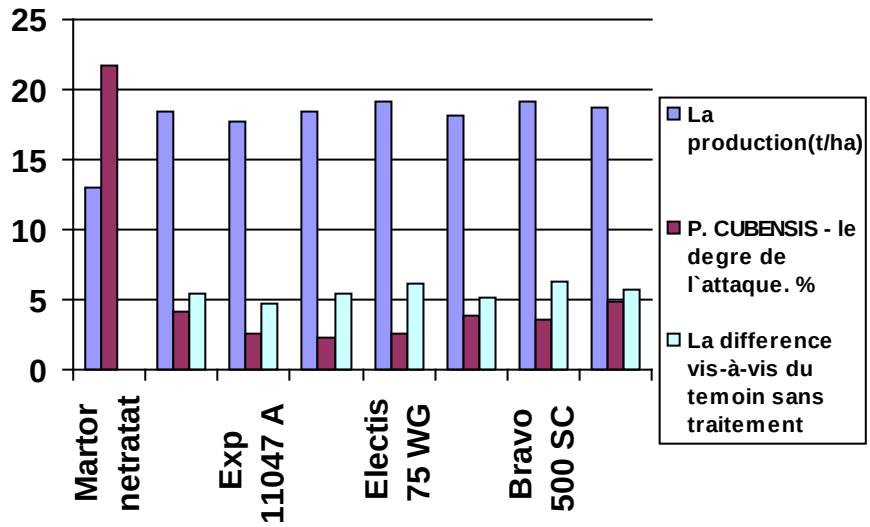

Fig. 2. L' efficacité des fongicides dans le combat du champignon *Pseudoperonospora cubensis* au melon (la variété Titus -2005).

Table1

L'efficacité des combinaisions de fongicides pour combattre le champignon *Pseudoperonospora cubensis* (variété Titus - 2005)

Nr crt.	Le produit	Le degree de l`attaque (G.A)%	La différence vis-à-vis du temoin sans traitement %	L'effic%	La production (t/ha)	La différence vis-à-vis du temoin sans traitement (t/ha)
1	*Temoin sans traitement*	*21,66*	*-*	*-*	*13,0*	*-*
2	*Manoxin Total 60 P U – 0,25 %*	*4,20*	*17,46***	*80,6*	*18,5*	*5,5**
3	*Exp 11047 A – 0,20 %*	*2,53*	*19,13***	*88,3*	*17,7*	*4,7**
4	*Kif W.D.G. – 0,15 %*	*2,30*	*19,36***	*89,4*	*18,4*	*5,4**
5	*Electis 75 WG – 0,20 %*	*2,56*	*19,10***	*88,2*	*19,2*	*6,2***
6	*Quadris – 0,08 %*	*3,80*	*17,86***	*82,5*	*18,1*	*5,1**
7	*Bravo 500 – 0,20 %*	*3,53*	*18,13***	*83,7*	*19,2*	*6,3***
8	*Melody Duo – 0,30 %*	*4,86*	*16,80***	*77,6*	*18,7*	*5,7**

L`analyse statistique pour le degré de l`attque(G.A.%):
Sd = 2,64 (la transformation arc sin √procent)

DL 5% = 1,51 x 2,15 = 3,24 = 0,3% - * différénce signicative
DL 1% = 1,51 x 2,98 = 4,50 = 0,6%- ** différénce précise signicative

L`analyse statistique pour la production:
Sd = 1,93

DL 5% = 1,93 x 2,15 = 4,14 t/ha - * différénce signicative
DL 1% = 1,93 x 2,98 = 5,75 t/ha - ** différénce précise signicative

CONCLUSIONS

Après le présentations faites, on peut conclure que l'intervalle de temps le plus probable d'attaque des champignon *Pseudoperonospora cubensis* dans le district Braila, este determiné par les valeurs des facteurs météorologiques enregistrées au mois de mai et les premierès deux décades au mois de juin.

Pendant les années pluvieuses et fraîches (2005) les mildiou des cucurbitacées apparaît un peu plus tard que pendant les années avec les étés humides mai plus chaudes, comme on a été 2004.

En 2005, le mildiou a eu une évolution relativement lentement et des valeurs plus petites du degré de l'attaque que les années passées, même si qu en 2004 on a résulté une riche sourse d'inoculation.

Ce fait prove q'une source riche d'inoculation, dans les conditions non – favorables au développement du champignon, ne peut pas provoquer que des infections d'intensité moyenne, comme on a passé en 2005.

Le temps très pluvieux de l'année 2005 (mai, juin et juillet on a totalisé 519 l/m^2) n'ont pas été accompagner par de températures moyennes plus élevées, qu'on a déterminé une évolution plus reduite du degré de l'attaque du mildiou.

De même, en 2005, quand les températures ont eu des valeurs optimes por le champignon, les précipitations ont manqué absolument ou ont été très faibles.

Le champignon *Pseudoperonospora cubensis* qui produit le mildiou des cucrbitacées, a des exigences plus élevées vis – a – vis de la température que de autres champignons qui font les mildioux (par exemple *Peronospora destructor* – le mildiou d'oignon).

Parce que, les précipitations abondantes, l'humidité élevée ne sont pas accompagnées aussi que des températures moyennes, relativement élevées (20 ±2 ^oC), n'on pas dirige aux attaques puissants de mildiou aux cucurbitacées.

A la fixation de la date du premier traitement, on doit considérer avec sévérité tous les deux facteurs, l'humidité et la temperaturé.

Pendant les années de sécherese (2003 et 2006) seulement 2 – 3 traitement sont nécessaires, avec fermété, contre le mildiou.

Pendant les temps pluvieux (2004, 2005) sont nécessaires le moins 5 traitements contre le mildiou surtout aux variétés et aux hybrides plus sensibles

Tous le produits utilisés, on prouve être effissaients à la diminution de l'attaque du champignon Pseudoperonospora cubensis en comparaison le temoin sans traitement.

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VIRIN-ABB-3-AN EFICIENT LEVER FOR ECOLOGICAL AGRICULTURE

VIRIN-ABB-3-O PÂRGHIE EFICIENTĂ A AGRICULTURII ECOLOGICE

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Abstract. *Advancement of strategies of ecological agriculture it is lost in thought without application of biological preparations occupy a separate place among the other biological means for plant protection. One important element in the technological process of insecticide virus production is an elaboration of a new preparation form of the virus insecticides as well as their commercialization. This work contains testing of biological preparation Virin ABB-3 -for elimination of Hyphantria cunea Drury in laboratory and field conditions. The preparation is based on viruses of nuclear polyhedrosesis and granuoses with* cumulative and synergetic action. *Presently the investigation are being carried out the elaboration of other virus insecticide for control in the systems of integrated plant protection of different agricultural, ornamental and forest crops.*

Rezumat. *Implementarea strategiilor de agricultură ecologică este imposibilă fără aplicarea largă a producere şi aplicare a mijloacelor biologice pentru protecţia plantelor. Preparatele biologice ocupă un loc distinct printre altele mijloace biologice de protecţie a plantelor. Un element important al procesului tehnologic de producere a insecticidelor virotice este elaborarea formei preparative şi comercilizarea lor. Această lucrare conţine testarea preparatului Virin –ABB-3 pentru distrugerea (combaterea) of Hyphantria cunea Drury în condiţii de laborator şi de câmp. Preparatul este bazat pe virusurile poliedrozei cu acţiune cumulativă şi sinergistă. În prezent au loc investigaţii în elaborarea unui alt insecticid virotic pentru lupta în sistemele integrate a protecţiei plantelor în diferite sisteme agricole, ornamentale, forestiere.*

INTRODUCTION

In the 70-80th years of the last century, the strategy of the agricultural production in the Republic of Moldova was mainly based on the continuous increase in the utilization of the plant protection agents. This abusive use led to a situation that in 1985, the total volume of the pesticides was more that 30725 tones on the reactant, at the same time, the area of the cultivated land reached 85% of the territory of the republic. The assortment composition included up to 135 denominations. The traditional agriculture based on the utilization of the chemical agents put forward a series of problems, associated with the aggravation of the ecologic crisis and namely the unrestricted use of pesticides.

The radical changes, which came over in the economic life of the country after 1991, led to the sharp retrogression of the level of pesticides use. (Volnyanskaya A.V., Stratulat T.G., Syrku R.F., 2004; Popushoy I., Voloshchyuk L., 1994; Ehler L., Bottrell D., 2000).

Long term researches in this field contributed to the formation of a well-balanced conception, emphasizing the dialectics of the counterbalances between the plants protection

and the environmental protection, which permitted to crystallize the ecological point of view in the light of the integrated systems of plant protection. (Boller E., Malovolta C., Jorg E., 1997; Goldstein V., Boinchan B., 2000). In the Republic of Moldova, investigations are pursued for the selection and identification of baculoviruses, which affect a big variety of destructive insects. The wide application of the virus preparation against the destructive insects, proved a high technologic (Ignoffo C., 1973; Tarasevich L.M., 1985; Chyuhriy M.G., 1988) and economic efficiency (Orlovskaya E.V., Shumova T.A. 1980; Bozhko N.A., 1988), as compared with other microbiological methods of plants protection. It was possible because of the organization of the production and mass raising insects. The modern scientific and technical achievements became the base of the ecological products growing which the last years are widely applicable in the developed countries. (Solkolov M.S., Filipchuk O.D., 1998, Voloshchyuk L., 2003). A series of problems in the field of plants protection and the growing of ecological products can be solved using three big biological agents: insects, microorganisms (viruses) and bioactive substances (Cross J., Dickler E., 1994; Voloshchyuk L., 2003). Recognition of the necessity for application the entomopathogenic viruses and baculoviral preparations elaborated on their basis is determined by the qualitative originality of the pathogenic agents, among which their specificity and epizootic character constitute the main advantages compared with the chemical insecticides. Manifestations of the purpose of rational utilization of these efficient levers it is necessary a profound knowledge of the mechanisms and conformity to natural laws which determine the regulation of the pest insects populations under the action of the baculoviruses(Tanada J. Kaya H., 1993).

Though in anterior investigation the development scheme of the family *Baculoviridae* (Granulosis Virus and Nuclear Polyhedrosis Virus) has been determined, nevertheless many aspects concerning the relations between pathogens and host-cell, as well as active transmission of the infection remain uknown. The aspects concerning the baculoviruses resistance to action of different environmental factors are not established (Bojco N.A., 1988; Muller L.,1997). Departing from the fact that epizootology – as a sciene about the causes, forms and conformities to the natural laws of the phenomena of the infection mass spreading among the animals – touches not only upon the pure theoretical aspects of the baculoviral infection development, but role of investigations in this domain increases rapidly (Fuxa J.R., Tanada J., 1987; Beckage N.E., Tompson S.N., Federici B.A., 1993). It becomes obvious that the entomologists do not limit themselves only establish the spreading levels in the case of mass reproduction of different insect species. We are sure that knowledge more profound of the conformities to the natural laws of spreading of viral infections conditions to a great extent increasing of the efficiency of the microbiological preparations in biological plant protection. The starting moment of the epizootic phenomena are in a tight dependence on the state of host-insect, pathogene and environmental factors. Investigation of the system ”virus-host” has allowed to elucidate the main conformities to the natural laws of interaction between the pathogene and the insects, and to establish the optimal conditions for development the process of the pathogenesis and regulation the host-insect mortality. It was demonstrated the transmission transphasic and transovarial of pathogens, the fact that determines the virus transmission from one generation to anogher and provides long preservation of infection in the frame of the population, so regulating its density (Tarasevici L.M.,1985; Fuxa J.R., Tanada J., 1987;Huber J., 1990).;

At present, it is recommended to use against the *Hyphantia cunea* Dryry, the ecologic clean virus preparation Virin –ABB-3, which is not connected with the laboratory raising of insects. For achieving these aims natural populations of insects shall be used. It is profitable from economic point of view, because the natural food is used. The obtaining of the virus preparation directly on the insects hosts creates the conditions for the obtaining of the native virus. On the basis of our experiments and those of the other specialists, we ascertained that raising insects hosts creates the conditions for obtaining of native virus.

In these cases, the challenges as the relationship between the virus and the host, the persistence of the virus infection, the transmission of viral infection among the insects population are solved by the nature itself. To this effect, it is necessary to have special, isolated plantation preferred by the insects against which the virus preparation is used. The aim of the presented work is to study the mechanisms of manifestation of the specific features of Virin-ABB-3 and to search the possibilities of use in a view to increase the biological activity of the strains for its production.

MATERIAL AND METHODS

The researches have been realised on the caterpillars of 2-3 ages of the *Hyphantria cunea* Drury. In the study, we used the Nuclear Polyedrosis Virus, selected and indentified in the laboratory of the insects' viruses. For the contamination of the laboratory insects, we used the dosed feeding, which contains respectively 10 polyhedrons for each caterpillar. The monitoring of the insects population and the estimation of the dead caterpillars has been carried out daily, beginning from the 3 rd day of the contamination. The effectiveness of the virus action was established according to the Abbot formula, which provides the insects ' natural death:

$$E_{ab} = \frac{Me - Mo}{100 - Mc} * 100$$

Where Eab- – is the death rate, %; Mo – the number of dead specimens in the experiment; Mc- - the number of dead specimens in the control, J_o - the number of alive specimens in the experiment. The caterpillars *Hyphantria cunea* Drury were kept under laboratory conditions at 27 C°.

The mathematical treatment was registered on the 15th day after contamination (Dospekhov, 1985), the statistical treatment was made according to Gar K.A.(1963).

RESULTS AND DISCUSSIONS

Integrated Pest Management is today a widely accepted strategy to reduce over-dependence on chemical insecticides and their potentially negative environmental and economic effects. Biotechnology has considerable potential to contribuite to sustainable biological elements of Integrated Pest Management. The experiments with the preparation Virin-ABB-3 on the contaminated caterpillars (larvae) of *Hyphantria cunea* Drury on different plants became an acute necessity for the determination of the percentage of the mortality of specimens with the same concentration and the same number as well as the biological effectiveness. The results of the experiments are presented in the table 1

Table 1

The infection population of *Hyphantria cunea* Drury Virin-ABB-3 of different plants

Plants	No. of caterpillars	Solution Conc.	No. of the death caterpillars					The percentage of the mortality			Biologic Efficacy to the Abbot, on the 15 days, %
			3	5	7	10	15	on the 5th	on the 10th	on the 15th	
Mulberry	40	10^6	0	12	19	34	39	30,0	85,0	97,5	97,3
Maple ash	40	10^6	0	8	16	29	38	20,0	72,0	95,5	95,2
Walnut Opex	40	10^6	0	6	9	28	38	15,0	70,0	85,0	84,2
Cherry tree	40	10^6	0	5	10	27	32	12,0	65,0	80,0	78,9
Acasia	40	10^6	0	2	5	16	30	5,0	40,0	75,0	73,8
Control	40	10^6	0	0	2	4	4	0	5,0	5,0	-

According to the table, on the 5th day, the death rate of caterpillars of *Hyphantria cunea* Drury on different plants are modified on the average of 2%, on the 10th days on the average of 7%, on the 15th day on the average of 3,5%. The highest mortality rate of the caterpillars has the mulberry – 97,5%, the lowest mortality rate has acacia – 75,0 %. The biological effectiveness according to Abbott on the 15th day represented 73,8%. The mortality rate in the control on the 10th – 15th day was 5%. As follows from the table 2, the highest efficiency in the first variant has the mulberry – 82,52%, in the second variant the cherry tree- 84,5%, in the third variant the mulberry – 87,5%. In the control, the highest efficiency has the maple ash – 51,5%. Thus, for the contamination of the caterpillars of *Hyphantria cunea* Drury with various preparations the best variant is the caterpillar powder + the powder of sawdust has the mulberry – 89, 53%.

Table 2

The contamination of the caterpillars of *Hyphantria cunea* Drury with various preparations

Preparations	Plants	Number of trees	Treatments	Biologic efficacy,%
1. the caterpillar powder + the powder of sawdust	Cherry tree	100 trees	2	65,0
	Maple ash	100 trees	2	72,25
	Mulberry	100 trees	2	89,53
2. the caterpillar powder+ melasses + flour	Cherry tree	100 trees	2	73,0
	Maple ash	100 trees	2	82,85
	Mulberry	100 trees	2	68,9
3. the caterpillar powder + the vegetable rest powder	Cherry tree	100 trees	2	69,8
	Maple ash	100 trees	2	86,9
	Mulberry	100 trees	2	84,9

Table 3

The keeping VG şi VPN a *Hyphantria cunea* Drury for foliate surface after baculovirus treatments

Days	No. of larva	Conc.	Numărul larvelor Moarte		S-au format pupe		The percentage of the mortality		Biologic Efficacy to the Abbot , %
			No. of larva	%	No. of larva	%	No. of larva	%	
Control (fără tratare)	300	0	38	12,66	262	87,33	48	16,0	-
Ziua a doua după tratare	300	10^6	300	0	0	0	300	100	98,9
Ziua 4	300	10^6	295	98,33	5	1,66	300	100	98,9
Ziua 6	300	10^6	239	79,66	61	20,33	259	86,33	83,7
Ziua 8	300	10^6	217	72,33	83	27,66	233	77,66	73,3
Ziua 10	300	10^6	185	61,66	115	38,33	215	71,66	66,2
Ziua 12	300	10^6	67	22,33	233	77,66	93	31,0	17,8

As follows from the table 3, baculoviruses in different preparative forms keep activity for 8-10 days. The first 4 days biologic efficacy safe of 100%. The mortality rate on the 12^{th} day was of 31%.

CONCLUSIONS

The comparison of viral pathogens with conventional chemical pesticides is usually solely from the perspective of their efficacy and cost. In additional to efficacy, the advantage of use of microbial control agents are numerous. These include safety for humans and other non-target organisms, reduction of pesticide residues in food, preservation of other natural enemies, and increased biodiversity in managed ecosystems.

Even if the baculovirus preparations are proposed to be used as biological methods against harmful insects, they are not widely applied today because of the long incubation period.

One of the most important elements of the technologic process of the virus insecticides is the elaboration of the preparative form. According to the presented experiments, the control of the preparation Virin-ABB-3 with different preparative forms in laboratory and field conditions, demonstrated that the most efficient form is the caterpillar powder + the powder of sawdust has the mulberry – 89, 53%

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STUDIES CONCERNING IN CHEMICAL AND THERMIC CONTROL OF BEAN WEEVIL (*ACANTHOSCELIDES OBTECTUS* SAY.) IN STORAGE CONDITION

STUDII PRIVIND COMBATEREA CHIMICĂ ŞI TERMICĂ A GĂRGĂRIŢEI FASOLEI (*ACANTHOSCELIDES OBTECTUS* SAY.) ÎN CONDIŢII DE DEPOZIT

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Abstract. *The papers presents the positive results obtained by some pesticides and thermic control applied against the bean weevil - Acanthoscelides obtectus Say., after a syntetic rewiew of the potential chemical and temperature methods which may be used in the control of the insectes harmful to the stored bean seeds. The chemical control is realised treatments with syntethic pyrethroid (permetrin, deltametrin), and organophosfphoric insecticides (malation, pirimifos metil, fenitrotion and chlorpirifos-metil). Thermic control periods varied for 0, 1, 2, 3, 4, 5 and 6 hours and the temperatures achieved were 60 Celsius degree. Thermic control is recommended for beans only for consumption, but not for seeds.*

Rezumat. *Lucrarea prezintă rezultatele pozitive obţinute de câteva pesticide şi tratament termic aplicat asupra gărgăriţei fasolei (Acanthoscelides obtectus Say), precum şi rezultatele sintetice ale unor metode chimice şi termice potenţiale care pot fi folosite în combaterea acestui dăunător al fasolei în condiţii de depozit. Combaterea chimică s-a realizat cu piretroizi de sinteză (permetrin, deltametrin) şi insecticide organofosforice (malation, pirimifos metil, fenitrotion şi chlorpirifos-metil). Perioadele pentru tratamentul termic au fost 0, 1, 2, 3, 4, 5 şi 6 ore iar temperatura utilizată a fost de 60 grade C. Tratamentul termic este recomandat numai pentru fasolea boabe de consum, nu şi pentru semînţe.*

Bruchids are the major problem affecting bean (*Phaseolus vulgaris* L.) seed and grain in storage. The bean weevil, *Acanthoscelides obtectus* Say. is an extremely dangerous pest, if there are no control measures taken, being able to cause damage up to 100% to the stored seeds (Cândea and Bratu, 1993). Protection of stored seeds can be differentiated on usage categories: the ones which have seeding destination can be chemicaly processed while the supplies which have consumption destination can only be protected by non-polluting methods (Ghizdavu and Porca, 2000, Porca and contributors, 2002).

Our researches were aimed to determine the efficiency of the syntethic pyrethroid (permetrin, deltametrin), and organophosphoric insecticides (malation, pirimifos metil, fenitrotion and chlorpirifos-metil) in comparision with the termic control of bean weevil *Acanthoscelides obtectus* Say, in storage condition, the influence of the dose on the organism (mortality), the use of an efficient dose, with a very reduced impact on human or environment (Porca, 2002).

MATERIAL AND METHODS

The biological material (been weevil adults) has been obtained in thermostat at a temperature of 15 - 20ºC and a relative air humidity of 75 - 80%. The experiment have been organized in 8 varieties with 3 repetitions for the chemical control and in 7 varieties with 3 repetitions for the thermic control, being organized according to the method of randomized blocks. The results of which were statistically correlated using the variant analysis method. Each repetition was made of 20 adults. For the chemical control, the filter paper bands (disks) which have been well moistured with the solution processed at the recommended concentration have been placed in the experimental recipients made of glass. They were kept in a thermostat adjusted at a temperature of 15 - 20ºC and a relative air humidity of 75 - 80%.

RESULTS AND DISCUSSIONS

In our researches we used synthetic pyretroids (with permetrin and deltametrin) and organophosphates (with malation, pirimifos metil, fenitrotion, clorpirifos-metil), from the IIIth and IVth group of toxicity (Table 1).

Table 1

The insecticides use in chemical control of *Acanhoscelides obtectus* Say, in the seeds storage condition

No.	Variants	Active substances	Insecticides type	Toxicity group
1	Carbetox 37 EC	malation 37%	organophosphates	III
2	Actellic 50 EC	pirimifos-metil 50%		IV
3	Reldan 40 EC	clorpirifos-metil 40%		III
4	Prostore 210 EC	bifentrin 10g/l + malation 200g/l		III
5	K'obiol DP 2	deltametrin 0,2%	synthetic pyretroids	III
6	Fastac 10 EC	alfa-cipermetrin 100g/l		III
7	Coopex 25WP	permetrin 25%		IV
8	K'othrine 2,5%	Deltametrin 2,5%		III

In the Table 2 we presented the efficiency of insecticides under the interaction of responding-time insecticides factors. The Actellic 50 EC was the first martor (Mt1) and the second martor was the average of varieties. The influence of 5 hours responding-time factor, by comparing the differences of varieties which have been studied with Mt1, varieties treated with K'othrine 2,5% (327.5%, + 45.5); Coopex 25WP (311%, +42.2); Prostore 210EC (194%, +18.8); Kobiol DP2 (142.5%, +8.5) recorded higher mortality and the differences statistically assured being very significant positive. Varieties treated with Reldan 40EC (70%, -6.0); Fastac 10EC (88%, -2.4) and Carbetox 37EC (91%, -1.8) recorded much lower mortality then Mt1 and the differences are statistically assured being very significant negative.

Table 2

The interaction of responding-time insecticides factors in chemical control of *Acanthoscelides obtectus* Say. in the seeds storage condition for 5 hours

No	Variants	Mortality%		±d	Signif. of difference with Mt1	Variants	Mortality%		±d	Signif. of difference with Mt2
		Absolute values	Relative values				Absolute values	Relative values		
1	Actellic 50 EC (Mt_1)	20	100	+0.0	-	Actellic 50 EC	20	60.42	-13.1	00
2	Carbetox 37 EC	18.2	91	-1.8	00	Carbetox 37 EC	18.2	54.98	-14.9	00
3	Reldan 40 EC	14.0	70	-6.0	000	Reldan 40 EC	14.0	42.29	-19.1	000
4	Prostore 210 EC	38.8	194	+18.8	**	Prostore 210 EC	38.8	117.22	+5.2	*
5	K'obiol DP 2	28.5	142.5	+8.5	*	K'obiol DP 2	28.5	86.1	-4.6	0
6	Fastac 10 EC	17.6	88	-2.4	00	Fastac 10 EC	17.6	53.17	-15.5	00
7	Coopex 25WP	62.2	311	+42.2	***	Coopex 25WP	62.2	187.9	+29.1	***
8	K'othrine 2,5%	65.5	327.5	+45.5	***	K'othrine 2,5%	65.5	197.8	+32.4	***
9	Average of variants(Mt_2)						33.1	100	-	

$DL_{5\%}$ =4.24 $DL_{1\%}$ =5.88 $DL_{0.1\%}$ =7.76

Table 3

The interaction of responding-time insecticides factors in chemical control of *Acanthoscelides obtectus* Say. in the seeds storage condition for 10 hours

No	Variants	Mortality%		±d	Signif. of difference with Mt1	Variants	Mortality%		±d	Signif. of difference with Mt2
		Absolute values	Relative values				Absolute values	Relative values		
1	Actellic 50 EC (Mt_1)	60.0	100	+0.0	-	Actellic 50 EC	60.0	107.37	+4.12	**
2	Carbetox 37 EC	42.2	70.33	-17.8	00	Carbetox 37 EC	42.2	75.51	-13.7	000
3	Reldan 40 EC	40.0	66.6	-20.0	000	Reldan 40 EC	40.0	71.58	-15.8	000
4	Prostore 210 EC	58.7	97.83	-1.3	0	Prostore 210 EC	58.7	105.04	+2.82	*
5	K'obiol DP 2	59.2	98.66	-0.8	0	K'obiol DP 2	59.2	105.94	+3.32	*
6	Fastac 10 EC	49.8	83	-10.2	00	Fastac 10 EC	49.8	89.11	-6.08	00
7	Coopex 25WP	68.4	114	+8.4	**	Coopex 25WP	68.4	122.4	+12.5	***
8	K'othrine 2,5%	68.8	114.6	+8.8	**	K'othrine 2,5%	68.8	123.12	+12.9	***
9	Average of variants(Mt_2)						55.88	100	+0.0	-

$DL_{5\%}$ =4.24 $DL_{1\%}$ =5.88 $DL_{0.1\%}$ =7.76

By comparing the differences of varieties which have been studied with Mt2 (average of varieties), the varieties treated with K'othrine 2,5% (197.8%, +32.4); Coopex (187.9%, +29.1); Prostore (117.22%, +5.2) recorded better mortality, and the differences are statistically assured at the very significant positive significance degree. The variety treated with Reldan 40EC recorded lower mortality (42.29%) then Mt2 and the difference (-19.1) is statistically assured at very significant negative significance degree. This variant is following by varieties treated with: Fastac 10EC (53.17%, -15.5); Carbetox 37 EC (54.98%, -14.9); Acttelic 50EC (60.42%, -13.1); K'obiol DP2 (86.1%, -4.6) recorded much lower mortality then Mt2 and the differences are statistically assured being significant negative.

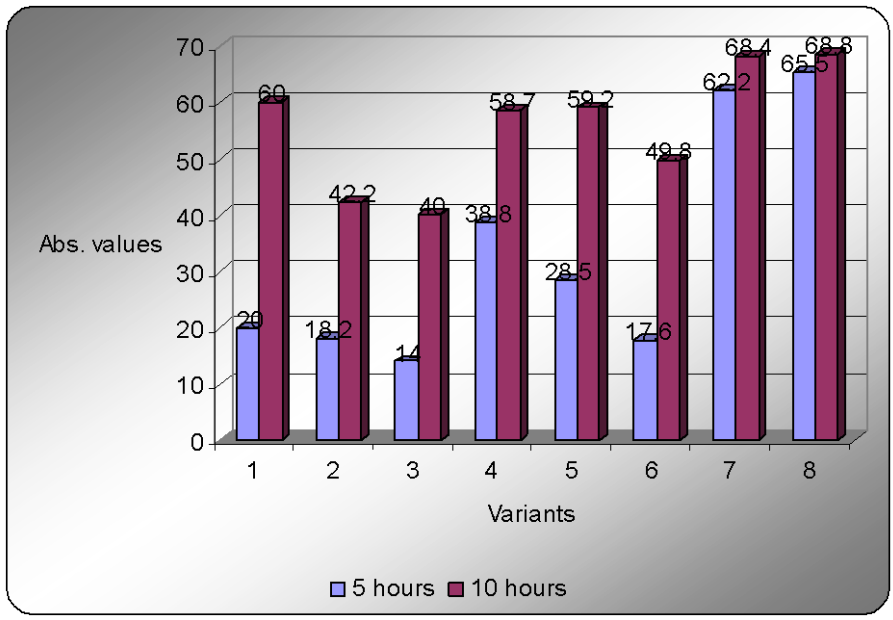

Fig. 1 The efficiency of some insecticides used in chemical control for bean weevil, (*Acanthoscelides obtectus* Say)

In the Table 3 and Figure 1 we presented the efficiency of insecticides under the interaction of responding-time insecticides factors. The influence of 10 hours responding-time factor, by comparing the differences of varieties which have been studied with Mt1, varieties treated with K'othrine 2,5% (114.6%, +8.8); Coopex 25WP (114%, +8.4) recorded higher mortality and the differences statistically assured being significant positive. Varieties treated with Reldan 40EC (66.6%, -20.0); Carbetox 37EC (70.33%, -17.8); Fastac 10EC (83%, -10.2) and Prostore (97.83%, -1.3) recorded much lower mortality then Mt1 and the differences are statistically assured being significant negative.

By comparing the differences of varieties which have been studied with Mt2 (average of varieties), for 10 hours of tratements, the varieties treated with

K'othrine 2,5% (123.12%, +12.9); Coopex (122.4%, +12.5); Acttelic 50EC (107.37%, +4.12); Prostore (105.04%, +2.82) recorded better mortality, and the differences are statistically assured at the significant positive significance degree.

In the thermic control the periods varied for 0, 1, 2, 3, 4, 5 and 6 hours and the temperatures achieved were 60 Celsius degree. Thermic control is recommended for beans only for consumption, but not for seeds. The experiment was made with 7 variants in 3 repetitions. In the table 4 and figure 2 are presented the average results of thermic control and its effects on the mortality on *Acanthoscelides obtectus* Say.

Table 4

The results of thermic control and its effects on the mortality on *Acanthoscelides obtectus Say.* adults

Exposure period (hr)	Temperature (^{o}C)	Adult mortality (%)
0	**60**	**0.0**
1	**60**	**76**
2	**60**	**90**
3	**60**	**100**
4	**60**	**100**
5	**60**	**100**
6	**60**	**100**

The maximum of eficiency for the thermic control is 3 hours of exposure period, by comparing with 2 hours of exposure period (90%) and one hour of exposure period (76%).

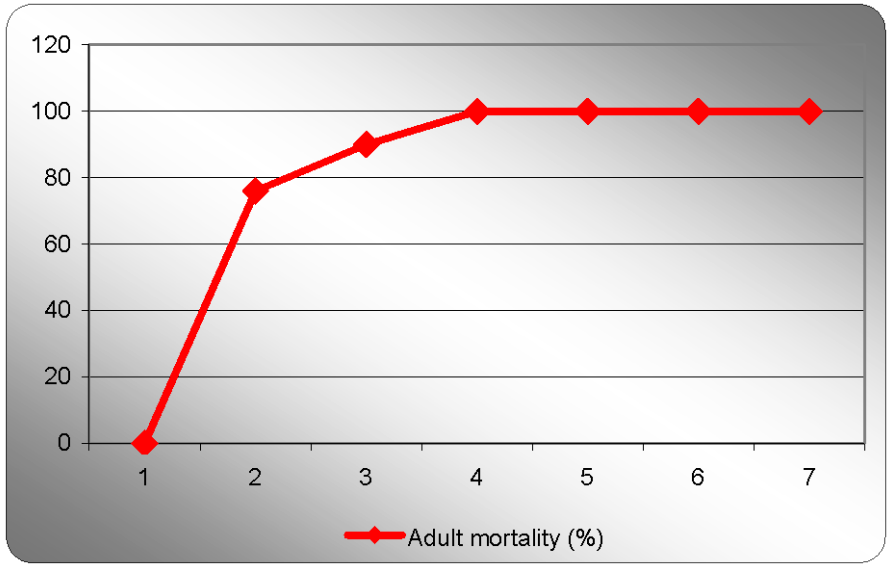

Fig. 2 The results of thermic control on Acanthosceslides obtectus Say.

CONCLUSIONS

1. After 10 hours responding-time, we recorded high mortality, from 40.0%, at the variety treated with Reldan 40 EC, to 68.8% at the variety treated with K'othrine 2,5%.

2. The most efficient varieties, which obtained the best results, were recorded at varieties treated with K'othrine 2,5%, Coopex 25 WP, Actellic 50EC, K'obiol DP2, Prostore 210 EC

3. The maximum of eficiency for the thermic control is from 3 hours of exposure period, when the adult mortality is 100%, but the thermic control recommended for beans only for consumption, not for seeds.

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THE SPECTRUM OF THE HARMFUL ARTHROPODS FAUNA FROM THE S.D. BANU MARACINE PLUM ORCHARDS

SPECTRUL FAUNEI DE ARTROPODE DĂUNĂTOARE DIN PLANTAȚIILE DE PRUN DE LA S.D. BANU MĂRĂCINE

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Abstract. *Within the cultivation technology, one of the most important link in order to obtain high and quality yield, is represented by the protection against the diseases and pests. In order to establish the biological reserve of the pests, we have to inventorying and follow the evolution of the pest populations. Also it's very important to know the climatic conditions during the vegetative repose, which can modify the forecast establish in the autumn. The research that make the object of this paper has been materialized through establishing the structure of the harmful fauna of arthropods from the fruit-growing ecosystem Banu Mărăcine- Craiova.*

Rezumat. *În cadrul tehnologiei de cultură, una dintre verigile determinante pentru obținerea de producții mari și de calitate o reprezintă protecția împotriva bolilor și dăunătorilor. Inventarierea și urmărirea evoluției dăunătorilor din zonă pentru a se cunoaşte rezerva biologică pentru anul următor constituie un factor important care trebuie avut în vedere la stabilirea schemelor tehnologice de combatere. Totodată este necesară cunoaşterea condițiilor climatice din perioada repausului vegetativ, care pot modifica prognoza stabilită în toamnă.* Cercetările care fac obiectul acestei lucrări s-au concretizat în *stabilirea structurii faunei de artropode daunatoare din ecosistemul pomicol aparținând S.D. Banu Mărăcine- Craiova.*

The research has been made in a plum orchard at the Didactical Station Banu Maracine, and has focused on the identification of the harmful species of arthropods. During 2007 at the S.D.Banu Maracine there has been collected entomological material, and then analyzed in order to establish the harmful fauna of arthropods that affect the plum trees.

MATERIAL AND METHODS

In order to establish the harmful entomofauna of the plum orchard from S.D. Banu Mărăcine, during 2007, there has been made collects of the entomological material, using different means and method: colecting using the entomological net, pheromonal traps, light traps, food traps, visual control, analyzing the sample with the magnyfing glass and miscroscop, in the field or in laboratory.

The collects has been made in different phenophase of the plum.

The entomological material collected from the Banu maracine ecosystem has been determined using different guides for determine the species of insects .

RESULTS AND DISCUSSIONS

The year 2007 has been characterized by an excesive droughtnes climate with very high temperature during spring and summer (table 1).

Regarding the air relative humidity, had low values during April-September of 36%-66%, which favorized the instalation of a very accented hydric stress climat. We have to notify the droughtness climat, with pluvio-metric deficite of 42,8 mm respectively 48,6 mm (Table 2). Besides the fact that there has been recorded a long period of droughtness, the air average temperature during the vegetation period, has been higher than the multiannual average (table 1).

Table 1

The temperature during the vegetation period in 2007

Month	Average temperature (^{o}C)	
	Monthly average	Multiannual monthly average
January	5,5	-2,6
February	4,0	-0,2
March	7,6	4,8
April	12,9	11,4
May	18,7	16,8
June	23,0	20,9
July	26,5	22,1
August	23,0	22,0
September	15,6	17,5
Total/Average		10,8

Table 2

The humidity during the vegetation period in 2007

Month	Rainfall (mm)		Relative humidity (%)
	Monthly sum	Multiannual monthly sum	
January	17,6	36,4	69,0
February	36,9	31,4	72,0
March	51,3	35,0	64,0
April	0,0	42,8	46,0
May	93,6	61,7	60,0
June	57,6	63,8	57,0
July	5,6	54,6	36,0
August	148,6	43,6	66,0
September	65,6	38,0	71,0
Total/Average		538,5	

The structure analyze of the phytopagous arthropods, from the Banu Maracine ecosystem, impose a first remarque that not all the phytophagous arthropds encountered in the plum orchard, are harmfull for this species. Some of them are only passing, a plum orchard represent an biotope which ensure if not food at least a temporary shelter.

The colected data has been processed and presented in the table 3. Thus, the harmful fauna, encountered in the plum orchard from the fruit-growing ecosystem Banu Maracine, comprise a number of 25 species.

The most numerous order has been *Coleoptera* with 9 species (36%), from the total of 25 species of harmful arthropods, followed by *Lepidoptera* order with 7 species (28%) and *Homoptera* order with 5 species (table 3).

Table 3

The harmful arthropods from the plum orchards S.D. Banu Maracine, 2007

Nr. crt.	Species denomination	Family	Order
1	*Bryobia rubrioculus* Scheut.	*Tetranychide*	*Acari*
2	*Quadraspidiotus perniciosus* Comst.	*Diaspididae*	*Homoptera*
3	*Ceresa bubalus* F.	*Membracidae*	*Homoptera*
4	*Parthenolecanium corni* Bouché	*Coccidae (Lecaniidae)*	*Homoptera*
5	*Hyalopterus pruni* Geoffr.	*Aphididae*	*Homoptera*
6	*Brachycaudus helichrysi* Kalt.	*Aphididae*	*Homoptera*
7	*Rhynchites bachus* L.	*Curculionidae*	*Coleoptera*
8	*Capnodis tenebrionis* L.	*Tenebrionidae*	*Coleoptera*
9	*Perotis lugubris* F.	*Tenebrionidae*	*Coleoptera*
10	*Epicometis hirta* Podo.	*Scarabaeidae*	*Coleoptera*
11	*Rhynchites auratus* Scop.	*Curculionidae*	*Coleoptera*
12	*Rhynchites cupreus* L.	*Curculionidae*	*Coleoptera*
13	*Sciaphobus squalidus* Gyll.	*Curculionidae*	*Coleoptera*
14	*Melolontha melolontha* L.	*Scarabeidae*	*Coleoptera*
15	*Anomala solida* Er.	*Scarabeidae*	*Coleoptera*
16	*Neurotoma nemoralis* L.	*Pamphilidae*	*Hymenoptera*
17	*Vespa vulgaris* L.	*Vespidae*	*Hymenoptera*
18	*Vespa germanica* L.	*Vespidae*	*Hymenoptera*
19	*Grapholitha funebrana* Tr.	*Tortricidae*	*Lepidoptera*
20	*Yponomeuta padellus* L.	*Hyponomeutidae*	*Lepidoptera*
21	*Operophtera brumata* L.	*Geometridae*	*Lepidoptera*
22	*Euproctis chrysorhoea* L.	*Lymantriidae*	*Lepidoptera*
23	*Hyphantria cunea* Drury.	*Arctiidae*	*Lepidoptera*
24	*Aporia crataegi* L.	*Pieridae*	*Lepidoptera*
25	*Lymantria dispar* L.	*Lymantriidae*	*Lepidoptera*

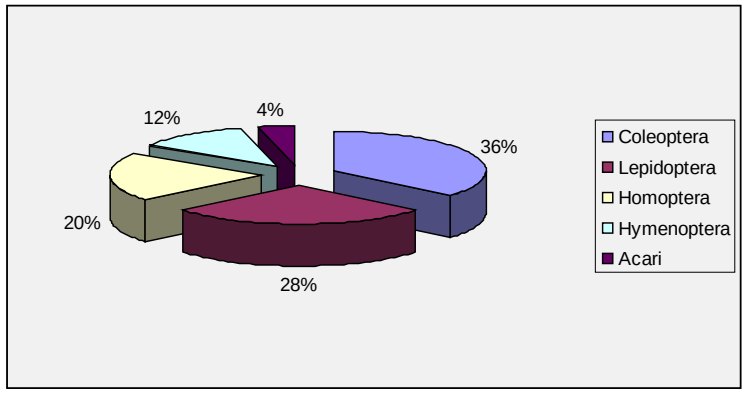

Fig. 1. The structure of the harmful fauna of arthropds in the fruitgrowing area S.D. Banu Mărăcine in 2007

In the plum orchard from the S. D. Banu Maracine, only a few species have a high economically influence. These are the species encountered yera by year, and represent the key species, that required a special attention.

The main pests of the plum in the fruit-growing ecosystem S.D. Banu Maracine are :

- Mealy plum aphid (*Hyalopterus pruni* Fabr.);
- European fruit lecanium (*Parthenolecanium corni* Bouché);
- Small ermine moth (*Hyponomeuta padella* L.).
- Plum moth (*Grapholitha funebrana* Tr.);

CONCLUSIONS

Following the recorded data we can acertain that the main pests of the plum in the fruit-growing ecosystem Banu Maracine, during 2007, has been the following:

- Mealy plum aphid (*Hyalopterus pruni* Fabr.);
- Plum moth (*Grapholitha funebrana* Tr.);

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BIOTECHNOLOGY FOR AGRICULTURAL WASTES RECYCLING BY USING *IN VITRO* CULTURES OF EDIBLE AND MEDICINAL MUSHROOMS

BIOTEHNOLOGIE DE RECICLARE A DEŞEURILOR AGRICOLE PRIN CULTURI *IN VITRO* DE CIUPERCI ALIMENTARE ŞI TERAPEUTICE

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Rezumat. *Principalul scop al acestei lucrari a fost acela de a stabili biotehnologia optima de protectie a mediului prin reciclarea deseurilor viticole si vinicole, prin utilizarea acestora drept substraturi corespunzatoare pentru cultivarea ciupercilor alimentare si medicinale. Avand in vedere faptul ca ciupercile alimentare si medicinale necesita un micromediu specific, ce include un complex de nutrimente, precum si factori fizici si chimici care influenteaza productia de biomasa fungica si formarea corpurilor de fructificare, experimentele au fost concentrate asupra studierii unei noi biotehnologii de reciclare integrala a deseurilor lignocelulozice care sunt produse anual, atat in podgorii, cat si in industria de vinificatie. In conformitate cu principalul scop al acestei lucrari, in experimentele efectuate au fost utilizate doua specii de ciuperci alimentare si terapeutice apartinand grupului Basidiomicetelor, si anume: Lentinus edodes si Pleurotus ostreatus, sub forma de culturi pure.*

Abstract. *The main aim of this work was to establish the optimal environmental biotechnology of recycling the winery and vine wastes by using them as appropriate substrata for edible and medicinal mushrooms growing. Taking into consideration that any edible or medicinal mushrooms requires a specific micro-environment including complex nutrients, as well as all physical and chemical factors that have an influence upon fungal biomass production and fruit body formation, the experiments were focused on the study of a new biotechnology for total recycling of all the lignocellulose wastes which are released annually both in vineyards and wine producing industry. According to the main purpose of this research work, two edible and medicinal mushroom species of Basidiomycetes group, namely Lentinus edodes as well as Pleurotus ostreatus were used as pure mushroom cultures*

The agricultural works as well as the industrial activities related to vine crops and wine processing have generally been matched by a huge formation of wide range of waste products. Many of these lignocellulosic wastes cause serious environmental pollution troubles if they are allowed to accumulate in the vineyards or much worse to be burned on the soil inside the vineyard sites (Vournakis & Runstadler 1989). The main aims of the presented experiments were to find out the best biotechnology of recycling the winery and vineyard wastes by using them as a growing source for edible mushrooms and protect the vineyard

ecosystems by valorising all the wastes of vineyard ecosystems and wine producing industry (Petre, 2002; Petre & Petre, 2006).

MATERIALS AND METHODS

Fungal culture media

The stock cultures were maintained on malt-extract agar (MEA) slants (20% malt extract, 2% yeast extract, 20% agar-agar). Slants were incubated at 25°C, 120-168 h and stored at 4°C. The pure mushroom cultures were expanded by growing in 250-ml flasks containing 100 ml of liquid malt-extract medium at 23°C on rotary shaker incubators at 110 rev min^{-1} for 72-120 h (Petre, 2006).

Methods used in experiments

In order to prepare the inoculum for the spawn cultures of *Pleurotus ostreatus* and *Lentinus edodes*, the pure mushroom cultures were inoculated into 100 ml of liquid malt-yeast extract medium with 3-5% (v/v) and maintained at 23-25°C in 250 ml rotary shake flasks (Ropars et al., 1992; Wainwright, 1992). The experiments of inoculum preparation were set up under the following conditions: constant temperature, 25°C; agitation speed, 90-120 rev min -1; initial pH, 5.5–6.5. All the seed mushroom cultures were incubated for 120–168 h (Chang & Hayes, 1978). The seed cultures of these mushroom species were inoculated in liquid culture media (20% malt extract, 10% wheat bran, 3% yeast extract, 1% peptone) at pH 6.5 previously distributed into 1000 ml rotary shake flasks. During the incubation time period, all the spawn cultures were maintained in special culture rooms at 25^0 C (Fig. 1).

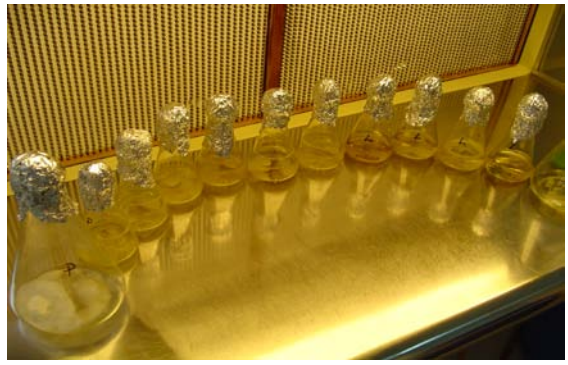

Fig. 1 – Mycelia cultures of *Pleurotus ostreatus* and *Lentinus edodes* mushrooms developed in liquid media

The culture composts dedicated to mushroom production were prepared from the lignocellulosic wastes resulted from: vineyard cuttings and grapes pommace. In this respect, there were prepared three variants of culture compost made of grapes pommace and vineyard cuttings, after they have already been mechanical pre-treated by grinding in order to make them more susceptible to the enzyme actions (Carlile & Watkinson, 1996; Stamets, 1993). All the culture compost variants made of ground vineyard and

winery wastes were transferred into 1000 ml glass jars and disinfected by steam sterilization at 120^0C for 60 min. When the jars filled with composts were chilled they were inoculated with the liquid mushroom spawn already prepared. After 10 to 15 days of incubation, the mycelia have grown inside the culture composts covering the whole their surfaces (Fig. 2).

Fig. 2 – Jars with *Pleurotus ostreatus* spawn grown on composts made of vine cuttings and grapes pommace

RESULTS AND DISCUSSIONS

The effects induced by additional ingredients upon the mycelia growing during the incubation were investigated (Fig. 3, 4, 5):

- carbon sources (maltose, glucose, sucrose, xylose),
- nitrogen sources (what bran, malt extract, peptone, tryptone, yeast extract);
- minerals ($CaCO_3$, $CaSO_4$, $MgSO_4 \cdot 5\ H_2O$, K_2HPO_4, KH_2PO_4)

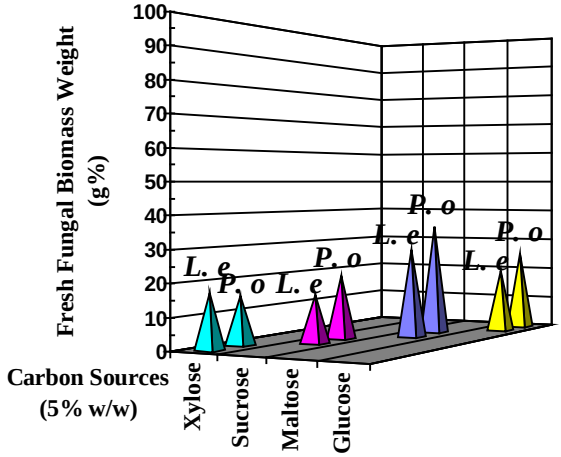

Fig. 3 - Comparative effects of carbon sources upon mycelia growing of *Pleurotus ostreatus* (P. o) and *Lentinus edodes* (L. e)

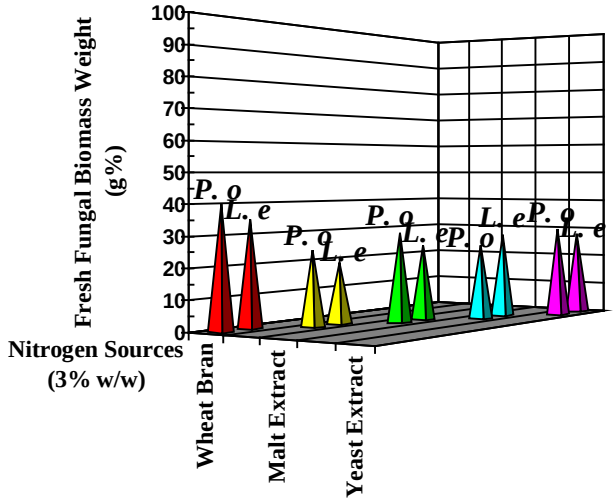

Fig. 4 - Comparative effects of nitrogen sources upon mycelia growing of *Pleurotus ostreatus* (P. o) and *Lentinus edodes* (L. e)

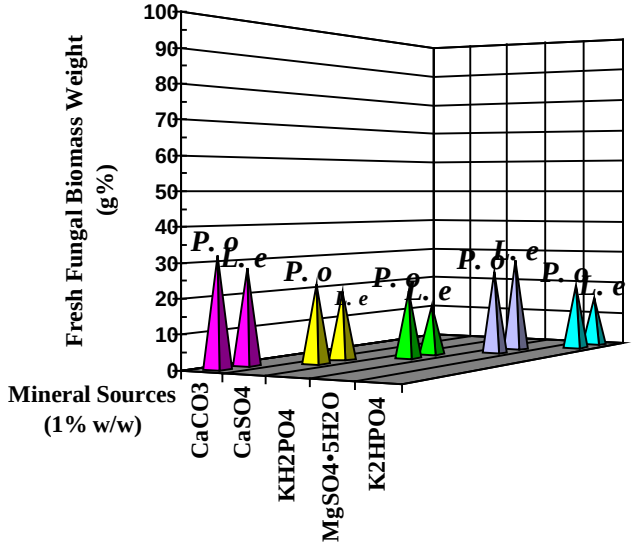

Fig. 5 - Comparative effects of mineral sources upon mycelia growing of *Pleurotus ostreatus* (P. o) and *Lentinus edodes* (L. e)

The research experiments were achieved by growing all these fungal species in special rooms, where the physical, chemical and biological parameters of mushroom cultures (temperature, inoculum age and size, pH level) were kept at optimal levels to get the highest production of fruit bodies (Fig. 6, 7).

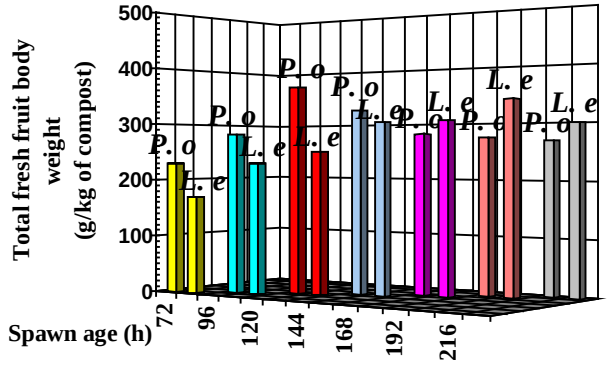

Fig. 6 - The influence of spawn age upon fruit body formation of *Pleurotus ostreatus* (P. o) and *Lentinus edodes* (L. e)

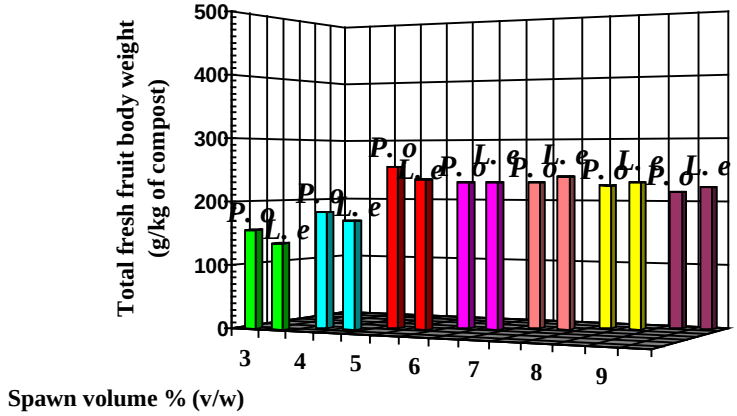

Fig. 7 - The influence of spawn volume upon fruit body formation of *Pleurotus ostreatus* (P. o) and *Lentinus edodes* (L. e)

Studying the effects of physical and chemical factors that could influence the mycelia growing as well as fruit body formation and development of *Pleurotus ostreatus* and *Lentinus edodes*, there were registered the following representative results:

- maltose, as one of tested carbon sources, had shown the highest influence upon the mycelia growing and fresh fungal biomass production about of 28 – 35g%;

- from those five nitrogen sources, wheat bran was the most efficient nutrient upon the mycelia growing and fungal biomass production of *L. edodes* and *P. ostreatus*, by 35-40 g% fresh fungal biomass weight, being closely followed by the malt extract at 25–30 g%;

- $CaCO_3$ yielded the best mycelia growing as well as fungal biomass production at 28-32 g% and for this reason it was registered as the optimal mineral source;

- the best pH levels for the mushroom fruit body production were 6.5–7.0 for both mushroom species, registered at the temperature level of 17°C;

- concerning *P. ostreatus*, the spawn age of 144 h and its volume of 5% (v/w) are the best variants and for *L. edodes* species the highest fruit body production was registered at the spawn age of 192 h and the volume of 7% (v/w).

CONCLUSIONS

Registered data revealed that by applying this biotechnology, the winery and vineyard wastes could be recycled as useful raw materials for mushroom compost preparation in order to get significant mushroom production.

The final fruit body production of the cultivation of these two mushroom species was registered between 1.5 – 2.8 kg relative to 10 kg of composts made of vineyard and winery wastes.

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THE GREADIENT OF TEMPERATURE ANALYSIS IN A REFRIGERATED DISPLAY CASES FOR FOOD PRODUCTS PRESERVATION

ANALIZA GRADIENTULUI DE TEMPERATURA ÎNTR-O VITRINĂ FRIGORIFICĂ PENTRU PĂSTRAREA PRODUSELOR ALIMENTARE

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Abstract. *Computational fluid dynamics (CFD) is a powerful numerical tool that is becoming widely used to simulate many processes in the food industry. Recent progression in computing efficacy coupled with reduced costs of CFD software packages has advanced CFD as a viable technique to provide effective and efficient design solutions. In the present paper we show by CFD techniques the modelation and simulation of a maintaining processes of some agro-food products at low temperature (0-4°C) into refrigerated display case by temperature gradients determination. CFD simulation has the advantage of virtually testing of temperature distribution into interior space of refrigerated display case before introducing the real food products for being kept into. CFD method is important because could show simultaneously the temperature in two or three dimensions on different regions from the display case, which is practically impossible to do by classical methods (temperature measuring with temperature transducers).*

Rezumat. *Calculele de dinamica fluidelor (CFD) reprezinta o unealta numerica puternica ce devine larg utilizata la simularea multor procese din industria alimentara. Progresele recente din domeniul calculatoarelor cuplata cu reducerea costurilor pachetelor de programe CFD au propulsat CFD ca pe o tehnica viabila sa furnizeze solutii eficiente in proiectarea propriu-zisa. In acest articol este prezantata prin tehnica CFD modelarea si simularea unui process de mentinere a produselor agroalimentare la o temperature scazuta (0-4°C) intr-o vitrina frigorifica prin determinarea gradientilor de temperatura. Simularea CFD are avantajul de a proba virtual distributia de temperatura in spatiul interior al vitrinei frigorifice inainte de a introduce in mod real produsele alimentare pentru pastrare in vitrina. Metoda CFD este importanta deoarece poate arata temperatura in doua sau trei dimensiuni simultan pe mai multe regiuni din interiorul vitrinei, ceea ce este practic imposibil prin metode clasice de masurare a temperaturii cu traductoare de temperatura.*

INTRODUCTION

With the purpose to maintain the agro-food products at a low temperature for a long time period, it is necessary the maintaining of a low and uniform temperature into refrigerated display case.

Vertical open display cases are widely used in supermarkets. The use of refrigerated display cases allows good visibility and ensures free access to stored food for shop costumers. A virtual insulation barrier called the air curtain is developed by the recirculation of air from the top to the bottom of the case [1].

This is a nonphysical barrier between cold air in the case compartments and the warm shop environment. As the air curtain falls from the inlet at the top of the case, it entrains cooled air from the back of each case compartment. This air passes over all the food products resulting in heat transfer from the food to the air, which allows the food to be maintained at a predefined temperature. Heat transfer also occurs between shop environment and the air curtain. This causes the temperature of the air curtain to increase and reduces the effectiveness of the air curtain in the lower compartments of the display case [2].

The study air curtains are necessary because these are easily disturbed of air circulation in front of the display case or the shop costumers. This disturbed create "hole" in the aerodynamic air curtain and even if they are short time manage to an inefficient seal arouse an increase of temperature in inside display case with a extra energetic consumptions for cold products preservations.

Numerous CFD studies on the ability of the air curtain to maintain food at a predetermined temperature have been conducted over recent years [3, 4].

The considerable advances made through the CFD modelling of display cases in the last few years will undisputedly lead to improving their efficiency, and thus strengthen their link in the chilled food chain.

FORMULATION OF THE PROBLEM

The display case cabinet of the investigation is a vertical open display unit (figure 1) with four shelves for refrigerating food.

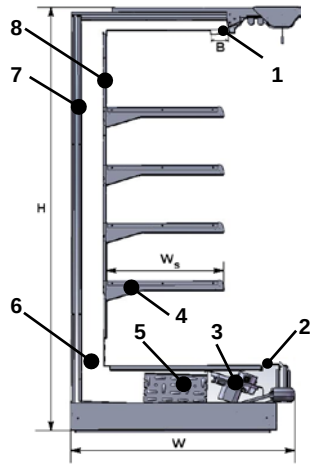

Fig.1. Cross section of a typical one air curtains vertical display case:
1- discharge air grille (DAG) (honeycomb); 2 - return air grille (RAG); 3 – fan;
4 – shelfs; 5 – evaporator; 6 - rear duct; 7 - insulating layer; 8 - rear grille.

In a vertical open display case, air is forced to flow through an evaporator which is situated on the base of the case by suitable fans located on the front of the evaporator in the case. A small fraction of the cooled air is feed into the case through the perforated plate at the back of the case, while the bulk of cold air is blown through one linear discharge air grille (honeycomb) to form one air curtain. The temperature of the inner

part air curtain is lower than that of the outer part air curtain, and the profile velocity of the inner part air curtain is lesser than that of the outer part air curtain. The air curtain and air infiltration from the external medium is recirculated through the return grill and is positioned at the base of the display case.

CFD SIMULATION OF REFRIGERATED DISPLAY CASES

CFD simulation of a refrigerated display case with four shelves, with the purpose to establish the temperature gradient, supposes several steps of engineering designing.

First step is the pre-processing for which the purposed geometry is drawn in three dimension and then discretizated with a node network necessary for temperature distribution calculation. In the second step boundary conditions and equations solvers are introduced for temperature distribution calculation into the processed geometry from the first step. After the calculus is finished, the obtained results are processed in post-processing step where graphs, temperature and speed distribution, concentration distribution, etc. can be visualized. After the evaluation of the obtained results, if the temperature distribution (uniform distribution), which is the purpose of this study, it isn't accordingly, the redesign study is restarted, with pre-processing step, and the refrigerated display case geometry is remodeled till the desired geometry is obtained.

Pre-Processing step

The geometry of the three purposed sections for simulation has been taken from a 3D refrigerated display case assembly drawing in SolidWorks software (figure 2).

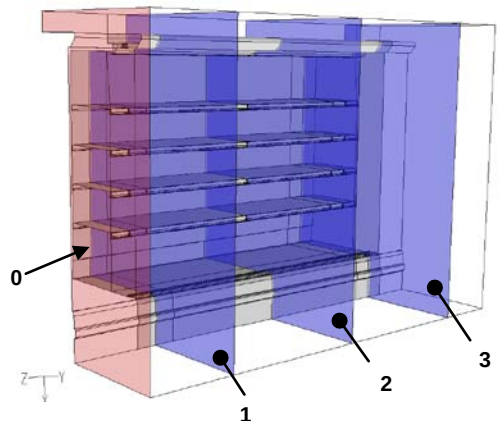

Fig. 2. Supporting and transporting units:
0- lateral plane velocity input; 1- left cross section; 2- middle cross section;
3- right cross section**.**

With the purpose to simulate 3D geometry, the processing (calculus) step would last too much time, and it was referred to simplification assumptions, considering that thermal transfer phenomenon in volume is about the same with the one in sections unfolded. It generates three sections in two dimensions, for parts form volume, considered to have an uneven temperature gradient distinguished by experimental tests in cold test room.

Depends on their position in the refrigerated display cases referred to the test room wall through a laminar air flow goes in with a speed of about 0.2 m/s, these three sections are recognized as left (L), middle (M) and right (R).

The two dimensional predictive models were created using GAMBIT software. The surfaces of the three sections L, M, R have been discretizated in GAMBIT with a structurated mesh that consists of parallelepiped network (figure 3).

The used knots number in discretization was of 254060. The knots were distributed with higher consistency in the interest zone of the air curtain and internally refrigerated display case, dropping off exponential in consistency toward the outward walls of test room. The boundary conditions were imposed in Gambit and completed with functions and values in FLUENT.

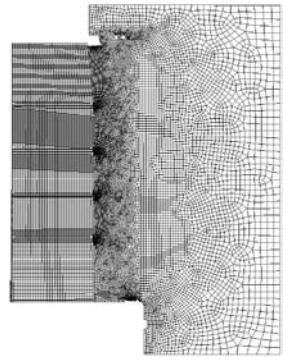

Fig. 3. *Cross section with mesh at the vertical display case*

Processing step

2D models for the three sections have been introduced and calculated with Fluent v6.3 a commercially available CFD code what uses the finite volume technique. So for the DAG region was introduced polynomial pre-definite function for the suitable speed profile of each cross section, completed with the variation function of temperature. The speed profiles and temperature function have been initially experimental determined into the testing room.

In the test room (the outward region refrigerated display cases) it was introduced initial temperature of 25 °C. Knowing as in outward zone of refrigerated display cases in the tangent plan air flow with speed of 0.18 - 0.2 m/s (according to standard tests EN 441), initial boundary condition in the DAG was completed with a turbulent intensity of 2.66, 1.83, 2.16 % for the cross section L, M, R, in harmony with the hydraulic diameter.

In consent with user guide from FLUENT level to the turbulence intensity is considered low around value of 1 % and highly heaved to 10%.The simulation being unsteady was imposed a time step size equal with the time measurements of 0.2 second, number of time steps 1800 and maximum iteration per time step 10. In this kind the time for simulation is 6 minutes and a total number of iterations 18000 realized at a time computation for about 12 hours.

Post-Processing step

The simulations results for one three cross sections are processed through the temperatures profile distribution at one time considered of be the most disadvantageous, namely when it observes a strong interaction of respective infiltration of temperature increases in the lower shelves region refrigerated display cases.

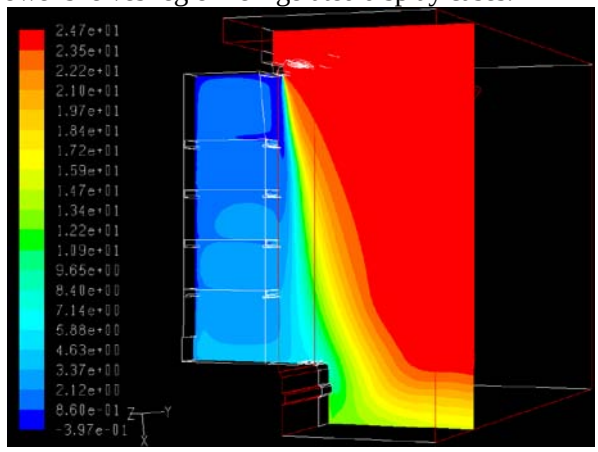

Fig. 4. Temperature distribution in the left cross section [°C] at 360 s time

The relative position function of working cross section toward the side section of the test room where input air with a speed 0.18 m/s can do the regions differentiation from refrigerated display cases where the air curtain an achieves the role of seal toward the outside environment.

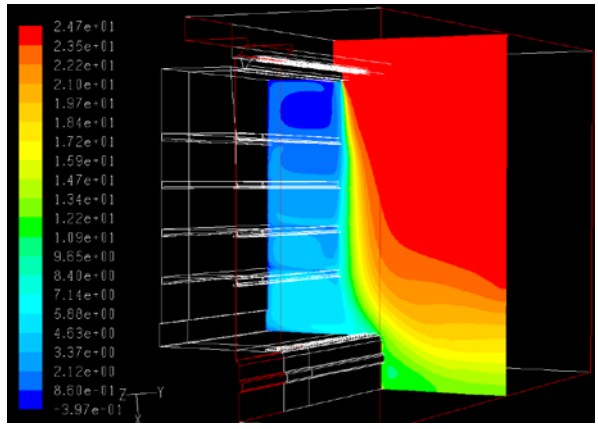

Fig. 5. Temperature distribution in the middle cross section [°C] at 360 s time

Uneven of temperature gradient with preponderant in R plan (figure 6) of inferior shelves, and also in L and M plan respectively (figures 4, 5) leads to a constructive reoptimization of refrigerated display case geometry. Uneven temperature gradient into inferior shelves region leads to the keeping of agro-food products at a higher temperature than the one assessed by normative.

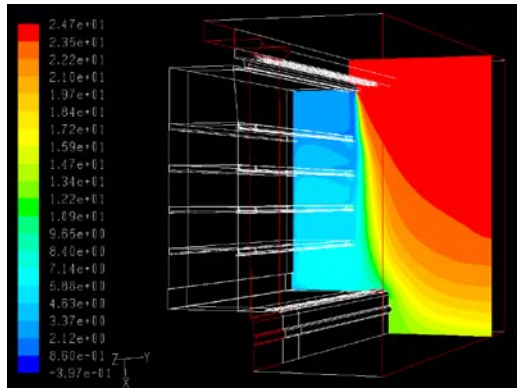

Fig. 6. Temperature distribution in the right cross section [°C] at 360 s time

CONCLUSIONS

The advantage of 2D simulation in different transversal sections of the refrigerated display case offers a good interpretation of the simulation results in a reasonable calculation time for the actual technique, compared to the same precision level and the density of the discretization but into a three-dimensional space of the refrigerated display case. The obtained results by simulation in the purposed variant are agree with the measurements made for the temperature and for the speed. This correlation between simulation and experiments has been validated by the obtained experimental results with the temperature and speed transducers positioned in front of each shelf that indicates the temperature and speed distribution on the whole air curtain height.

It can be concluded from tests and CFD simulations that a reoptimization of refrigerated display case geometry is more than necessary, and the way of calibrated CFD simulations by experiment leads to a time economy during the projection process and it is more easily from the point of view of costs, compared with other testing methods and visualization of temperature and speed gradient, for example Thermo Scan and PIV (Particle Image Velocimetry) that cannot be applied into closed study domains.

The mention of a more uniform distribution of temperature into opened refrigerated cabinets is an actual desideratum that can improve the quality of keeping by cold of food products for a long period.

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ESTABLISHMENT OF CONSERVATIVE TECHNOLOGIES OF TILLAGES MECHANIZATION ON WHEAT CROP FOR ROMANIA N-E AREA

STABILIREA TEHNOLOGIILOR CONSERVATIVE DE MECANIZARE A LUCRĂRILOR SOLULUI LA CULTURA DE GRÂU, PENTRU ZONA DE N-E A ROMÂNIEI

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Abstract. *Concerning the establishment of conservative technologies of tillage mechanisation on wheat crop for Romania N-E area, in year 2007 autumn, six variants of technologie were experienced. We determined operation qualitative indices at each variant for each machinary, as well as, energetic and exploitation indices for each cultivator. After sowing of the crop, at certain time, it determined at each variant: soil resistance to penetration, pondered average diameter of the soil structural elements and the hydrical stability of these elements. It determined also, at each variant, the fuel consumption per hectare needed for the performing of the mechanised tillages for the wheat crop setting up. Having in view, the results obtained after experiments, we evaluated the variants of technologies for mechanisation of tillages according with the soil conservation conditions on wheat crop.*

Rezumat. *În vederea stabilirii tehnologiilor conservative de mecanizare a lucrărilor solului pentru zona de N-E a României, la cultura de grâu, în toamna anului 2007 s-au experimentat 6 variante de tehnologii. La fiecare variantă s-au determinat indicii calitativi de lucru, pentru fiecare utilaj de lucru, şi indicii energetici şi de exploatare, pentru fiecare agregat agricol. După însămânţarea culturii, la o anumită perioadă de timp, s-a determinat, tot la fiecare variantă, rezistenţa solului la penetrare, diametrul mediu ponderat al elementelor de structură ale solului şi stabilitatea hidrică a acestor elemente. De asemenea, la fiecare variantă s-a determinat consumul de combustibil la hectar pentru efectuarea mecanizată a lucrărilor necesare înfiinţării culturii de grâu. Pe baza rezultatelor obţinute în cadrul experimentărilor efectuate s-au evaluat variantele de tehnologii pentru mecanizarea lucrărilor corespunzător condiţiilor de conservare a solului, la cultura de grâu.*

GENERALITIES

Concerning the establishment of conservative technologies of tillage mechanisation on *wheat* crop for Romania N-E area, it experienced more variants of technologies. These technologies have been tested to establish which of them meet, in the highest level, the sustainable agriculture concept and which assure, first of all, protection, conserving and improvement of soil.

For this, each mechanization technology variant that includes conservative unconventionaly tillages made by adequated machinaries will be compared with sample variant where it is practiced conventionally tillage technology but the comparison is to be made also with other conservative technologies. Each variant of techology comprises primary tillage of soil, weed control, preparing of seed bed. Sometime, the tillages can be reduced and the sowing can be made directly in stuble (in unploughed soil). Because, several experimental technologies include complex unit that have in their structure sowing equipment, it established that the sowing is to be present to all technologies, in such way, these to be compared.

MATERIAL AND METHOD

Experiments regarding tilling mechanization technologies on wheat crop field were performing during 20 september 2007 till 3 april 2008. Experiments were made on cambic chernozem having a clay content of 36 percents and average values for apparent density and moinsture. The land average longitudinal slope has 2 grades. The sunflower was the previous plant.

Before tillage and sowing on wheat field, the SR 250 machine chopped all plant remains for all tillage mechanization technologies.

We experimented six variants of mechanization technologies of tillage and sowing. They are showed on *table 1*.

Variant V_1 is considered sample – variant, because, it represents a conventional technology (generally practiced on field).

We determined tillage quality indices for each technological variant and for each machinery (machinary or implement). We determined, also, energetic and exploitation indices for each technological variant and for each complex unit.

Table 1

Variants of tillage and sowing mechanization technology on wheat crop

Complex unit used	Variant of tehnologies
• tractor Valtra T-190 + reversible mouldboard plough Opal 140 • tractor U-650 + disc harrow GD-3,2 + tine harrow 2GCR-1,7 (3 types) • tractor U-650 + versatil sowing hauled SUP-29	V_1 (sample)
• tractor Valtra T-190 reversible mouldboard plough + Opal 140 • tractor Valtra T-190 + complex unit AGPS-24DR (harrow FRB-3 + sowing SPU-24DR), 540 rot/min at PTO	V_2
• tractor Valtra T-190 + heavy disc harrow GDG-4,2 • tractor Valtra T-190 + complex unit AGPS-24DR (harrow FRB-3 + sowing SPU-24DR), 540 rot/min at tractor PTO	V_3
• tractor U-650 + chisel PC-7 • tractor Valtra T-190 + complex unit AGPS-24DR (harrow FRB-3 + sowing SPU-24DR), 540 rot/min at tractor PTO	V_4
• tractor Valtra T-190 + loosening elements of soil fixed on complex unit AGPS-24DR (540 rot/min at tractor PTO)	V_5
• tractor Valtra T-190 + combined machine for soil processing and sowing on rows MCR-2,5 (sowed directly, on unploughed land), 1000 rot/min at tractor PTO	V_6

We determined after wheat sowing, for each variant: soil resistance to penetration, pondered average diameter of structural elements of soil and their hydric stability. Also, we determined at each variant, the fuel consumption per hectare for performing of soil mechanized tillage and sowing.

RESULTS AND DISCUSSIONS

After experiments, we obtained important results concerning: tilling qualitative indices, exploitation and energetic indices, soil resistance to penetration, indices related to stability of soil structural elements and total fuel consumption per hectare for the performing of soil mechanized tillage and sowing.

On table 2 are showed the main results obtained at experiments.

Table 2

Results obtained concerning the tillage quality, soil conservation and fuel consumption

Variant of technology	Quality indices for tillage preparation of seedbed		Indices concerning conservation of soil properties			Fuel consumption per hectare for the performing of soil mechanized tillage and sowing *l/ha*
	Breakage grade of soil *%*	loosening grade of soil *%*	Soil resistance to penetration *daN/cm²*	Pondered average diameter of soil structural elements *mm*	Hydric stability of soil structural elements *%*	
V_1 (sample)	70	29	1,35	4,86	78,6	33,670
V_2	90	26	2,65	4,45	77,9	25,800
V_3	92	25	4,50	3,52	74,4	16,350
V_4	93	24	1,45	3,63	75,7	16,870
V_5	95	22	3,25	3,79	76,4	11,160
V_6	100	20	7,50	4,28	78,0	7,697

Breakage grade of soil at preparation of seedbed has changed depending on the used technology from 70 % to 100 %.

Taking in view that, the agro-technical demands impose that the breakage grade of soil to tillage of seedbed to be minimum 90 %, then V_1 (sample) can not be applied (at this variant the breakage grade of soil does not meet, by far, limits stated by technical demands). The others variants have appropriate values for breakage grade of soil. Among these, V_6 is the best, breakage grade of soil being of 100 %.

Regard to **loosening grade of the soil,** the obtained values to the those six variants meet the limits established by agro-technical demands. If in case of breakage grade of soil, its value is increasing continuously from V_1 to variant V_6, at loosening grade of soil, the situation is opposite: the more breakage grade of soil increases ,the more soil loosening grade reduces , which is normaly.

We have to mention that, the others tillage qualitative indices for the preparation of seedbed have not been presented because it considered that the most important qualitative index is breakage grade of soil**.** The problems that appear at the preparation of seedbed are because it can not assure a proper breaking of the soil. The reducing of the breaking grade of the soil having values

under the limit stated by demands agritechnical appears on tillage of the seedbed for autumn crops.

Soil resistance to penetration has been measured second days after sowing moment when soil resistance to penetration was measured is important because during vegetation this one has a certain increasing.

We have to mention that, if previous plant is weeding one, the soil has a penetration resistance relatively reduced in certain depth, due to the weeding works. Within our test, the wheat followed after sunflower. We determined the soil penetration resistance, from 5 cm to 5 cm, untill a depth of 30 cm. On table, we show only the average value of this index in the depth of 10 cm because in this area, all machinary worked influencing the soil penetration resistance.

We determined also, soil resistance to penetration on an untilled soil, before performing the works for sowing of the wheat. In this case, in depth of 0 - 10 cm soil resistance to penetration was of 4,00 daN/cm$^{2.}$ Next day after wheat sowing, soil resistance to penetration in depth of 0 - 10 cm has changed depending on technology variant between 1,35 daN/cm^2 and 7,50 daN/cm^2. The smallest value of the index was registered at variant V_1 and the biggest at $V_{6.}$

Agro-technical demands stated several value classes of soil resistance to penetration: very small class = under 11 daN/cm^2; small class = 11 - 25 daN/cm^2; middle class = 26 - 50 daN/cm^2 etc. Comparing these demands with obtained results, we found that soil resistance to penetration is **very small** at all variants. So, soil resistance to penetrationis is very good for all variants.

We appreciate that soil resistance to penetration had such small values before tilling and sowing of crop. This explain that,the soil had a proper moinsture due to rains which overpassed monthly annual average, also, the soil had been frequently weeded on previous crop and we determinated the soil resistence to penetration even next day after sowing.

Agro-technical norms stated that for a soil resistance to penetration till 25 daN/cm^2, the plant roots grow normaly. Taking in view, agro-technical norms and obtained results we appreaciate that, there are conditions for a normal growing of wheat plant roots at all variants.

Pondered average diameter of soil structural elements was determined second days after sowing for three depth: 0 – 10 cm, 10 – 20 cm, and 20 – 30 cm. On table are presented the values of this index for a depth of 0 - 10 cm, area where all machinaries have operated.

Pondered average diameter of soil structural elements was determined also on untilled soil, before soil tillage. It found that on depth of 0 – 10 cm pondered average diameter of soil structural elements is in this case of 4,23 mm.

From table, it found that after sowing the pondered average diameter of soil structural elements varied between 3,52 mm, and 4,86 mm. The smallest value of this parameter has been registered at V_3 and the biggest one at V_1 variant. In case of variants, where mouldboard plough was not used the biggest value of this parameter has been registered at V_6 and the smallest one at V_3.

Agro-technical norms state that, from agronomical point of view, soil structural elements having diameter between 3 – 5 mm (even over 5 mm) are more important. Comparing these demands with obtained results, it found that pondered average diameter of soil structural elements is proper for all variants.

If it is compared the value of this index determined on untilled soil (4,23 mm) with the values presented on table, it found that at V_6 (sowing direct) the value of index does not practically modified. At variants V_5, V_4, and V_3 the value of index diminshed due to active elements of machiries that have cut more or less soil strutural elements. At variants V_1, and V_2 the index has the biggest values because the mouldboard turned on the soil bringing to top the soil having a better structure (bigger element of structure).

Hydrical stability of soil structural elements was determined second days after sowing for three depth: 0 – 10 cm, 10 – 20 cm, and 20 – 30 cm. On table are presented the values of this index for a depth of 0 - 10 cm.

This index was determined also on untilled soil, before soil tillage. In this case it found that on depth of 0 – 10 cm hydrical stability of soil structural elements was of 77,3 %.

Agro-technical norms provide that if the hydrical stability of soil structural elements overpasses the limit of 60 %, this index sets in one class very high. Comparing the obtained results with agro-technical results. It can say that hydrical stability of soil structural elements is very good for all variants.

Analysing the obtained results, it finds that the smallest value of this index was recorded at V_3 variant, and the biggest one at V_1. At variants where the mouldboard plough was not used the biggest value of this index was recorded at V_6, and the smallest one at V_3.

As regards, the comparison between value of this index at unploughed soil (77,3 %) and the values showed on table, all observations that were made at pondered average diameter of soil structural elements are available also in case of hydric stability.

Fuel consumption per hectare obtains by adding fuel quantities consumpted for mechanized tillage and sowing, namely the tillages provided at each variant of technology. We consider that the fuel consumption per hectare for mechanized tillage and sowing at each experimented variant is appropiate. The biggest consumption was recorded at V_1, variant and the smallest one at V_6 variant.

Establishing of the technologies of mechanisation for soil tillage that will be applied. After the analyse of all determined indices at each variant, the researchers have stated the technology variants that will be applied, and their order.

If there are conditions for use of tillage conservation systems, we consider that the variants that can be applied beginning with the best one are: V_6, V_5, V_4, V_3. If V_6 variant can not be used, V_5 will be used. In case that V_5 can not be used, V_4 will be used. Finelly, if V_4 can not be used, V_3 will be used.

V_2 will be used, when it is imposed the use of moulboard plough. V_1 variant (sample) is not recommended to be applyed because the fuel consumption per hectare is too big, and the breakage grade of soil is unproper being situated under imposed minimal limit of agro-technical demands.

CONCLUSIONS

1. On the basis of the obtained results within experiments, researchers have stated the variants of technologies that are recommended to be applied.

2. When there are conditions of application of soil tillage conservative systems, variants that can be applied beginning with the best one are: V_6, V_5, V_4, V_3.

3. V_2 will be used when it is imposed the use of moulboard plough.

4. V_1 variant (sample) is not recommended to be applyed because the fuel consumption per hectare is too big, and the breakage grade of soil is unproper.

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MODELING SUBSTANTIATION OF ONE-GRAIN CROPS VEGETABLE CULTURES IN REPUBLIC OF MOLDOVA

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Abstract: *In article mathematical modeling of exact crops is stated. On the basis of the probability theory dependences of one-grain crops of vegetable cultures on which basis it is developed monogram for definition of norm of crops depending on a field ascension of seeds and along a number of distribution of seeds on the field area have been defined.*

Process of seeding of seeds can be divided into following stages: 1-creation of a stream of seeds by the sowing device; 2-transportation of seeds to a place of their emission from the device and their movement on a seed to a wire to a planting place in soil.

MATERIAL AND METHOD

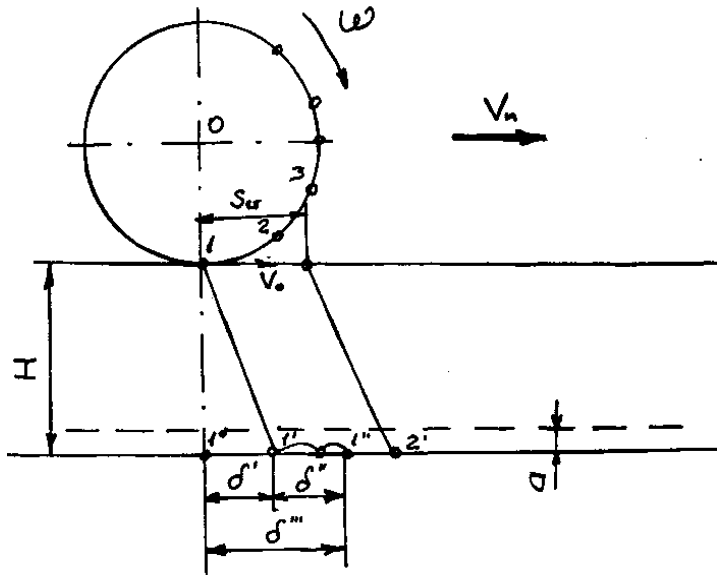
The stream of seeds created by the sowing device is not absolutely constant. The density of a stream characterized by quantity of seeds, falling to unit of length of a number, is a random variable. Stochastic function is density defined if its population mean and correlation function are known, therefore we use the theory of casual events.

RESULTS AND DISCUSSIONS

Researches allow to draw a conclusion, that at falling of seeds on soil under some corner (drawing 1) reflexion which are described by expression is inevitable: $\delta''' = \delta' + \delta''$ **(1)**

Where: δ ’ - distance across from a point in which the seed has been thrown out by the sowing device to a point in which it for the first time has adjoined to a groove bottom; δ ”- distance from a point of the seed first contact with soil to a point in which the seed will be fixed by soil.

The size δ' is function of height **H** of falling of a seed, initial speed $\mathbf{V_0}$, and conditions of its movement, that is possibility of collision with details ploughshare and a wire seed. The deviation δ ’ ”the first, second and subsequent seeds represents realization of the random variables possessing an identical population mean. Considering a relative positioning of seeds as not dependent on the general displacement of a stream which are characterized by a definitive arrangement in points of their emission by the sowing device it is possible to consider admissible using random variables, a population mean which is equal to zero that is: $\delta = \delta''' - m(\delta''')$ **(2)**



Drawing 1 - Scheme of process of seeding from soil to a point

But the deviation of seeds can be considered influence of the sowing device, ploughshare, soil conditions, properties of seeds:

$$\delta = \sum_{n=1}^{k} \delta = \delta' + \delta'' + \ldots + \delta^n \quad \textbf{(3)}$$

Value δ characterizes influence transformation on an initial stream of seeds. Transformation of a stream which has intervals S_u between seeds occurs under the influence of many factors which set in a consequence we will name reformative system. The interval between seeds in a number represents a linear combination of three sizes: initial stream S_u; deviations of the previous grain δ_i; deviations of the subsequent grain δ_{i+1}. In the algebraic form the interval between seeds will be presented by following expression: $\mathbf{S=S_u-\delta_i+\delta_{i+1}}$ **(4)**

Attaching negative significance S_u it is possible to define a condition of its performance: $\mathbf{S_u<\delta_i-\delta_{i+1}}$ **(5)**

From (5) follows, that it is enough for reception of one inversion, that on length of way S of a seeder the deviation of the subsequent seed has decreased in comparison with a deviation previous for size big than S_u. At crops enough big the quantity of seeds under the influence of individual deviations, arises an essential difference between initial and definitive distribution which, are characterized by change of an arrangement of seeds in a stream. Using a conclusion that the interval shows a combination of three sizes (6) we will define a dispersion of an interval along a number. $\mathbf{D_s=D_u+2D_\delta}$ **(6).** Where: D_u - an initial dispersion; D_δ - a dispersion of deviations.

The dispersion deviation in this case will be defined accordingly by expression:

$$\sigma_s = \sqrt{\sigma^2{}_u + 2\sigma_\delta^2} \quad \textbf{(7)}$$

From the analysis of graphic interpretation follows, that at normally distributed intervals of a stream and deviations the law of distribution of definitive intervals also turns out normal. Generalization of the considered scheme is casual when the seed overtakes **k** seeds (drawing 2**)**. For an advancing of two seeds the following condition is necessary: $\delta_i - \delta_{i+1} > 2S_u = 2S_m$ **(8)**

Condition of an advancing a seed of the subsequent **k** seeds is:

$$\delta_i - \delta_{i+1} > \sum_{i=1}^{k} S_u \quad \textbf{(9)}$$

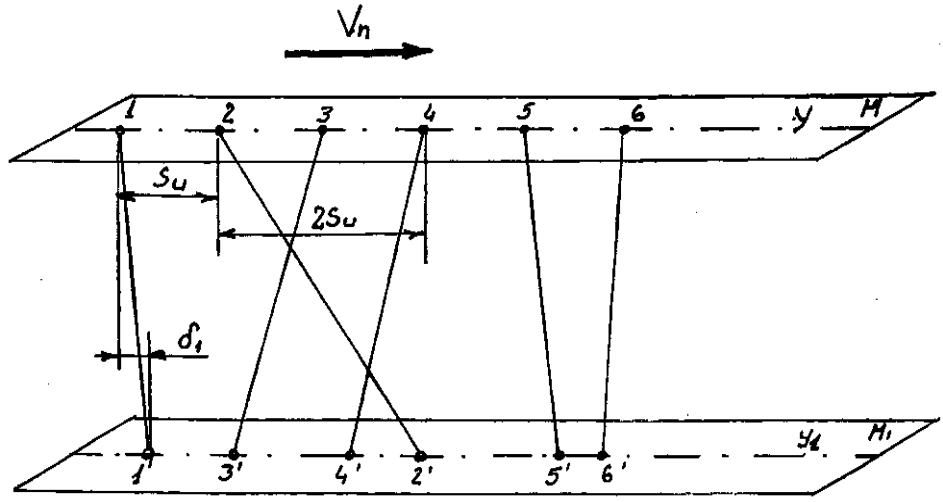
The dispersion difference increases owing to standing up distinctions between actual and the measured intervals. For calculation of numerical characteristics of distributions it is necessary to establish a parity between the actual and measured intervals. For the initial we will accept measured, and actual we will express through them. At two inversions actual intervals are measured in group between seeds. We will write down:

$S_1 = 1'\ldots2';\ S_2 = 2'\ldots3';\ S_3 = 3'\ldots4';\ S_4 = 4'\ldots5';\ S_5 = 5'\ldots6'$

The measured intervals are defined on distances: $S_1 = 1'\text{-}3'$ $S_2 = 3'\text{-}4'$; $S_3 = 4'\text{-}2'$; $S_4 = 2'\text{-}5'$; $S_5 = 5'\text{-}6'$

Proceeding from values of intervals, we will define dispersion and an indicator of asymmetry which after transformations will have the following appearance: $\Delta D'' = P_2 14 S_m^2$ **(10);** $A_3'' = \frac{M_3''''}{\sigma^3} = P_2 \frac{43 S_m{}^3}{\sigma^3}$ **(11)**

Where: $\Delta D''$ - a difference between dispersions of the actual and measured intervals at quantity of intervals **t=2**; P_2 - probability of inversion **t=2**; M_3'' - the third central moment defined taking into account inversion **t=2.**



Drawing 2 - Scheme of several inversions

Flat, that the law of distribution of deviations falling normal can be defined probability of occurrence of inversions under the law of distribution of a difference of independent random variables $\delta = \delta_i + \delta_{i+k}$. In a case if a size population mean $\delta = 0$, and root-mean-square deviations

$\sigma_s < \sigma_s \sqrt{2}$ the initial density will be:

$$f(x) = \frac{1}{\sigma_\delta \sqrt{2\pi}} e^{-\frac{x^2}{2\sigma_\delta^2}} = \frac{1}{2\sigma_\delta \sqrt{2\pi}} e^{-\frac{x^2}{4\sigma_\delta^2}} \quad \textbf{(12)}$$

The probability of occurrence of inversions is probability of hit of a random variable δ in an interval from δ... ∞. Having designated this probability P_i we will receive:

$$P_i = \frac{1}{\sigma_\delta \sqrt{2\pi}} \int_{S_u}^{\infty} e^{-\frac{x^2}{2\sigma_\delta^2}} dx \quad \textbf{(13)}$$

The elementary stream of casual events meeting requirements of ordinariness, stationary absence of a consequence is characterized exponential by the law of distribution of intervals. Its integrated function looks like: $F(l)=1-e^{-\lambda e}$ **(14).** Where: λ - density of seeds abreast, l - an interval between seeds.

However experimental data testify, that variation factors at crops fluctuate in wider limits (20 … 100 %). Therefore distribution of seeds in a number should be considered as distribution of a random variable by law Puasson. Having designated through **l** a piece of a groove and having admitted that the quantity of seeds will be there is in it a size casual with the certain law of distribution will receive, that the probability of a finding **m** seeds is defined by dependence:

$$P_m = \frac{(\lambda l)^m}{m!} e^{-\lambda t} \quad \textbf{(15)}$$

Where: λt - the average quantity of seeds falling to a piece **l**.

Having designated **λt** through **b,** we will receive: $P_m = \frac{(b)^m}{m!} e^{-b}$ **(16)**

As seeds are thrown out at crops of vegetable cultures on one on distance S_u from each other and the law of dispersion of an individual seed is known, it is possible to define their quantity falling to an elementary site **Δb.** Having directed a horizontal axis **x** on a groove bottom, and an axis **y** - we will vertically define density of a stream of seeds on an elementary site, which on distance **l** from the beginning of co-ordinates:

$$N = f_1(l)\Delta l + f_2(l)\Delta l + \ldots + f_n(l)\Delta l = \sum_{-\infty}^{\infty} f_i(l)\Delta l \quad \textbf{(17)}$$

Where: $f_1(l)$; $f_2(l)$; $f_n(l)$ - distribution laws at dispersion of 1st, 2nd … n the individual seeds.

In a considered case the kind of all functions of distribution is identical also a difference only position on an axis **0l,** and since. Displacement of the subsequent function concerning the previous does not depend on its position on an axis **OH** that equation (24) it is possible to copy as follows:

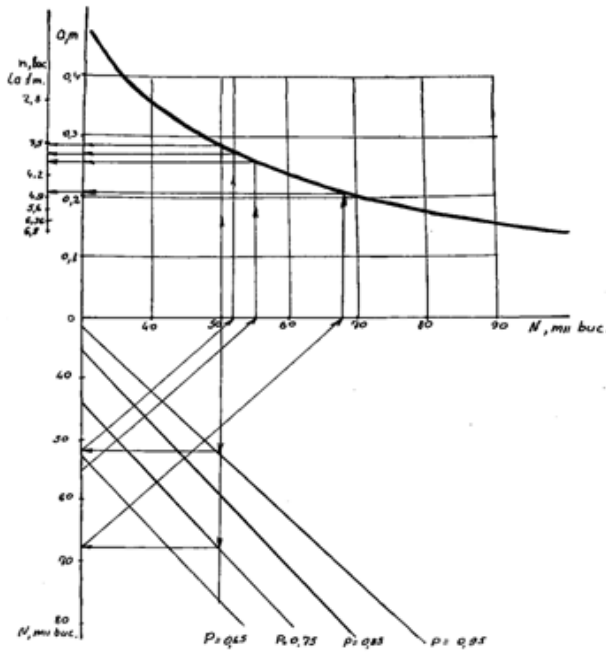
$$N=[f(l) + f(l \pm 2S_m) + \ldots + f(l \pm kS_m)]\Delta l \quad \textbf{(18)}$$

Signs ± specify, that summation of curves is conducted at the left and to the right of accepted for the first. For the normal law of distribution it is had:

$$N = \left[\frac{1}{\sigma\sqrt{2}} \left(e^{-\frac{l^2}{2\sigma^2}} + e^{-\frac{(l+S_m)^2}{2\sigma^2}} + \ldots + e^{-\frac{(l+kS_m)^2}{2\sigma^2}} \right) \right] \Delta l \qquad \textbf{(19)}$$

At $x \to 0$, we will receive: $N(l) = \int_{-\infty}^{\infty} f(l - kS_m) dl$ **(20)**

The analysis of function **N (*l*)** shows its dependence on parameters of deviations and distance between seeds. The density of plants on 1 hectare depending on germinating capacity and along a distance number between them by means of developed nomogram (drawing 3) has simultaneously been defined.



Drawing 3 - Nomogram for calculation of crops to a point for vegetable cultures.

CONCLUSIONS

As a result of researches the mathematical model for modeling of exact crops has been developed.

It has been defined, that distribution of seeds on a number is influenced by the inversion moment, including experimental data show that the factor of a variation for crops is in the big limits - 20 … 100 %. Therefore distribution of

seeds on a number should be considered as distribution of the first random variable which was considered in law Puasson.

Using the monogram for calculation of crops to a point, for vegetable cultures the real distance between plants on a number which differs from distribution of seeds to the strengthened crops has been defined.

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INFLUENCE OF DISTRIBUTION OF SEEDS ON A FIELD SURFACE ON PRODUCTIVITY OF VEGETABLE CULTURES IN REPUBLIC OF MOLDOVA

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Abstract: *As a result of studying of works of various authors it is established, that they studied reaction of productivity to density of standing of the plants, described by the equations of a hyperbole or a parabola which do not come nearer to experimental data and offer mathematical dependences in the absence of a competition between plants. On the basis of mathematical modeling of process of growth of a plant and results of experimental researches functional dependence of productivity of vegetable cultures on 1hectare is revealed.*

In article the basic models on mathematical modelling of process of growth of vegetable cultures are considered, and also the received results of productivity about 1 hectare are presented.

MATERIAL AND METHOD

In work mathematical formulas of the international scientists which investigated reaction of productivity to density of distance between seeds along a number were used.

RESULTS AND DISCUSSIONS

Giving the big importance of dependence between productivity **U** the kg/m^2 and density of standing of plants on the basis of results of researches and publications on this theme can be concluded, that it is grouped in two classes presented on fig. 1.

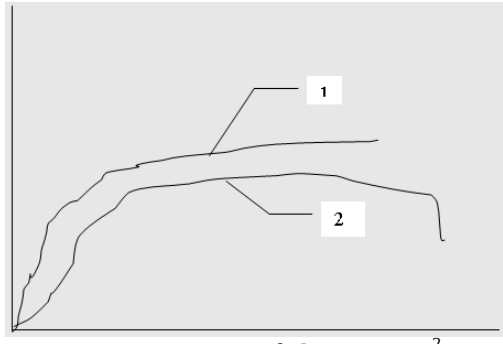

Fig 1. Reaction of productivity to density of standing of plants
1 - Hyperbolic dependence; 2 - Parabolic dependence.

In case of hyperbolic dependence the productivity curve aspires to asimptot whereas at hyperbolic constant reduction of a steepness of an inclination of a curve

comes to the end with an extremes point. Attempts to use for the description of the given functional dependence the hyperbole or parabola equations not always approximately given and consequently Hudson (1) offer dependence:

$$u = a + b\rho + c\rho^2 \quad (1),$$

Where: a, b and with – constant factors, with the account, that b > and with< 0; ρ - Density of plants on 1 м^2,

This is symmetric concerning an extremum point. It also can be modified dependence:

$$u = a + b\rho + c\rho^{\frac{1}{2}} \quad (2)$$

Where: a>0; b>0; c >0.

Duncan (2) has suggested approximating empirical given by gamma function:

$$u = a\rho e^{b\rho} \quad (3)$$

Where: **a** and **b** – constant factors, and, **a** >0, b<0.

However other variants are possible also when the behavior of a curve depends or on numerical values of parameters, or (that is more rare) when function has no асимптот extreme.

In this case in our opinion it is expedient to use the equation:

$$u = a\rho^b \quad (4)$$

Where: a> 0 and 0< b<1 sizes constants.

The given function in difference from (1, 2, 3) is characterized by absence of extreme and asimptot.

Proceeding from concrete biological situations asimptotichesky functions under K. Shouzaki and T. Kira statement (3) are better for describing the equation:

$$u = \frac{a\rho}{\rho + b} \quad (5)$$

However the equation (5) according to Holiday (4) does not reflect a situation when crop W is equal to a constant, kg counting on one plant i.e.

$$W = \frac{u}{\rho} = \frac{a}{\rho + b} \quad (6)$$

In the absence of a competition between plants in our opinion resulted statement is based only on algebraic illusion.

Having designated the area of a food of one plant through A, м^2 which it is equal:

$$A = \frac{1}{\rho} \quad (7)$$

And having substituted the equation (7) in the equation (6) it can be written down in a following kind:

$$W = \frac{aA}{1 + bA} \quad (8)$$

From the analysis of expression (8) appears that at a small competition of plants the weight falling to one plant is constant.

Asimptotichesky dependence (5) can be modified thus that there was an extreme for what it can be presented in a following kind:

$$u = \frac{a\rho}{1 + b\rho + c\rho^2} \quad (9)$$

By giving to parameters and, b and from various numerical values it is possible to receive by means of expression (9) various functions откликаот parabolic to ассимптотических.

Blisdeil and Nidler (5) have offered function of dependence on density of standing of plants based on function of growth of Richardson

$$\frac{dW}{dt} = \frac{kW\left(W_f^n - W^n\right)}{nW_f^n}$$

Where: to, n and W_f – constants, and k and W_f. are positive, and $n \geq 1$ following kind:

$$u = \frac{\rho}{\left(a + b\rho c\right)^d} \quad (10)$$

Usually it appears satisfactory at c=1.

Having designated: $\frac{1}{\rho} = S_1 S_2$; and a crop in recalculation on one plant $W = \frac{u}{p}$

Where: S_1 – distance between numbers of plants;

S_2 – Distance between plants in рядке;

W – a crop in recalculation on one plant.

Let's receive after transformation of function (10) equation describing dependence between U and density of standing expressed in distances S_1 and S_2 in a following kind:

$$u = \sqrt[d]{\frac{\rho^d}{a + b\left(S_1^{-1} + S_2^{-1}\right) + c\left(S_1 S_2\right)^{-1}}} \quad (11)$$

Where: a and b – constant factors for culture at c =1;

d – factor characterizing or parabolic, or асимптотическую response function;

At d = 1 – function has asimptotichesky the response:

At d > 1 – parabolic.

The equation 11 sufficiently describes dependence between productivity and the food area, but at the same time demands preliminary definition of reaction of the given culture on density of standing characterized in the factor d. In practical activities with sufficient reliability functional dependence between the area of a food of a plant and its productivity can be defined the equation:

$$u = \frac{S_1 S_2}{1{,}619 + 0{,}375 S_1 S_2} \quad (12)$$

Where: u – productivity of grain from one plant;

S_1 – width of a row-spacing;

S_2 – an interval between plants.

The analysis of graphic analogue of dependence (12) gives the basis to conclude, that the optimum area of a food providing reception of steady crops in the conditions of Moldova, should be in an interval 0, 16 … 0, 25 m^2.

Experimental data MNIIKS imposed on a theoretical curve testify to their good coordination with settlement and high коррелятивной communications (r = 0,699) investigated indicators at $\sigma^2 = 2{,}133$.

From the analysis of functional dependence of productivity of vegetable cultures on 1 hectare from norm of seeding follows, that she submits to law described by the equation:

$$Q = \frac{1}{1{,}671 + 1{,}979 e^{-N}} \quad (13)$$

CONCLUSIONS

13 graphic analogue constructed on the basis of the equation testifies to hyperbolic character of dependence on an investigated interval and leads to a conclusion, that optimum density of plants of vegetable cultures at its cultivation should be in the range of 70 … 80 thousand plants. Reliability of the given conclusion proves to be true almost stationary area of productivity at very high коррелятивной communications r = 0,852 investigated factors and a good coordination theoretical and experimental data ($\sigma^2 = 3{,}314\ e^{-0,04}$).

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RESEARCH OF THE PERIOD OF A DELAY OF IGNITION OF A GAS MIXTURE OF THE TRACTOR DIESEL ENGINE CONVERTED IN GAS-DIESEL

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Abstract. *Process of burning and the subsequent expansions of gases are base processes in a cycle of work of engines with internal combustion. In Gas-Diesel gas giving is carried out in the inlet pipeline where he has time to form till the ignition moment a homogeneous mix with air and with residual gases that allows using an air charge completely. Formation homogeneous a mix from gas and air allows to use completely a charge, that is effective burning of gas for lack of surplus of gas with smaller formation of soot and other products incomplete combustion diesel fuel, ignition and burning process is direct in the engine cylinder before the moment. At work Gas-Diesel theoretical calculations on definition of necessary quantity of air, products burning, degrees of a heat-conducting path of natural gas and diesel fuel have been executed; theoretical display diagrammes of the Diesel engine and Gas-Diesel have been constructed. Comparing specific warmth at burning mixes from natural gas and diesel fuel, it is possible to draw not correct conclusions about power characteristics Gas-Diesel in comparison with a diesel engine. As it has been proved by theoretical calculations diesel engine transfer in Gas-Diesel, speak about possibility reception of the same working capacity on gas, as well as on solar oil.*

Rezumat. *Procesul de ardere şi ulterior dilatarea gazelor sunt procese de bază a ciclului de lucru la motoarele cu ardere internă. În Gazo-Diesel debitarea gazului se îndeplineşte prin conducta de aer, unde el dovedeşte să se formeze până la momentul de inflamare practic amestec omogen cu aer şi cu gazele remanente. Formarea amestecului omogen de gaz-aer permite complet să se folosească încărcătură de aer, adică de ars efectiv gazul în lipsa surplusului de aer considerabil cu formarea mult mai mică a funinginii şi altor produse a arderii necomplete a combustibilului Diesel, injectat nemijlocit în cilindrul motorului înainte de inflamare şi în procesul de ardere. La analiza lucrului Gazo-Dieselului au fost efectuate calcule teoretice la determinarea cantităţii necesare de aer, produselor de ardere, puterea calorifică a gazului natural şi combustibilului lichid; sunt construite diagramele teoretice indicate a Gazo-Dieselului şi Dieselului.Comparând căldura specifică de ardere amestecurilor stecheometrice de gaz natural şi combustibil Diesel, se poate de făcut concluzie greşită despre caracteristicile de putere reduse ale Gazo-Dieselului comparativ cu a Dieselului. Însă, cum s-au dovedit calculele teoretice trecerea Dieselului în proces Gazo-Diesel mărturisesc despre posibilitatea primirii aceleiaşi puteri la lucru cu gaz precum ca şi la combustibil Diesel.*

RESULTS AND DISCUSSIONS

In Gas-Diesel gas giving is carried out in the inlet pipeline where he has time to form till the ignition moment a homogeneous mix with air and with residual gases that allows using an air charge completely.

Diesel fuel, injected directly ahead of ignition and in the course of burning forms a heterogeneous mix. The certain share of gas worsens conditions of spontaneous ignition of diesel fuel. As a result of the resulted factors the period of a delay of spontaneous ignition increases. Duration of this period appreciably defines speed of increase of pressure at combustion both fuels, i.e. smoothness of work of the engine.

Attempts of theoretical calculation of the period of a delay of ignition as functions of temperature, pressure and energy of activation are represented basically by indicative functions. The basic influence renders thermal stress of the engine.

Professor A. I. Tolstov, being based on the analysis of display diagrammes of eleven various high-speed engines with spontaneous ignition [1], has offered the general formula for definition of a delay of ignition δ depending on pressure and temperature of air, frequency of rotation of the engine and properties of fuel

$$\delta = \beta_0 (T/P)^m \cdot (1 - k \cdot n) \cdot e^{E/RT}$$

Where *P, T* - average pressure and air temperature for the period δ;

n - frequency of rotation of the engine;

E - energy of activation;

R - a gas constant;

m, k, and β_o - skilled factors.

Using the given expression we make theoretical calculation of the period of a delay of ignition a convertible diesel engine of series D-240.

As a result of theoretical researches a number of the curves representing indicative functions of dependence of the period of a delay of ignition from temperature of a fresh charge of air for different corners of the moment of an advancing of injection (fig. 1) is received. Intensity of a steepness of curves influences both a corner of an advancing of injection φ, and temperature of fresh charge $^{/}{}_{0}$. T

The range of the period of a delay of ignition for high-speed engines which tractor diesel engines concern also, according to professor O.I. Vyrubova [2] makes 0,5 … $2 \cdot 10^{-3}$ seconds. On the received theoretical curves fig. 1 this range are noted by the shaded surface. The range is characterized by the greatest steepness of curves that testifies to fast transition from almost stable value of the period of a delay of ignition δ to as table (sharply varying).

The Main role of such sharp transition in the specified zones the temperature of a fresh charge and to each moment of an advancing of injection plays the temperature limits. In a zone of heats the moment of injection of fuel makes insignificant impact on the period of a delay of ignition and for value of corners of injection 0º, 10º and 15º the size δ is rather insignificant. In process of increase in a corner of injection (20º, 25º, etc.) δ even value starts to increase in a zone of heats. In the field of low temperatures of a fresh charge the period of a delay of ignition grows promptly and can quickly reach the moment when diesel fuel will not ignite.

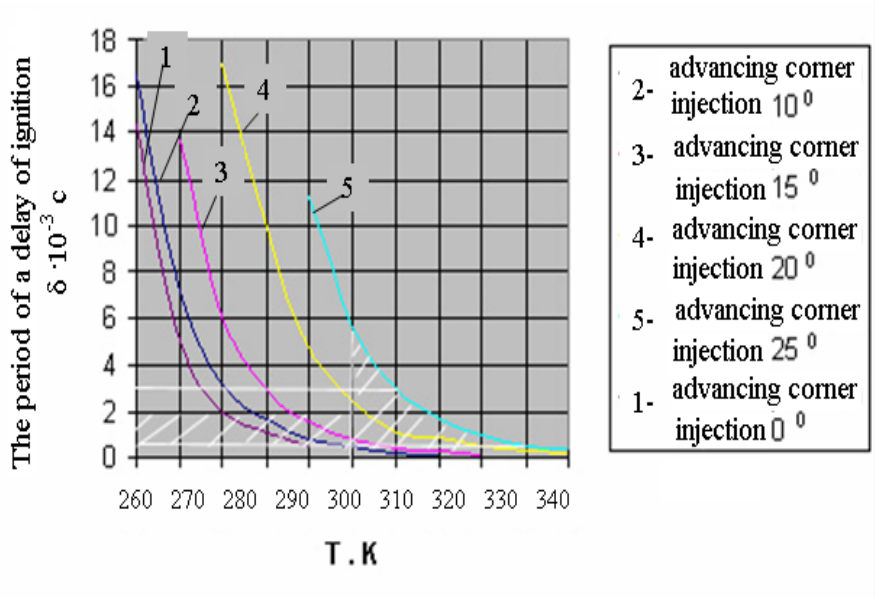
For counted engine D-240 the moment of the beginning of giving of fuel is equal 18º … 20º turn of a cranked shaft of the engine before piston arrival in HEDC, hence, the injection moment is approximately nearby 20º. The period of a delay of ignition for 310ºC already comes nearer to the top limit $2 \cdot 10^{-3}$ With, characteristic for high-speed

engines, and at 350ºC - to the bottom limit $0{,}5 \cdot 10^{-3}$ ºC. Vyhod for the top limit will lead to the big delay of the period of ignition and as result, to rigid work of the engine, and an exit for the bottom limit - will increase pressure of flash. Therefore the temperature of a fresh charge of the engine makes solving impact on process of combustion of fuel and, accordingly, not only on power and economic indicators of work of the engine, but also and on strength its parameters.

With reduction of a corner of an advancing of injection the period of a delay of spontaneous ignition decreases. The curves corresponding to a corner of injection 0º, 10º and 15º, having, located on the schedule under the same value δ, settle down more to the left, i.e. In a zone of lower temperatures.

To later corner of injection there corresponds the smaller period of a delay of spontaneous ignition at the same value of temperature of a fresh charge. Such phenomenon speaks pressure growth at the piston approach to HEDC. However at too small value of a corner of an advancing of injection the period complete burning increases, that leads finally to decrease power and economic indicators of the engine.

In engines with Gas-Diesel process a small share of diesel fuel 10 … 15 % from the general charge of all fuels are injected for a short time interval that allows reducing a corner of an advancing of injection.



During this period temperature and pressure high, and the small quantity of fuel has time to ignite and burn down completely. Thus, I phase (the period of a delay of ignition) is reduced and in the engine cylinder all diesel fuel arrives. In II phase (the period of increase of pressure) burns down all diesel fuel and from it the gas, which temperature of ignition in 2 … 2,2 times above, than at diesel fuel ignites.

Presence of many centers of burning and preliminary preparation of molecules of gas for reaction promotes that combustion process occurs completely in II phase and burning in III phase (complete burning) should be absent practically.

Combustion of all fuel in II phase can lead to increase in the maximum pressure of flash and, as result, to rigid work of the engine Rise in temperature and pressure in the beginning of II phase promotes acceleration heat exchanging processes, to an intensification of chemical reactions and in common leads to reduction of preparation of particles of gas to its fast involving in combustion process.

For gas the period of a delay of ignition coincides with II phase of combustion of diesel fuel. On all process of combustion the display diagrammed which has been removed by practical consideration can clear a real picture of influence of the given phenomenon only.

CONCLUSIONS

On the basis of theoretical calculations it is established, that the period of a delay of ignition in Gas-Diesel depends basically on temperature of a fresh charge and a corner of an advancing of injection.

The increase in temperature of a fresh charge and reduction of a corner of injection lead to decrease in the period of a delay of spontaneous ignition.

For converting of tractor diesel engines in Gas-Diesel it is necessary to define by practical consideration a corner of an advancing of injection and optimum temperature of a fresh charge.

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SOME STUDIES REGARDING FLOWER CULTURE USING ORGANIC SUBSTRATES

CERCETĂRI PRIVIND CULTURA PLANTELOR FLORICOLE PE SUBSTRATURI ORGANICE

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Abstract. *The aim of this research was to use mixtures of organic substrates obtained from the composts formed from different waste materials at the Hydrangea macrophylla Ser. culture in containers. The experiment was made in the greenhouse of the University of Agronomic Sciences and Veterinary Medicine-Bucharest. Transplants were made on different mixtures formed from manure, peat, and sand and forestry leaves compost. Then, the transplants were introduced in 5 l containers. The pots were filled with 4 variants of volumetric mixture and 10 replicates formed with forestry leaves compost, peat, garden soil, sand respectively red peat. The research on Hydrangea macrophylla Ser. culture using waste composts has the limitation of pH and the high content of macro elements from substrates. The concentration of macro elements from plants varied with the substrates composition and vegetation period. The highest values of nitrogen were registered in variant 4 with 45% of leaves compost and the accumulation of element increase from the first period of analysis to the third. Phosphorus accumulated in small quantities. Potassium, an element that determines the quality of the flowers, was accumulated in values which varies from 2.96 to 3.6% with the highest values on the first period of analysis. These studies represent a new direction in the reuse of some waste materials on the culture of flowers.*

Rezumat. Cercetările efectuate au urmărit comportarea plantelor cultivate în containere pe diferite rețete de substraturi realizate prin dozarea volumetrică a componentelor: compost de frunze, turbă roşie, pământ de grădină şi nisip. Butaşii au fost înrădăcinați pe un substrat alcătuit din turbă roşie, compost de frunze şi nisip, fasonați după înrădăcinare la 10cm lungime şi plantați fiecare în containere de capacitate de 5l conținând substratul fiecărei variante (în număr de 12 plante/variantă). În cursul perioadei de vegetație s-au aplicat lucrările de îngrijire specifice (udări) şi tratamente fitosanitare pentru combaterea dăunătorilor. Au fost urmărite în dinamică evoluția indicilor agrochimici ai substraturilor, conținutul N, P, K forme totale în frunze şi măsurători biometrice (înălțimea plantelor, numărul de frunze şi lungimea lăstarilor, diametrul florilor). Rezultate semnificative privind creşterea şi dezvoltarea plantelor s-au obținut la varianta 3 cu 20% turbă roşie, 30% pământ de grădină, 40% compost de frunze şi 10% nisip în substrat.

Hydrangea is one of the most beautiful plants, which blooms, in forced culture, from March until May, bearing flowers with big, white, pink or blue floral bracts. Hydrangea plants are cultivated outdoors, in frost protected places, and in gardens where they bear flowers from June until October. In the garden, they grow under partial shade, having a very pleasant decorative aspect (Davidescu and colab., 2001, Selaru, 1998).

The purpose of this research was to obtain hydrangea plants in the container culture using some substrates result from mixing different residual materials and classic materials and to determine the optimum substrate for this culture.

MATERIAL AND METHODS

The experiment was made in the greenhouse of University of the Agronomic Sciences and Veterinary Medicine-Bucharest. Transplants were made on different mixtures formed from manure, peat, sand and forestry leaves compost. Then, the transplants were introduced in 5 l containers. The pots were filled with 4 variants of volumetric mixture and 10 replicates formed with forestry leaves compost, peat, garden soil, sand respectively red peat (table 1). During the vegetative periods, biometric measurements and analyses of plants and substrata were made.

RESULTS AND DISCUSSIONS

At the beginning there were made the analyses on the substrata used in the culture. The results are presented in table 1.The pH values for the each variant were between 6.22 and 6.48, soluble salts content varied between 0.13% and 0.39%, content, which does not represent a problem for the hydrangea plants because the optimum values are between 0.3-0.5%. The content of nutritive elements presents optimum values of nitrogen and potassium, but smaller values of phosphorus.

Table 1.

Agrochemical characteristics of substrates at transplanting of shoots

Variant	pH	Soluble salts total content %	Content, ppm			
			NH_4^+	NO_3^-	PO_4^{3-}	K^+
Red peat:Garden soil:Sand 45%:45%:10%	6.22	0.39	24.37	570	3.5	210
Red peat:Garden soil:Leaves compost:Sand 30%:30%:30%:10%	6.48	0.13	14.6	266	2.3	185
Red peat:Garden soil:Leaves compost:Sand 20%:30%:40%:10%	6.30	0.30	20.6	301	2.8	196
Red peat:Leaves compost:Sand 45%:**45%**:10%	6.31	0.23	29.25	271	3.3	205

During the vegetation period, the substrata and the leaves from the experimental variants were analyzed.

The **values of nitrogen** from the substrata show a different release of that element during the period of vegetation. In all the variants, the values are high because the components of the substrata suffer a composting process together with the release of nitrogen. All the variants have values of nitrogen, which are upon the values of variant 1 (control). The highest value of 318.5ppm is in variant 4 (Red peat: Leaves compost: Sand 45%:**45%**:10%) which have 45% of leaves compost.

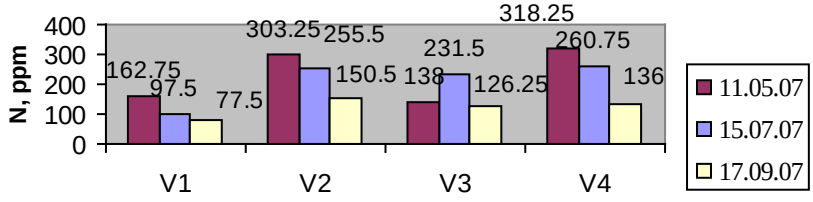


Fig.1- Evolution of nitrogen in culture substrata

Fig.2- The influence of substrata on the quantities of nitrogen from leaves

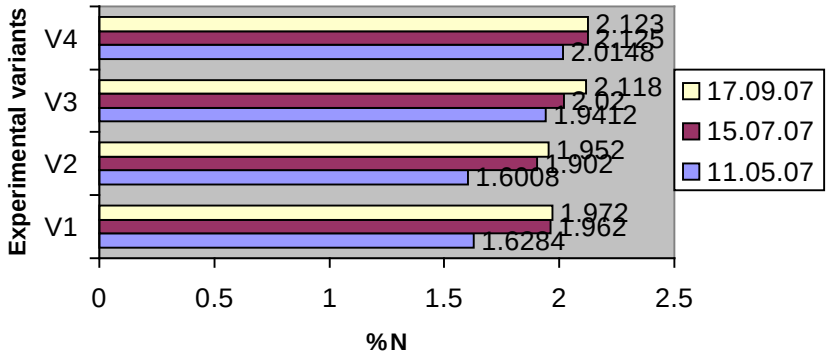
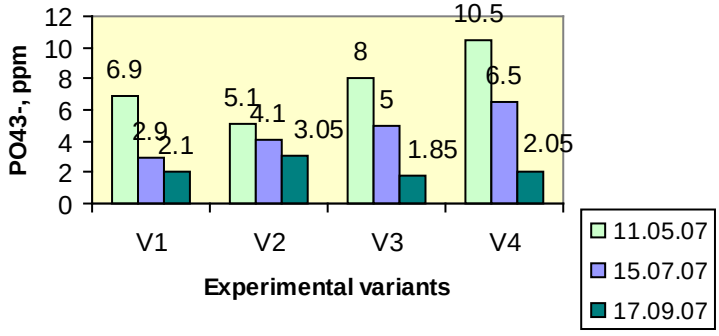


Fig.3- Evolution of phosphorus in culture substrata

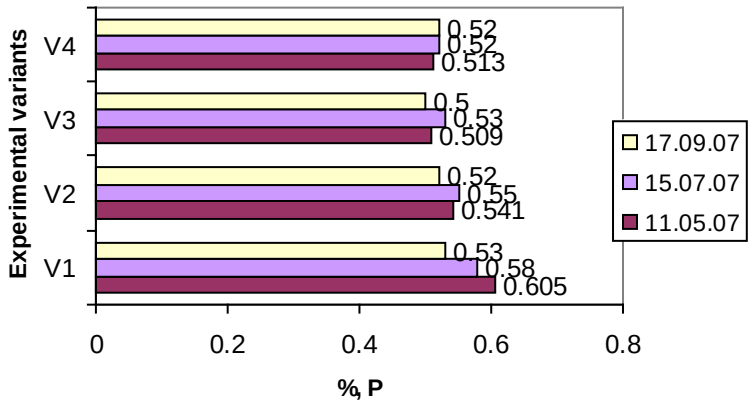


The analysis of nitrogen from the leaves of *Hydrangea macrophylla* shows a minimum limit of 1.600% in variant 2, analysis from May to a maximum value of

2.125% in variant 4 from July analysis. The nitrogen quantity from leaves depend with the supply of that element in substrata. The maximum values of nitrogen are in variant 4 in which the quantity of nitrogen from the substrata is the highest from all variants.

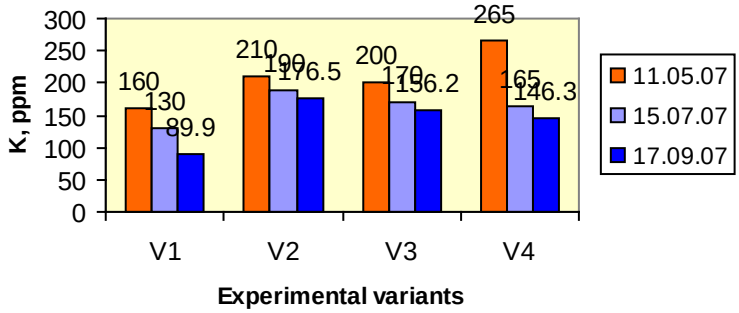
From the point of **phosphorus**, the values of that element in the substrata during the vegetation period are small and could influence the development of plants. The highest value was registered in variant 4 with the value of 10.5ppm. The release of that element shows that the maximum values are at the first period of analysis and that the values of that element decrease until very small values of 1.85% at variant 3 to 3.05% at variant 2 in May.

Fig.4-Influence of subtrata on the content of phosphorus from leaves



The concentrations of phosphorus in the leaves are low and are from 0.50% to 0.605%. The accumulation of that element in *Hydrangea macrophylla* leaves is at the same level at all periods of analysis and variants because the quantities of that element from the substrata are low from the beginning and during the vegetation period.

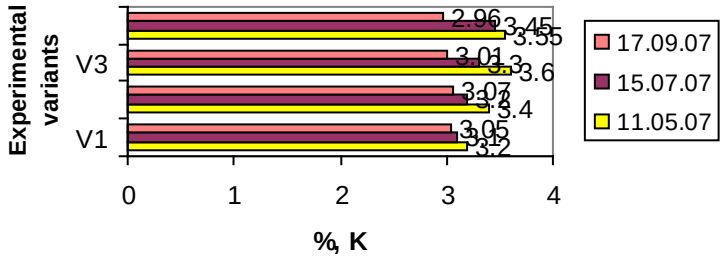
Fig.5-Evolution of potassium in culture subtrata



Potassium, the other important macro element registered high values at all periods of analysis, and varies from 89.9ppm at variant 1 in September to 265ppm in variant 4 in May. The highest values are in variant 4 where the substrata release the

highest quantities of potassium. These values of the potassium were accumulated during the vegetation periods on the leaves of the *Hydrangea macrophylla* from the experimental variants the 4 variant registered the highest values (3.55%) of potassium in leaves of plant and 3.6% at variant 3.

Fig.6- Influence of substrata on the potassium content in leaves



To see the influence of N, P, K content of the substrata there were made corelations between the content of every element from substrata and content of the same elements from hydrangea leaves at all period of analyses. The results were presented in figures 7 and 8.

Fig.7- Correlation between nitrogen from substrata and nitrogen in leaves

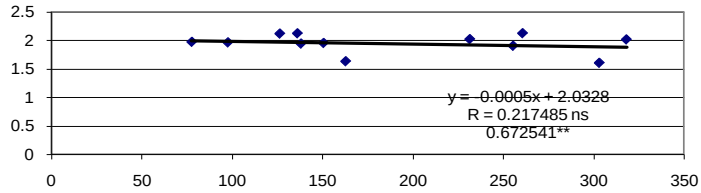
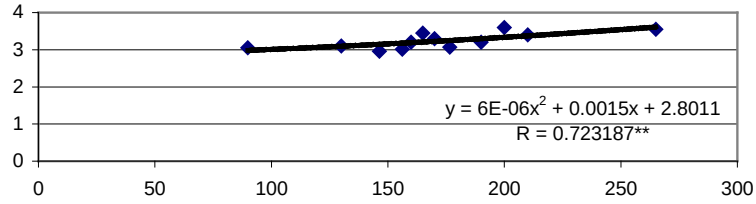


Fig.8- Correlation between potassium from substrata and potassium from leaves



The correlations betweem the macro elements contents from experimental substrata and contents of the same elements in hydrangea leaves shows that the absorbtion of nitrogen and potassium are very significant.

CONCLUSIONS

1. The leaves compost content of substrata influence the composition in N, P, K of mixture;

2. The content in macro elements of *Hydrangea macrophylla* leaves is positively influenced by the content in the same elements from substrata:

a. **Values of nitrogen** from the substrata show a different release of that element during the period of vegetation, in all the variants, the values are high because the components of the substrata suffer in time a composting process. The highest value of 318.5ppm is in variant 4 (Red peat: Leaves compost: Sand 45%:**45%**:10%).The maximum values of nitrogen from *Hydrange macrophylla* leaves are in variant 4 in which the quantity of nitrogen from the substrata is the highest from all variants

b. From the point of **phosphorus**, the values of that element in the substrata during the vegetation period are small and could influence the development of plants. The highest values are registered in variant 4 with the value of 10.5ppm. The concentrations of phosphorus in the leaves are low, from 0.50% to 0.605%.

c. **Potassium** from substrata registered high values at all period of analysis, and varied from 89.9ppm to 265ppm. The highest values are in the variant 4. From the experimental, variants the 3 variant registered the highest values of potassium in leaves of plant at variant with 405 leaves compost.

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THE MOBILE PHOSPHORUS SUPPLY OF SOME CHERNOZEM SOILS FROM DOLJ COUNTY

STAREA DE APROVIZIONARE CU FOSFOR MOBIL ÎN UNELE SOLURI DE TIP CERNOZIOM DIN JUDEȚUL DOLJ

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Abstract. *This research was carried out in 2006-2007 period, on Dolj county soil, respective in Băileşti Plain which occupies the central part of Oltenia Plain. There were analyzed 76 probes sampled from 18 profiles. Chernozem soils occupy about 80% form Băileşti Plain soils, being typical, vermic and cambic. On these soil types were determined the P_2O_5 mobile quantity (mg/100 g) and a series of physicochemical analyses, meaning pH, carbonates (%), humus (%), clay (%), Nitrogen total (%), K_2O mobile (mg/100 g), SB, SH (me). It resulted that there is a direct correlation between the mobile phosphorus and pH. Thus, the total concentration of phosphorus drops significantly with the rising of pH level above 7,5 and below 5,5, being top between 6,3-6,5. On these soil types it can be observed a good supply with phosphorus for vegetables crop, the intensive fruit yard and vineyard, and very good, excessively for field crops.*

Rezumat. *Studiul a fost efectuat în perioada 2006-2007, pe teritoriul județului Dolj, respectiv Câmpia Băileştiului care ocupă partea centrală a Câmpiei Olteniei. S-au efectuat 18 profile din care s-au recoltat 76 de probe care au fost analizate. Cernoziomurile ocupă aproximativ 80% din solurile Câmpiei Băileştiului, fiind tipice, vermice şi cambice. Pe aceste tipuri de sol a fost determinat conținutul de P_2O_5 mobil (mg/100 g) şi o serie de analize fizico-chimice, respectiv pH, carbonați (%), humus (%), argilă (%), azot total (%), K_2O mobil (mg/100 g), SB, SH (me). S-a constat că există o corelație directă între fosforul mobil şi argilă, între fosforul mobil şi humus (R = 0.967) şi o corelație invers proporțională între fosforul mobil şi pH. Astfel, concentrația totală a fosforului scade semnificativ cu creşterea pH-ului la valori peste 7,5 şi cu scădere sub 5,5, fiind maximă între 6,3-6,5. Pe aceste tipuri de soluri se observă o foarte bună aprovizionare în fosfor atât pentru culturile de legume, plantațiile intensive de pomi fructiferi şi viță de vie, cât şi foarte bună, excesivă pentru culturile de câmp.*

The present study focus on the determination of mobile phosphorus from soil, which is mainly compose from mineral occluded phosphates, from those absorptive bounded but labile to the clay minerals and from those with organic provenience, respective mineralized from humus. The optimal condition for the phosphates mobilization and maintenance in liquid phase in mineral soils are meeting in low acid domain reaction. In moderate and strong acid domain, as well as in those neutral and alkaline take place a decrease of phosphorus concentration from the soil solution and their fixation in low soluble forms. Another factor that determines indirect the phosphorus mobility is represented by the soil texture. The

particle sizes that determine the soil texture influence differentiated, after the presence or absence of colloids, the absorption and the mobility of nutrients. The mobile phosphorus increase direct proportional with the organic matter.

MATERIAL AND METHODS

The research carried out in 2006-2007 period focused on the establishing of the mobile phosphorus quantity in chernozem soil type from Oltenia Plain. There were sampled soil probes on the depth, determining the soil type (soil profile) and the physicochemical analyses: pH, carbonates, humus, total nitrogen, mobile phosphorus, mobile potassium and the clay quantity. The used methodology is according to the ICPA Bucureşti standards.

RESULTS AND DISCUSSIONS

In this paper we are taking into account the soil of two town, representative for the Oltenia Plain: Calafat and Băileşti. Thus, the typical cambic chernozem from Calafat presents the next physicochemical characteristics:

Table 1

The physicochemical characterization (average values) on the depth

Horizon and depth cm	Ama	Amn	AB	Bv	Cca
	0-20	20-40	40-60	60-80	80-120
pH	7,3	6,1	7,1	7,3	8,3
Carbonates %					13,8
Humus %	12,56	1,44	2,96		
N_t %	0,160	0,150	0,100		
P_2O_5 mobile mg/100g	62,2	41,6	11,1		
K_2O mobile mg/100 g	66	31	86		
Clay	20,9	22,2	23,0	22,4	16,3

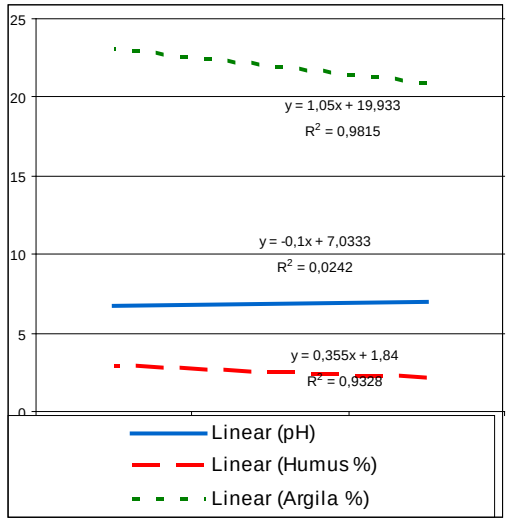

Fig. 1. The relation between pH, humus and clay and the mobile phosphorus quantity on typical cambic chernozem from Calafat

The soil reaction (pH) on arable layer is low acid. The humus quantity in the arable layer is middle, and the total nitrogen quantity is moderate. The mobile phosphorus (ppm) in arable layer points a good supply. The mobile potassium (ppm) in arable layer points a poor supply.

As it can be observe, there is a insignificant relation between pH and P_2O_5 quantity (R^2 = 0,0242), due to the low acid – neutral pH, the phosphorus being immobilized in the soil solution. The other relation are distinct significant.

On the typical low decarbonated chernozem we meet the next physicochemical characteristics:

Table 2

The physicochemical characterization (average values) on the depth

Horizon and depth cm	Ap	Am	AC	Cca
	0-20	20-40	40-60	60-120
pH	6,53	7,88	8,17	8,28
Carbonates %	-	0,3	7,8	15,2
Humus %	2,42	1,46	-	-
N_t %	0,140	0,083	-	-
P_2O_5 mobile mg/100g	162,4	41,2	31,6	-
K_2O mobile mg/100 g	105	70	-	-
Clay	22,4	19,8	17,2	15,6

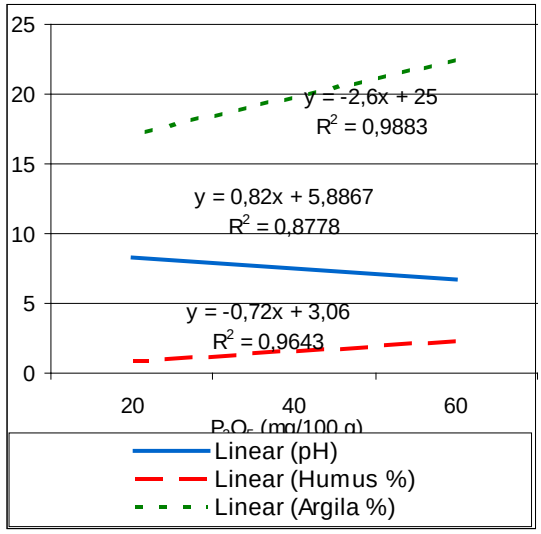

Fig. 2. The relation between pH, humus and clay and the mobile phosphorus quantity on the typical low decarbonated chernozem soil from Băileşti

The soil reaction is low acid to neutral on the depth. The humus quantity is small. The nutrients supply is like: the total nitrogen is good; the mobile phosphorus is good and the potassium mobile is poor. The carbonates quantity is higher on the depth.

Between pH, humus and clay and the P_2O_5 quantity there is distinct significant relations.

On the typical wet underground chernozem soil from Băileşti, we meet the next physicochemical characteristics:

Table 3

The physicochemical characterization (average values) on the depth

Horizon and depth cm	Ap	Am	AC	Cca
	0-20	20-40	40-60	60-120
pH	6,35	7,90	8,10	8,27
Carbonates	-	3,8	6	13,5
Humus %	2,48	1,6	1,2	-
N_t %	0,140	0,087	0,067	-
P_2O_5 mobile mg/100g	141,1	14,0	-	-
K_2O mobile mg/100 g	110	62	31	-
Argilă	17,6	15,1	13	10,2

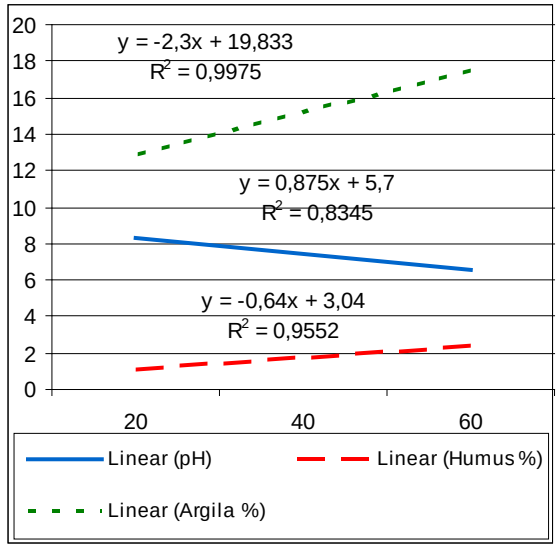

Fig. 3. The relation between pH, humus and clay and the mobile phosphorus quantity on the wet underground typical chernozem from Băileşti

The soil reaction is low acid to low alkaline. The humus quantity is middle. The main nutrient have the next supply: the total nitrogen is small, the mobile phosphorus is big, the mobile potassium is small. The carbonates horizon is higher on the depth.

From the figure, we can observe significant and distinct significant relation for the parameters taking into account.

There are, also, both insignificant and significant relation between the studied parameters and the phosphorus quantity, on the three layers. Thus, in

figure no. 4 we are represented the existing relation on the 0-20 cm layer. The figures no. 5 and 6 correspond to the 20-40 cm layer, respective 40-60 cm layer.

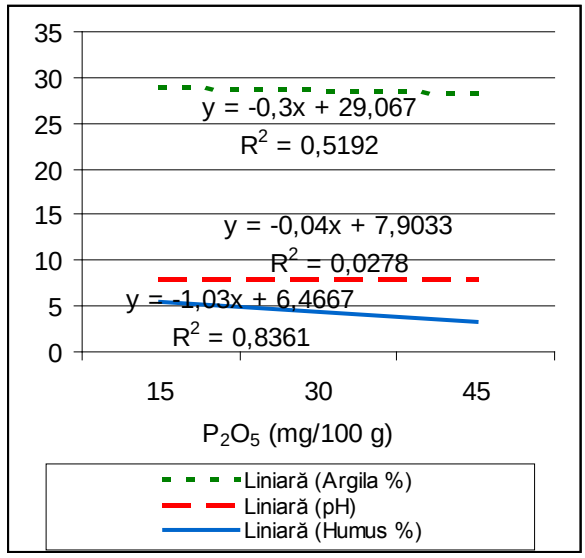

Fig. 4. The relation between pH, humus and clay and the phosphorus quantity on 0-20 cm layer, to the vermic typical chernozem from Băileşti

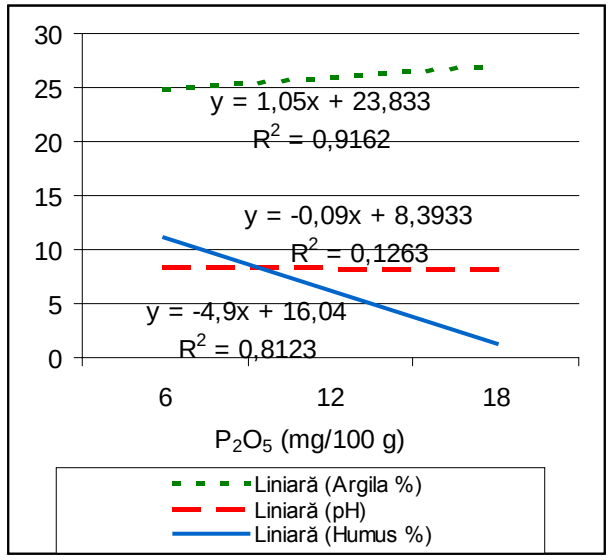

Fig. 5. The relation between pH, humus and clay and the phosphorus quantity on 20-40 cm layer, to the vermic typical chernozem from Băileşti

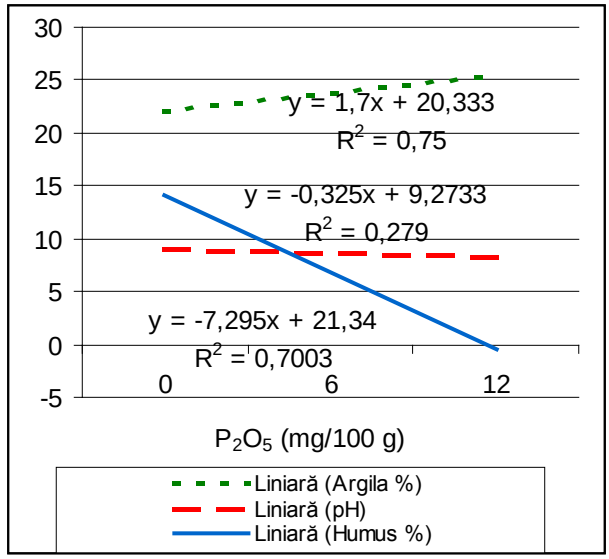

Fig. 6. The relation between pH, humus and clay and the phosphorus quantity on 0-20 cm layer, to the vermic typical chernozem from Băileşti

In the soil dynamic on the depth, it can be observed significant relation on the 20-40 cm layer, comparative with the other two layer, where the values fluctuation leads to low significant regression coefficients.

CONCLUSIONS

From the study of the fourth chernozem soil types results that the most significant relation exists between the humus and clay quantity and the total phosphorus. The pH vary depending by the chernozem type.

The profile depth doesn't influence the relation between the studied parameters and the phosphorus quantity.

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A SEARCH OF TECHNOLOGIES OF QUALITY IMPROVEMENT OF SOYA SEED BY THE MEANS OF CERTAIN COMBINATIONS OF MINERAL FERTILIZERS

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Abstract. *Optimization of plant growing by the balanced use of nitric and sulphuric fertilizers is actual question, as metabolism of nitrogen and sulphur in plants is closely associated by synthesis and accumulation of proteins. That is why the purpose of this work was to ground ecological expedience of the use of nitric and sulphuric fertilizers for improvement of quality of Soya bean seeds (Glycine max (L.) Merr., cultivar Ustya) in the conditions of Ukrainian Polissya. Sulphuric fertilizers were conducted in the dose of 50 kg/ha ($N_{80}P_{60}K_{80}S_{50}$). Control variant - $N_{80}P_{60}K_{80}$. The doses of nitric fertilizers were: $N_{30}P_{60}K_{60}$, $N_{60}P_{60}K_{60}$, $N_{120}P_{60}K_{60}$, $N_{180}P_{60}K_{60}$. Control variant – without fertilizers. The results of the research showed that balanced mineral fertilizers supply is necessary for forming of high-quality Soya harvest. It is set that the use of sulphuric fertilizers in an amount 50 kg/ha improves Soya bean seed quality mainly because of raising of sulphurcontaining aminoacids and total protein fraction. Differences in influence of nitric fertilizers doses are found out and allowed to ground ecological expedience of their use. The dose $N_{30}P_{60}K_{60}$ was favorable for increases of protein contain, lipids and saccharose in seeds. It is found, that nitric nutrition in doses higher than $N_{120}P_{60}K_{60}$ is ineffective and inadvisable for Ukrainian Polissya conditions.*

INTRODUCTION

The increases of the productivity of agricultural plants bind to the improvement of mineral nutrition, and intensification of agriculture with application of high doses of fertilizers. Modern ecological approaches require the knowledges of biochemical features of vital functions of cultures in the agricultural conditions taking into account its possible di- or eustress influencing, and intercommunications between a taking and transformation of nutrition elements in plants [3]. Optimization of plant growing by the balanced use of nitric and sulphuric fertilizers is actual question, as metabolism of nitrogen and sulphur in plants is closely associated by synthesis and accumulation of proteins [1]. That is why the purpose of this work was to ground ecological expedience of the use of nitric and sulphuric fertilizers for improvement of quality of Soya bean seed (*Glycine max* (L.) Merr., cultivar Ustya) in the conditions of Ukrainian Polissya.

MATERIALS AND METHODS

The object of study was soya plant (*Glycine max* (L.) Merr.) cultivar Ustya. Field experiment was conducted at a research center of National agriculture university. Soil

– sod-podzol, humus content – 4,3%, nitrogen content – 0,27-0,31%, phosphorus content – 0,15-0,25%, potassium content – 2,3-2,5%. Sulphuric fertilizers were conducted in the dose of 50 kg/ha ($N_{80}P_{60}K_{80}S_{50}$). Control variant - $N_{80}P_{60}K_{80}$. The doses of nitric fertilizers bringing varied and was: $N_{30}P_{60}K_{60}$, $N_{60}P_{60}K_{60}$, $N_{120}P_{60}K_{60}$, $N_{180}P_{60}K_{60}$. Control variant – without fertilizers. For the characteristic of biochemical features of soya seeds the total content of protein, saccharose and lipids have been defined [4]. Electrophoresis of protein fractions was conducted by technique of Laemmli [2].

RESULTS AND DISCUSSIONS

The results of the research of sulphuric fertilizers use showed the changes of quality composition of Soya seeds. At the analysis of protein content was found out its increasing on 5,2%. During conducting of electrophoresis analysis of total protein of Soya bean seeds, 17 components were found in a control variant (Fig. 1a.).

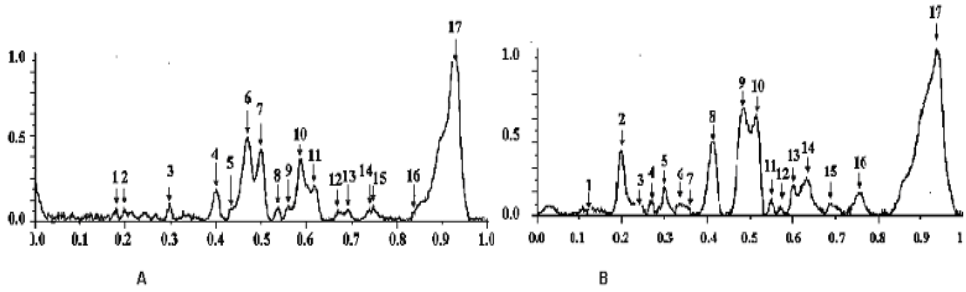

Fig. 1. Electrophoresis of protein of Soya seeds in normal conditions (A) and after treatment with sulfuric fertilizers (B).

The presence of unidentified, but characteristic for all Soya cultivars component with Rf 0,17 was fixed. Component with Rf 0,9 was identified in acidic and alkaline legumin fraction. Also absence of area with Rf 0,53 in acidic legumin fraction was defined.

The intensity of unidentified component with Rf 0,17 was raised in seeds after treatment plants by sulphuric fertilizers (Fig. 1b.). Besides, redistribution in legumin fraction was observed. Growth of intensity of areas with Rf 0,43, 0,48 and 0,51, which are identified as acidic legumins and presence of permanent component with Rf 0,90 were found out. Contents of lipids and saccharose did not change in seed.

Bringing of nitric fertilizers in the dose $N_{30}P_{60}K_{60}$ was also favorable for rising of total content of proteins in the Soya bean seed (Fig. 2.).

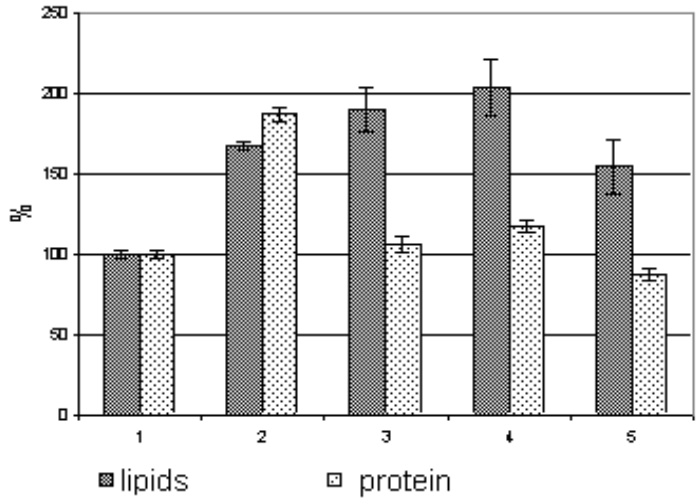

Fig. 2. Content of lipids and protein in Soya bean seeds in different conditions of nitrogen nutrition (1 – without fertilizer, 2 – $N_{30}P_{60}K_{60}$, 3 – $N_{60}P_{60}K_{60}$, 4 – $N_{120}P_{60}K_{60}$, 5 – $N_{180}P_{60}K_{60}$).

17 components of protein fraction were set by electrophoresis analysis (Fig. 3 A, B.). Increase of protein fraction with Rf 0,56 was dose–depentent (for variants $N_{30}P_{60}K_{60}$ – $N_{120}P_{60}K_{60}$). This fraction was identified as acidic legumins. However, in the $N_{180}P_{60}K_{60}$ variant intensity of this fraction comparatively to other variants was the lowest. That showed up in multiplying a peak height only on 19% (Fig. 3 B).

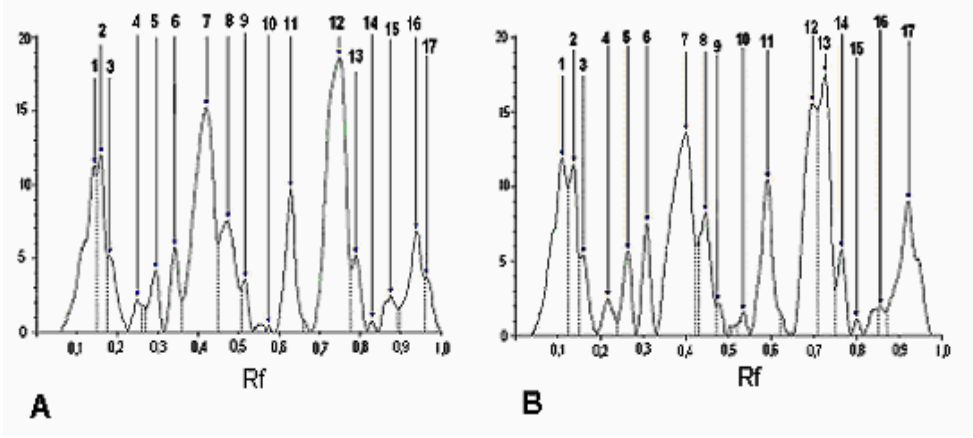

Fig. 3. Electrophoresis of protein of Soya seeds in normal conditions (A) and after treatment with nitrogen fertilizer $N_{120}P_{60}K_{60}$ (B).

The content of lipids was increased twice in the $N_{120}P_{60}K_{60}$ variant, then this index in the $N_{180}P_{60}K_{60}$ variant declined to 56,3% (Fig. 2.). The content of saccharose in Soya seeds at the $N_{30}P_{60}K_{60}$ and $N_{60}P_{60}K_{60}$ conditions has raised on 74,5 and 19,2% accordingly. Only in the $N_{180}P_{60}K_{60}$ variant the reliable decline of saccharose on 30% was determined.

CONCLUSIONS

Balanced mineral fertilizers supply is necessary for forming of high-quality crop of Soya. It is set that the use of sulphuric fertilizers in an amount 50 kg/ha improves quality of Soya bean seed mainly because of raising of sulfur containing amino acids and general protein fraction. Differences in influence of doses of nitric fertilizers are found out and allowed to ground ecological expedience of their use. The dose $N_{30}P_{60}K_{60}$ was favorable for substantial increase of protein contains lipids and saccharose in seeds. It is found, that nitric nutrition in doses higher than $N_{120}P_{60}K_{60}$ is ineffective and inadvisable for Ukrainian Polissya conditions.

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STUDY CONCERNING THE BALANCE OF CALCIUM AND MAGNESIUM INTO SUBSTRATES MADE FROM RECYCLABLE ORGANIC WASTE

STUDIUL PRIVIND BILANȚUL CALCIULUI ŞI MAGNEZUILUI ÎN SUBSTRATURI DE CULTURĂ ALCĂTUITE DIN DEŞEURI ORGANICE RECICLABILE

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Abstract:*The recycling and revaluation of some organic waste (forestry compost, leaves compost, peat and marc compost) as non-polluting substrates in horticulture impose the study of their properties and agrochemical characterization in order to establish their adaptability for ornamental plants cultivation. Besides the principal nutritive elements (nitrogen, phosphorous, potassium) that are absolutely indispensable for plants growth and development, calcium and magnesium have an important role not only for plants nutrition but also for the physico-chemical proprieties of substrates such as stability, structure and base saturation. The research involved 4 substrate receipts in which the marc compost was in different proportions and the other 3 compounds (forestry compost, peat and leaves compost) in equal quantities. The substrate columns were percolated with distillated water and Coïc nutritive solution to establish the percent of calcium and magnesium dislocated, retained in substrate and leached in percolate. The results were correlated with the substrates' pH and sum of exchangeable base cations. The exchangeable forms of calcium and magnesium were extracted with ammonium acetate, $AcNH_4$, 0.5M, pH=4.65, ratio 1:3 v/v, Gäbriels and Verdonck method.*

Rezumat. *Reciclarea şi revalorificarea în agricultura a unor deşuri organice (compost forestier, pământ de frunze, turbă şi compost de tescovină) sub forma de substraturi nepoluante folosite în special în horticultură, impune studierea proprietăților şi caracterizarea lor agrochimică în vederea pretabilității lor pentru cultivarea plantelor dendrofloricole. Pe lângă elementele nutritive esențiale (azot, fosfor, potasiu), absolute indispensabile creşterii şi dezvoltării plantelor, Ca şi Mg joacă un rol important atât în nutriție cât şi în definirea unor proprietăți fizico-chimice, cum ar fi stabilitatea substratului, structura lui şi gradul de saturație în baze. Cercetările s-au efectuat la 4 rețete de substrat în care compostul de tescovină a fost introdus în cantități variabile, celelalte trei component de baza fiind participante în cantități egale. Pentru stabilirea procentuală a formelor de Ca şi Mg dizlocat, nedizlocat şi cel regăsit în percolat, substraturile au fost percolate pe coloane cu H_2O distilată şi cu soluție nutritivă Co ïc, iar datele ob ținute au fost corelate cu pH şi S_B din substraturi. Extracția formelor schimbabile de Ca şi Mg s-a efectuat prin metoda Gäbriels şi Verdonck în acetat de amoniu 0,5M, pH = 4,65 raport 1:3 v/v.*

Due to the existence of a multitude of organic and mineral compounds and the various proportions in which those can participate for a substrate, the number of recipes is very big. Because each ornamental species have specific requirements concerning the substrate proprieties, it is essential to study the substrates before to recommend them to

a culture (Van der Boon, 1982).

Substrates' physical and chemical proprieties are determinate and establish by a series of studies that contain elements of fundamental research such as: solubility, mobility, retention of some anions and cations into the substrate (Davidescu et al., 2002, Anstett, A., 1976). If these aspects were elucidated for the soils in the past century, they still remain unknown for the substrates (Carrión et al., 2005), because their study started just two decades ago, as soon as the ornamentals production was extended to containerized culture.

MATERIAL AND METHOD

The organic compounds used for the substrates variants were the following: forestry compost, leaves compost, peat and grape marc compost (waste from wine production). The proportions among components that composed the substrates are presented in table 1:

Table 1

The organic substrates formula

Variant	Components ratio			
	Forestry compost	Leaves compost	Peat	Marc compost
V1	1	1	1	0,5
V2	1	1	1	1
V3	1	1	1	2
V4	1	1	1	3

The agrochemical characterization of the components was made after the determination of pH, total soluble salts content, soluble forms of: nitrate, ammonium, phosphorous, potassium, calcium, magnesium and total forms of nitrogen, phosphorous and potassium (table 2).

Table 2

The agrochemical characteristis of the substrates variants

Variant	pH	Total soluble salts contents %	P-PO_4^{3-} ppm	N-NO_3^- ppm	N-NH_4^+ ppm	Ca^{2+} ppm	Mg^{2+} ppm	K^+ ppm	Na^+ ppm	N_{total} %	P_{total} %	K_{total} %
V1	6.55	0.45728	2.8	1175	28	1132.53	168.34	250	45	1.9834	0.320	0.70
V2	6.74	0.38080	urme	980	23	448.93	88.70	295	40	1.9928	0.325	0.65
V3	7.35	0.28704	44.20	632	37	91.82	10.60	275	23	2.1056	0.336	0.95
V4	7.89	0.16864	82.00	693	46	40.81	5.89	170	15	2.5098	0.358	1.05

The cation exchange in substrate variants was studied using the percolation on glass columns procedure (Madjar R. et al., 2007). The columns of 3 cm in diameter and 25 cm height were filled with 20 cm substrate variants (V1, V2, V3, V4) sustained by glass wool on the base of the columns. In order to establish the nutritive ions exchange, after the saturation of the substrates with distillate water, these were percolated with water or acidophil nutritive Coïc solution.

Constantly, the volume of the collected percolate solution was measured and then the percolate rate was determinate. After the percolation of water and Coïc solution, the content of the exchangeable calcium and magnesium was analyzed in the collected percolate. Also, the substrates were studied after the percolation of the solutions applied. The exchangeable calcium and magnesium forms were determinate in ammonium acetate

$AcNH_4$, 0.5 M, pH = 4.65, ratio 1/3 (Gäbriels and Verdonck, 1991).

RESULTS AND DISCUSSIONS

For a normal growing of plants, it is necessary a calcium saturation over 45% from the total exchangeable bases and over 20% Ca from the sum of exchangeable cations.

Comparing the calcium content in different types of soils (2438 ppm in typical grey soil, 4840 ppm in typical clay-illuvial chernozem soil, 3458 ppm reddish brown mollic soil, 1004 ppm typical podzol soil) with our variants of substrates, we observed a very high content of exchangeable calcium, varying between 9590.8 ppm (V3) and 14692.3 ppm (V4).

Table 3

The balance of calcium exchangeable in substrate variants

Variant	Ca, ppm				
	Exchangeable in substrate at the beginning of experiment	Exchangeable in substrate after the percolation with distillate water	In percolate water	Exchangeable in substrate after the percolation with nutritive solution Coïc	In percolate Coïc
V1	12957.80	1397	85.70	767	186.72
V2	10713.10	1530	60.19	795	99.99
V3	9590.80	1122	20.40	683	29.58
V4	14692.30	877	7.14	591	30.61

The exchangeable Ca content in substrates was comparable with the values of the typical rendzina soil (12058 ppm) and the eubazic brown mollic soil (12298 ppm). The presence of peat and grape marc compost in substrates explain their high content in calcium, considering that the typical peat moss soil can attain 22158 ppm exchangeable Ca. After the percolation of substrates with water, undislocated calcium represented 93.98% at V4 and 85.15% at V2 and in resulted percolate, the percent of calcium was very low of 0.048% (V4) and 0.66% at V1.

Table 4

Exchangeable Ca (%) dislocated, undislocated forms and Ca in percolate with distillate water leaching on recyclable organic waste columns substrate

Variant	Ca (%)			
	Exchangeable total dislocated	Exchangeable undislocated	Exchangeable in substrate after percolation	In percolate (water solution)
V1	11.44	88.55	10.78	0.660
V2	14.81	85.15	14.28	0.560
V3	11.91	88.09	11.69	0.210
V4	6.01	93.98	5.96	0.048

After the percolation with nutritive Coïc solution, undislocated calcium represented 95.76% (V4) and 91.64% (V2). The calcium percent from Coïc percolate was low, between 0.2% (V4) and 1.44% (V1).

Table 5

Exchangeable Ca (%) dislocated, undislocated forms and Ca in percolate with Coïc nutritive solution leaching on recyclable organic waste columns substrate

Variant	Ca(%)			
	Exchangeable total dislocated	Exchangeable undislocated	Exchangeable in substrate after percolation	In percolate (Coïc solution)
V1	7.36	92.63	5.91	1.44
V2	8.35	91.64	7.42	0.93
V3	7.42	92.57	7.12	0.30
V4	4.23	95.76	4.02	0.20

Table 6

The balance of magnesium exchangeable in substrate variants

Variant	Mg, ppm				
	Exchangeable in substrate at the beginning of experiment	Exchangeable in substrate after the percolation with distillate water	In percolate water	Exchangeable in substrate after the percolation with nutritive solution Coïc	In percolate Coïc
V1	475.11	519.33	13.19	244.72	45.29
V2	421.29	534.78	11.29	281.65	35.48
V3	541.82	497.98	4.01	311.84	11.64
V4	492.72	457.06	1.55	348.01	5.04

In the substrates, the content of magnesium varied between 541.82 ppm (V3) and 421.29 ppm (V2), these values being superior of some soils such as typical cambic chernozem (55.08 ppm exchangeable Mg), cambic chernozemic soil (156 ppm) or reddish brown luvic soil (201.6 ppm exchangeable Mg). The biggest saturation with Mg was remarked at substrate V4 that included two parts of grape marc compost. After the substrates percolation with water in V1 and V2, 109.30%, respectively 126.93% exchangeable Mg was founded. In substrate variant 3 and 4 the exchangeable Mg represented 91.90%, respectively 92.76% from total magnesium dislocated. With nutritive Coïc solution was dislocated at the percolation 59.70% exchangeable Mg in V3 and 75.27% exchangeable Mg in V2. From total exchangeable Mg dislocated, into the substrates were found the following percents: 51.50% atV1, 57.55% atV3, 66.85% atV2 and 70.63% atV4.

Table 7

Exchangeable Ca (%) dislocated, undislocated forms and Ca in percolate with distillate water leaching on recyclable organic waste columns substrate

Variant	Mg (%)			
	Exchangeable total dislocated	Exchangeable undislocated	Exchangeable in substrate after percolation	In percolate (water solution)
V1	112.08	-	109.30	2.77
V2	129.61	-	126.93	2.67
V3	92.64	7.35	91.90	0.74
V4	93.07	6.92	92.76	0.31

Table 8

Exchangeable Ca (%) dislocated, undislocated forms and Ca in percolate with Coïc nutritive solution leaching on recyclable organic waste columns substrate

Variant	Mg (%)			
	Exchangeable total dislocated	Exchangeable undislocated	Exchangeable in substrate after percolation	In percolate (Coïc solution)
V1	61.04	38.96	51.50	9.53
V2	75.27	24.73	66.85	8.42
V3	59.70	40.30	57.55	0.30
V4	7.65	28.35	70.63	1.02

Table 9

Sum of Exchangeable Bases (SB) Σ (Na, K, Ca, Mg), me/100 g substrate

Variant	Na me/100g substrate	K me/100g substrate	Ca me/100g substrate	Mg me/100g substrate	Σ(Na,K, Ca,Mg)= SB me/100g substrate	pH
V1	0.136	4.487	64.65	3.89	73.163	6.55
V2	0.130	5.064	53.45	3.45	62.094	6.74
V3	0.141	9.487	47.85	4.44	61.918	7.35
V4	0.152	10.064	73.31	4.03	87.550	7.89

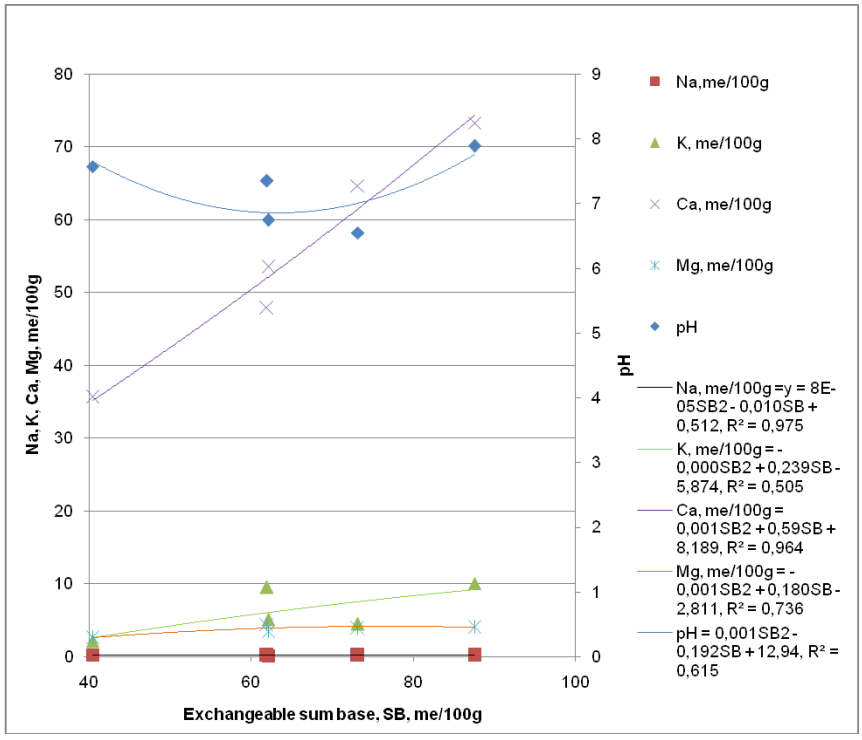

Fig.1 - Correlation between exchangeable sum base SB (me/100g) and Na, K, Ca, Mg and pH

Table 10

The percent of monovalent (Na + K) and bivalent (Ca + Mg) ions from the sum of the exchangeable bases in substrates

Variant	Σ (Na,K, Ca,Mg)	% (Na + K)	% (Ca+Mg)
V1	73.163	6.31	93.68
V2	62.094	8.36	91.63
V3	61.918	15.54	84.45
V4	87.550	11.66	88.33

Correlation between SB, the content in exchangeable cations and substrate pH (fig. 1) indicate that only in the case of Na and Ca the correlation is distinct significant in experimental substrate variants.

CONCLUSIONS

The retention and extraction on substrate was different for the studied ions.

Higher quantities of P, K, Mg and Na in percolate were found in the case of nutritive Coïc solution substrate percolation.

Calcium was retained better by the organic components of the substrates; the undislocated Ca was found of 78.65% after water percolation and 89.10% after nutritive Coïc solution percolation.

Lab simulation of irrigation (water percolation) conducted us to the conclusion that in container plant culture leaching phenomena of nutrients comes out after frequently watering of plants.

Lab simulation of fertilizations with nutritive solution determine different reactions of the ions in the substrate, phenomena which have to be considered in containerized plant technology where the nutrients supply must be correlated with species requirements.

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THE EFFECT OF FERTILIZATION ON THE MINERALS CONTENTS IN TOMATOES

EFECTUL FERTILIZĂRII ASUPRA CONȚINUTULUI DE MINERALE DIN TOMATE

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Abstract: *In this paper was analyzed the macroelements (Na, K, Ca, Mg) and microelements (Fe, Mn, Cu, Zn, Ni, Pb) accumulated in tomatoes cultivated in field, in Romanian west area, after NPK fertilization. The experience was done in a cambric curiosum soil, with low acidity reaction and the high natural fertility potential favorable vegetables cultivation. The study was performed on control soil samples (without fertilizers) and soil samples after differentiated NPK fertilization in variable dozes: $N_{30}P_{30}K_{30}$, $N_{45}P_{45}K_{45}$, $N_{60}P_{60}K_{60}$, $N_{120}P_{60}K_{60}$. A field experiment was using tomatoes samples in different precocity steady: early (Export II) and middle tardy (Ace Royal). Na and K were determinate by atomic emission spectroscopy; Ca, Mg and microelements by atomic absorption spectroscopy. The highest values were observed for K, Mg, Ca, Na. The mineral fertilization doses and the precocity steady of tomatoes influence the content of minerals in tomatoes fruit.*

Rezumat: ***I****n aceasta lucrare s-a urmarit determinarea continutul de macroelemente (Na, K, Ca, Mg) si microelemente (Fe, Mn, Cu, Zn, Ni, Pb) acumulate in fructele de tomate cultivate in conditii de camp, in zona de vest a tarii, in urma aplicarii îngrasamintelor minerale. Tipul de sol pe care s-a amplasat experienta este un cernoziom cambic, sol cu reactie usor acida, cu un bun potential de fertilitate favorabil culturii legumicole. Cercetarile s-au efectuat pe un sol nefertilizat, precum si in conditii de fertilizare diferentiala cu NPK in urmatoarele doze: $N_{30}P_{30}K_{30}$, $N_{45}P_{45}K_{45}$, $N_{60}P_{60}K_{60}$, $N_{120}P_{60}K_{60}$. Ca material de cercetare s-au folosit soiuri de tomate in diferite stadii de precocitate: timpuriu (Export II) si semitarziu (Ace Royal). Na si K au fost determinate prin spectroscopie de emisie atomica; Ca, Mg si microelementele prin spectroscopie de absorbtie atomica. K, Mg, Ca si Na reprezinta, in ordine crescatoare, cantitatea cea mai mare de macroelemente acumulate in tomate. Doza de fertilizare si stadiul de coacere al tomatelor influenteaza continutul de minerale din fruct.*

Fertilizing and liming practices influence the mineral composition of plant. Plants use nutrients in mineral form for their growth, regardless of whether the nutrients originate from organic or mineral sources. Of all plant nutrients, nitrogen is the one usually required in the highest quantities.(www.yara.com)

Nitrogen, phosphorus and potassium are considered fertilizer macronutrients because plants require them in a relatively large quantity for maximum growth and may need to be added to the soil annually. (Relf, D., 2002) The fertilizers are better used in optimum water supply condition. (Manescu, B.,2003)

Macronutrients in vegetables:

Sodium (Na) uptake from the soil is a major cause of salinity toxicity in plants, yet little is known about the mechanisms that underlie Na^+ influx.

Potassium (K) The concentration of K is vegetative tissue usually ranges from 1.0 to 4.0%. It plays an important role in the photosynthesis and food production processes within the plant, in the enzyme action of the plant, in increasing resistance to lodging and in the disease resistant mechanism of the plant. Potassium also plays an important part in the regulation of water conditions within the plant cell and loss of water from the plant by transpiration. Potassium is more closely connected with quality of the plant.

Calcium (Ca) Calcium is a constituent of the cell wall. It promotes early root development and growth and is necessary for the proper functioning of growing points, particularly root tips. It enhances uptake of NO_3-N and therefore is interrelated with metabolism. Calcium provides a base for neutralization of organic acids. Its concentration in plant ranges from 0.2 to 1.0%.

Magnesium (Mg) It is an important constituent of the chlorophyll molecule and is, therefore, essential for proper photosynthesis. It is associated with transfer reactions involving phosphate reactive groups, and is particularly important in the formation of seeds rich in oil. It helps in the translocation of starches and also regulates uptake of other nutrients. Magnesium activates many enzyme systems involved in carbohydrate metabolism and synthesis of nucleic acids. Its concentration in crops varies between 0.1 and 0.4%.

Micronutrients in vegetables:

Zinc (Zn) It is associated with iron and manganese in the formation of chlorophyll. It is involved in several enzyme systems and plays a role in nucleic acid and protein synthesis. Zinc is required in the synthesis of auxins from the amino acid tryptophan, the compound that regulate the plant's growth rate and development. It assists the utilization of phosphorus and nitrogen in plants. It also plays a regulatory role in the intake and efficient use of water by plants. Normal range in plants is 25 to 150 parts per million (ppm).

Copper (Cu) Copper is involved in chlorophyll formation and is a part of several important enzymes such as cytochrome oxidase ascorbic acid oxidase, lactase and phenolase. It participates in lignine formation, protein and carbohydrate metabolism and is possibly required for symbiotic N fixation. It promotes formation of vitamin A in plants. Normal concentration in plant tissue ranges from 5 to 25 ppm (parts per million).

Iron (Fe) Though not a constituent of chlorophyll, iron is essential for its formation. It is an essential component of many enzymes. Iron also enters into oxidation processes that releases energy from sugars and starches and reactions that convert nitrate to ammonium in the plant. It plays an essential role in nucleic

acid metabolism. The sufficiency range of iron (Fe) in plant tissue is normally between 50 and 250 ppm. Iron deficiency is likely to occur when Fe contents are 50 ppm or less in the dry matter.

Manganese (Mn) It acts as a catalyst in several enzymatic and physiological reactions in plants and is a constituent of pyruvate carboxylase. It activates enzymes concerned with the metabolism of nitrogen and synthesis of chlorophyll. Manganese is also involved in the plant's respiratory processes. Normal concentration in plants typically ranges from 20 to 500 ppm. (http://engro.pakissan.com)

Nickel (Ni) Small nickel particles in the air settle to the ground or are taken out of the air in rain. Much of the nickel in the environment is found with soil and sediments because nickel attaches to particles that contain iron or manganese, which are often present in soil and sediments.

Lead (Pb) In general, plants do not absorb or accumulate lead. However, in soils testing high in lead, it is possible for some lead to be taken up. Higher concentrations are more likely to be found in leafy vegetables and on the surface of root. Since plants do not take up large quantities of soil lead, the lead levels in soil considered safe for plants will be much higher than soil lead levels where eating of soil is a concern. Generally, it has been considered safe to use garden produce grown in soils with total lead levels less than 300 ppm. The risk of lead poisoning through the food chain increases as the soil lead level rises above this concentration. Even at soil levels above 300 ppm, most of the risk is from lead contaminated soil or dust deposits on the plants rather than from uptake of lead by the plant. (Rosen, C., 2002)

Growing conditions are important for plants to absorb trace minerals. Potassium has a positive effect on keeping quality of tomato and additionally on taste of tomatoes. The uptake of K by fruit crops change rapidly and increase strongly during fruit development, together with a dramatic decrease in calcium uptake.Especially long term vegetable crop like tomato absorb such high quantities of minerals that it is impossible to supply these quantities as base dressind with fertilzers, because the osmotic pressure in the soil solution would increase to detrimental levels. (Voogt, W., 1981) For tomato a significant fraction of the absorbed K is partitioned to fruit. For K, the fractionis even higher than is for the total dry matter. However, the fraction of Ca in fruits is dramaticaly lower compared to K. The transition from vegetative to generative development will therefore cause a change in K/Ca ratio in the uptake. In addition, this effect is probably intensified by the fact that during the period of increased fruit load, the Ca uptake is reduced by the restricted root growth. (Noordwijk M.van, 1990) Ca is the dominant cation in the exchange complex of normal agricultural soils, its rate of movement into the plant is relatively slow in comparison with that of K. When this occurs, the absorbtion of Ca, Mg and Na is correspondind reduced. This may be to the disadvantage of the consuming animal and to man. (Bear,F.E., 1991)

Tomatoes contents 10 mg calcium, 237 mg potassium and 5 mg sodium per 100 g fresh matter (http://dieta.romedic) and after all authors the content ist 31.9 mg calcium, 396.7 mg potassium and 11.4 mg sodium per 100 g fresh matter. (http://www.freedomyou.com)

MATERIAL AND METHOD

Field experiments: The experience was done in a cambic cernosium soil, with low acidity reaction and the high natural fertility potential favorable vegetables cultivation. Fertilization was control (without fertilizers) and mineral fertilizers (NPK) in variable doses: $N_{30}P_{30}K_{30}$, $N_{45}P_{45}K_{45}$, $N_{60}P_{60}K_{60}$, $N_{120}P_{60}K_{60}$. The fertilization doses and the application methods in tomatoes fertilization were to determine in correlations between agro chemistry factors. in different precocity steady: early (Export II) and middle tardy (Ace Royal).

Tomatoes samples were collected on June-July (varieties Export II) and August (Ace Royal). Tomatoes fruit were collected at thoroughly fruit maturity.

Minerals determination: 20 g fresh tomatoes were dried at 105^0C to 3 hours, calcinated at 650^0C for 3 hours; added 10 mL HNO_3 0.5N solution and to run dry. The mineral residue were solubility in 25 mL HNO_3 0.5N. (MAIA, 1983) For all macronutrients determination were using diluted samples of 1:100 in deionized water and for iron, manganese, cooper and zinc using diluted samples of 1:10. Nickel and lead were using work solution. Determination of Na and K were determinate by atomic emission spectroscopy and Ca and Mg by atomic absorption spectroscopy using Continuum Source Atomic Absorption Spectrometer contrAA®300 by Analytik Jena. Using standard work conditions - flame type: C_2H_2/air; flame height: 6mm; air flow: 568 L/h; acetylene flow: 80 L/h for Ca determination, 70 L/h for Mg, 60 L/h for Fe, 50 L/h for the other minerals. The wavelength dominate (λ) for each chemical elements: Na – λ= 588 nm, Na – λ= 588 nm, K – λ= 766 nm, Ca – λ= 422 nm, Mg – λ= 285 nm, Fe – λ= 248 nm, Mn – λ= 279 nm, Cu – λ= 324 nm, Zn – λ= 213 nm, Ni – λ= 232 nm, Pb – λ= 217 nm. The correlation coefficient for the calibration curves (r^2) its: Na - 0.9962, K – 0.9972, Ca – 0.9949, Mg – 0.9263, Cu – 0.9942, Zn – 0.9873, Mn – 0.9959, Fe – 0.9988, Pb – 0.9975, Ni – 0.9952.

RESULTS AND DISCUSSIONS

In table 1 and 2 was presented macronutrients and micronutrients in tomatoes.

Table1.

Macronutrients in tomatoes varieties

Tomatoes varieties	Fertilization doses	Na [ppm]	K [ppm]	Ca [ppm]	Mg [ppm]
Export II	Control	68.80	1291.00	72.50	12.50
	$N_{30}P_{30}K_{30}$	38.80	1247.00	123.75	80.00
	$N_{45}P_{45}K_{45}$	46.20	1110.00	52.50	52.50
	$N_{60}P_{60}K_{60}$	21.20	1102.00	237.50	87.50
	$N_{120}P_{60}K_{60}$	18.75	945.00	72.50	72.50
Ace Royal	Control	62.50	975.00	57.50	12.50
	$N_{30}P_{30}K_{30}$	13.70	922.50	86.25	62.50
	$N_{45}P_{45}K_{45}$	27.50	836.20	172.50	31.25
	$N_{60}P_{60}K_{60}$	20.00	720.00	235.50	91.25
	$N_{120}P_{60}K_{60}$	37.50	590.00	95.00	16.25

The highest content of K is observed in control samples in two tomatoes sorts (1291.00 ppm for Export II and 975.00 ppm for Ace Royal) and decreased upon a time uptake fertilization doses.

Na content were higher in control samples for two tomatoes samples (68.80 ppm for Export II and 62.50 ppm Ace Royal). Lowest sodium content was observed in early precocity steady sorts (18.75 ppm) a $N_{120}P_{60}K_{60}$ and in middle tardy varieties

Ca and Mg content was lowest in two sorts in control samples (12.50 ppm Mg, 72.50 ppm Ca in Export II and 57.50 ppm Ca in Ace Royal). The highest calcium accumulation content is observed in Export II (237.50 ppm) and in Ace Royal (235.50 ppm) by $N_{60}P_{60}K_{60}$ fertilization doses. Magnessium highest values is observed in Export II (87,50 ppm) and in Ace Royal (91.25 ppm) a that fertilization doses.

Table 2.

Micronutrients in tomatoes varieties

Tomatoes varieties	Fertilization doses	Fe [ppm]	Mn [ppm]	Cu [ppm]	Zn [ppm]	Ni [ppm]	Pb [ppm]
Export II	Control	3.55	0.28	0.46	1.08	0.09	0
	$N_{30}P_{30}K_{30}$	4.14	0.46	0.64	1.39	0.09	0
	$N_{45}P_{45}K_{45}$	3.58	0.52	0.65	1.01	0.08	0
	$N_{60}P_{60}K_{60}$	4.98	0.56	0.64	1.36	0.08	0
	$N_{120}P_{60}K_{60}$	4.43	0.49	0.91	2.55	0.09	0
Ace Royal	Control	6.26	0.29	0.79	1.08	0.09	0
	$N_{30}P_{30}K_{30}$	5.10	0.59	1.09	0.85	0.07	0
	$N_{45}P_{45}K_{45}$	4.90	0.49	0.77	0.86	0.07	0
	$N_{60}P_{60}K_{60}$	3.85	0.35	0.75	0.69	0.08	0
	$N_{120}P_{60}K_{60}$	4.46	0.48	1.24	1.09	0.07	0

Fe has the highest content in Export II by $N_{60}P_{60}K_{60}$ fertilization doses (4.98 ppm) and for Ace Royal – 6.26 ppm in control samples. The lowest content in Fe was observed a control samples for Export II (3.55 ppm) and in $N_{60}P_{60}K_{60}$ fertilization doses for Ace Royal (3.85 ppm).

Mn accumulation is observed a $N_{60}P_{60}K_{60}$ (0.56 ppm) for Export II and a $N_{30}P_{30}K_{30}$ for Ace Royal (0.59 ppm). In control samples Mn values is very low (0.28 ppm for Export II and 0.29 ppm for Ace Royal).

The highest content in Cu and Zn was identified in two tomatoes sorts a $N_{120}P_{60}K_{60}$ fertilization doses. Because in high concentration these two metals are possible toxic, the contents in vegetable are limited. Maximum limits accept in Romanian legislation for heavy metals: Cu-5.0 mg/kg fresh matter, Zn – 1.0mg/kg, Pb -0.5 mg/kg. (Ordinance 975/1998).

Ni is present only in trace at 0.07-0.09 ppm; no observed differences between fertilization doses and tomatoes precocity steady.

Pb is not present in tomatoes fruit.

CONCLUSIONS

The highest values were observed for K, Ca, Na, Mg. The high mineral content K, Ca, Na are benefic mineral was identified in control samples.

Precocity steady influence upside down Fe accumulation in tomatoes.

The mineral fertilization doses influence the mineral content in tomatoes fruit and precocity steady not.

This area is favorable to tomatoes products with highest macronutrients contents.

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INFLUENCE OF LEAF AND MINERAL FERTILIZATION ON QUANTITATIVE AND QUALITATIVE PRODUCTION OF GRAPE VINE IN THE COPOU IAŞI VINEYARD SPECIFICS CONDITIONS

INFLUENȚA FERTILIZĂRII FOLIARE ŞI MINERALE ASUPRA PRODUCȚIEI CANTITATIVE ŞI CALITATIVE A VIȚEI-DE-VIE ÎN CONDIȚIILE SPECIFICE PODGORIEI COPOU – IAŞI

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Abstract. *Reguardind the fact that grape prezents a good ecological malleability, beeing plant in the moast variate conditions of climate and soil, alongside the others tehnological links, fertilization it impose as necessary to obtaine a big and qualitative productions, as well as making longer the plantation time life. With a view to satisfy the nourishment demands of the grapevine, plant known as a big consumer of nutritive element, busides the mineral fertilization, an important role owns the leaf fertilization with positive implications over the grape production. In this paper it is followed the application eficiency of foliar fertilization on two agrofunds: $N_0P_0K_0$ and $N_{50}P_{25}K_{90}$ (ecological doses) with a view to obtain some quantitative and qualitative productions and that has a role to protect the environment. In this purpose they're were used seven leaf fertilizers, from which five chemical: F_{221}, Folvifer, Fertcomplex C, Kristalon green, Poly-Feed and two biological: Maxiroot şi Biostar, applied on these two agrofunds, that contributed toincreaset and improve the quality characteristics of the grape productions.*

Rezumat. *Având în vedere faptul că vița de vie prezintă o mare plasticitate ecologică, fiind plantată în condiții de climă şi sol dintre cele mai variate, alături de celelalte verigi tehnologice, fertilizarea se impune ca necesară în obținerea unor producții cantitative şi calitative, precum şi în vederea măririi duratei de viață a plantației. În vederea satisfacerii cerințelor de hrană a viței-de-vie, plantă mare consumatoare de elemente nutritive, pe lângă fertilizarea minerală, un rol important îl deține şi fertilizarea foliară cu implicații pozitive asupra producției de struguri. În această lucrare se urmăreşte eficiența aplicării îngrăşămintelor foliare pe două agrofonduri: $N_0P_0K_0$ şi $N_{50}P_{25}K_{90}$ (doze ecologice) în vederea obținerii unor producții cantitative şi calitative şi cu rol în protejarea mediului ambiant. În acest scop s-au folosit şapte îngrăşăminte foliare, din care cinci chimice: F_{221}, Folvifer, Fertcomplex C, Kristalon verde, Poly-Feed şi două biologice: Maxiroot şi Biostar, aplicate pe cele două agrofonduri, care au contribuit la creşterea şi îmbunătățirea însuşirilor de calitate a producției de struguri.*

The foliar fertilisation represents a modern and efficacious way to increase and improve the quantity and the quality of grape production. The foliar fertilizers contains suitable sources of macro- and microelements, as well as organic substances, that are actives both biological and physiological with a function of

hormones and vitamins, that determines the stimulation of photosynthesis at plants.

The fertilization on foliar way may provide important spores of harvest, without residually pollution the production and the sol, contributing the increase of the power and photosynthetic output of the foliar device.

MATERIAL AND METHODS

The studies were made at the farm Copou of S.C. VINIFRUCT S.A COPOU-IAŞI and followed the foliar fertilizers application influence on two agrofunds ($N_0P_0K_0$ and $N_{50}P_{25}K_{90}$) at grape vine about quantitative an qualitative production.

The experience organised in year 2006, is bifactorial, settled after the method of the randomized blocks.

Factor A – assortiment of extraradiculary fertilizer

a_1 – Folisof F_{221}
a_2 – Folvifer 3021
a_3 – Fertcomplex C
a_4 – Kristalon green 18:18:18 Plus
a_5 – Poly-Feed 19:19:19
a_6 – Maxiroot
a_7 – Biostar

Factor B – the doses of mineral fertilizer

b_0 – $N_0P_0K_0$ (unfertilized)
b_1 – $N_{50}P_{25}K_{90}$

As mineral fertilizer were used: complex fertilizer C 15:15:15, ammonium nitrate 34,5% and potassium sulphat 50%.

The mineral fertilization with complex fertilizer C 15:15:15 and the potassium soulphat has been realised in autumm and the ammonium nitrate has been administrated in spring, before the begining of vegetation, by spread and incorporation in the soil.

The biological matherial was represented by the race of grape Petit Sauvignon grafted on the portgraft Kober 5 BB.

The concentration recommended for leaf fertilizers are of 0,2-0,3 % for the organic ones (Maxiroot and Biostar) and content between 0,5-1 % for the chemical ones but the doses are of 2-3 l/ha for the organic leaf fertilizers and content between 7-8 l/ha fot the chemical ones.

The leaf fertilization was made in three rounds: the first fertilization -before blooming, the second after blooming and the third fertilization at ten days after the second one (2 june 2007, 23june 2007, respectively 3 july 2007).

In the time of the vegetation period were made several observation and measurments and finally was weiged the grape production and was determined the content of sugars and the total acidity of the must for each experimental variant.

RESULTS AND DISCUSSIONS

The values concerning the grape production obtained at the surface unit, the must of sugar and total acidity have as result, by eliminating the repetition, making the average on each variant (tables 1 and 2).

Comparative with the witness, the variants that have been foliar fertilized obtained increases of production included between 0,3-1,07 t/ha and the variants that were combined fertilized and that also look advantage of mineral agrofund, doubled the harvest increase. We can notice from figure 1 the most significant

Table 1

The production and the increase obtained at the race Sauvignon

Variant	Production *t/ha*	Production increase *kg/ha*	Production increase *%*
Mt	5.73	0	100
F1	6.80	1070	119
F2	6.68	950	117
F3	6.30	570	110
F4	6.50	770	113
F5	6.36	630	111
F6	6.52	790	114
F7	6.10	370	106
F1+ NPK	8.05	2320	140
F2+NPK	7.82	2090	136
F3+NPK	7.34	1610	128
F4+NPK	7.60	1870	133
F5+NPK	7.22	1490	126
F6+NPK	7.01	1280	122
F7+NPK	6.90	1070	119

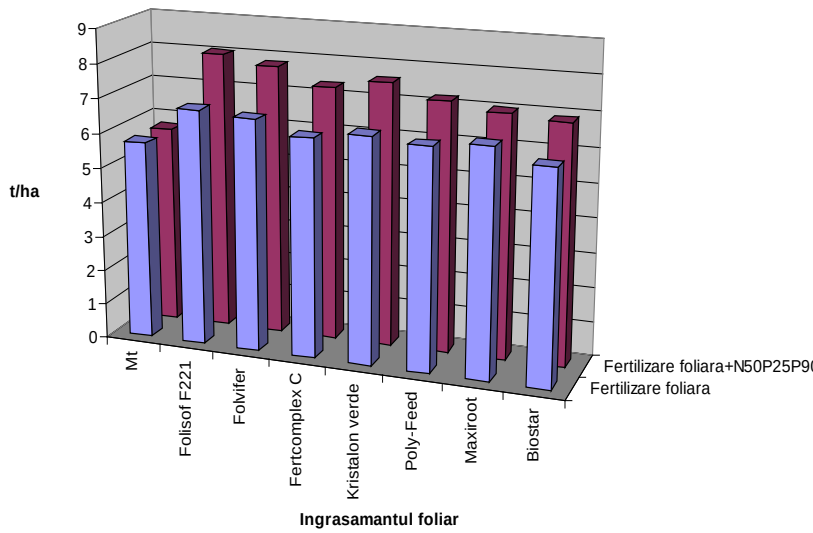

Fig. 1 – The influence of foliar and mineral fertilization over the grape vine production at the race Sauvignon

grapes production were obtained in the case of foliar fertilizers: Folisof $F_{221,}$ Folvifer and Kristalon green it benefit by radicular fertilization, respectively: 8,05 t/ha, 7,82 t/ha and 7,60 t/ha.

In the case of variants that benefited only by foliar fertilization, were obtained significant productions when it was used the assortments: Folisof $F_{221,}$ (6,8 t/ha,), Folvifer (6,68 t/ha), Maxiroot (6,52 t/ha) and Kristalon verde (6,5 t/ha).

The sugar quantities were acumulated differently inside the grapes depending on the foliar assortment applied, these having values between 170,5 - 190 g/l at the variants that were foliar fertilized and between 182,5 – 206 g/l at the variants that were combined fertilized.

The most significants acumulation of sugar were recorded at the variants combined fertilized with foliar fertilizers: Folvifer (206 g/l) Kristalon verde (205,5 g/l), Biostar (200,5 g/l), Poly-Feed (197,5 g/l).

Table 2

The sugar content and total acidity of the must at the race Sauvignon

Variant	The sugar content of must (*g/l*)	The probably alcoholical force of the must(*%vol.*)	Total acidity of the must *g/l* H_2SO_4
Mt	168.7	9.9	5.1
F1	174	10.2	4.7
F2	175	10.3	4.8
F3	190	11.2	4.9
F4	169.5	9.9	5.1
F5	193	11.3	4.4
F6	170.5	10	4.8
F7	181.5	10.7	5
F1+ NPK	186	10.9	5.5
F2+NPK	206	12.1	5.4
F3+NPK	193	11.3	4.7
F4+NPK	205.5	12.1	5.5
F5+NPK	197.5	11.6	5.4
F6+NPK	182.5	10.7	4.9
F7+NPK	200.5	11.7	4.9

From figure 2 we can notice that two of the foliar assortments and certain: Folvifer and Kristalon green favoured important acumulations of sugar (206 and 205,5 g/l) when they benefited also by radicular fertilizer comparative with the situation when these were applied on an unfertilized agrofund (175, 169,5 g/l).

The differences concerning the sugar quantities accumulated by the variants that were foliar and combined fertilized towards the witness variant are comprised between 0,8-37,3 g/l.

The probably alcoholical force gained increased once with the increase of the sugar content of the grapes. This was established with the help of the interpretation tables, based on the sugar content of the grapes and has values comprised between 9,9-12,1 %vol alcohol

The total acidity of the must, expresed in g/l H_2SO_4 is balanced, having values comprised between 4,4-5,5 g/l H_2SO_4.

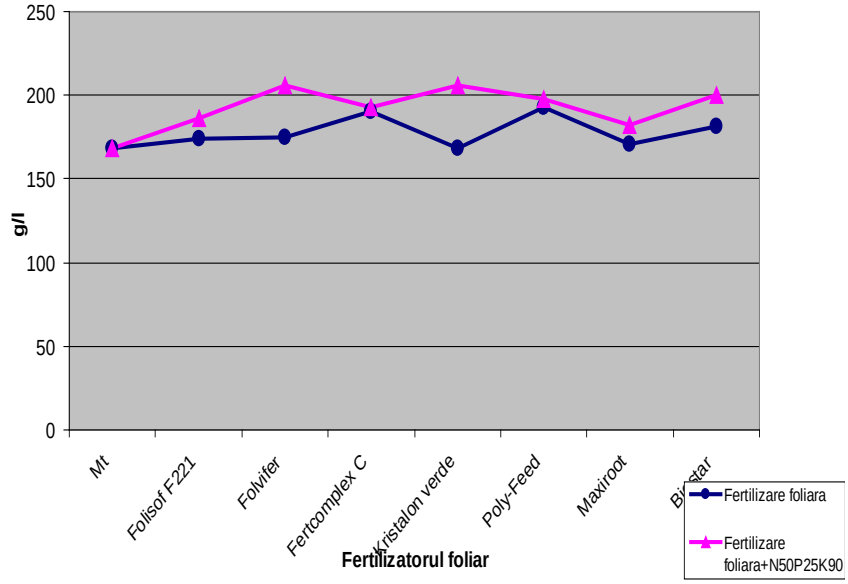

Fig. 2 – The influence of foliar and mineral fertilization over the content of sugar inside the grapes at the race Sauvignon

CONCLUSIONS

1. By applying foliar fertilizer on the two agrofunds (unfertilized and fertilized in ecological doses) was aimed the obtained of some superior quantitative and qualitative productions with the maintenance of an unpolluated environment.

2. From the obvious difference of the production increase obtained in the case of the variants that were combined fertilized comparative with these only foliar fertilized, we can take the importance of radicular fertilization in order to obtain quantitative productions.

3. The highest productions were obtained in case of the variants that were combined fertilized (mineral and foliar), these being comprised between 6,90-8,05

t grape/ha, comparative with the variants that were only foliar fertilized (6,1-6,8 t/ha).

4. The biggest increases of production were obtained at the variants that were fertilized with foliar fertilizers: Folisof F_{221}, Folvifer and green Kristalon on the agrofund mineral fertilized in ecological doses respectivly: 2,32 t/ha, 2,09 t/ha and 1,87 t/ha.

5. The sugar quantities acumulated were bigger at the variants fertilized with foliar fertilizers: Folvifer (206 g/l) Kristalon green (205,5 g/l), Biostar (200,5 g/l) and Poly-Feed (197,5 g/l) when it was also applied radicular fertilizers.

6. The differences concerning the sugar quantities acumulated by the variants that were foliar and combined fertilized towards the witness variant were comprised between 0,8-37,3 g/l.

7. The foliar and combined fertilization had a positive influence over the total acidity of the must, this remaining ballanced between 4,4-5,5 g/l H_2SO_4

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EFFICACY AND SELECTIVITY OF SOME HERBICIDES HAVING COMPLEX ACTION IN CONTROLING THE WEEDS IN THE VITICULTURAL PLANTATIONS

EFICACITATEA ŞI SELECTIVITATEA UNOR ERBICIDE CU ACŢIUNE COMPLEXÃ ÎN CONTROLUL BURUIENILOR DIN PLANTAŢIILE VITICOLE

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Abstract. *Under the row weed management in many vineyards have traditionally relied on the use of a pre-emergence herbicide application in the spring followed by an application of a post-emergence herbicide in June (or around grape bloom). Concerns over the potential for ground water contamination through the use of pre-emergence herbicides applied directly to the soil, the persistence of these herbicides in the soil and the need to increase the rates of these herbicides to achieve reliable weed management caused researchers to examine other weed management options. Research indicated that two properly timed applications of a broad spectrum, post-emergence herbicide (early June and mid-late July) could be as effective as a conventional weed management program using persistent pre-emergence herbicides.T he pre-emergent herbicides have been identified as problematic materials , present water quality problems. Regulatory and environmental issues surrounding the use of these chemicals in vineyards are going to put pressure on growers to use less of these materials. Contact-only herbicides such as glyphosate represents a technique as alternative to the use of pre-emergent herbicides in vineyards. In these experiments, the post-emergence program managed annual grasses along with annual and perennial broadleaf weeds to an acceptable level. The goal of this study was to move the results of this research into fields to determine if: 1) it fit into a growers schedule of production practices, 2) was economically feasible, and 3) any persistent weed problems would result from yearly use of a post-emergence weed management program.*

Rezumat. *Programele de combatere a buruienilor în plantaţiile viticole sunt reconsiderate, la ora actualã, în scopul reducerii sau eliminãrii erbicidelor preemergente. In multe plantaţii viticole, managementul combaterii buruienilor pe rândul de vãţ de vie se bazează pe aplicarea erbicidelor preemergente primãvara, urmatã de aplicarea unui erbicid postemergent în luna iunie. Utilizarea erbicidelor de contact de tipul glifosat reprezintã o tehnicã alternativã la folosirea erbicidelor preemergente in plantatiile viticole. Au fost experimentate unele erbicide sistemice, aplicate în programe postemergente, în scopul managementului la un nivel acceptabil a buruienilor .Erbicidele Gramoxone, Dominator, Touchdown System 4 au asigurat controlul eficace al unor specii de buruieni anuale şi perene, mono şi dicotiledonate.*

INTRODUCTION

More and more vineyards are taking a hard look at their weed control programs with the aim of reducing herbicide use. More growers are using only post-emergent materials, thereby reducing or eliminating the use of pre-emergent materials.

Post-emergent herbicides are used for control of established weeds. There are two types: those that burn back the above-ground portion but typically do not kill the root and those that are absorbed and are translocated through the plant, killing the root as well. It is feasible to eliminate use of pre-emergent herbicides and control weeds with several well-timed post-emergent applications.

MATERIALS AND METHODS

Two vineyard blocks were used in this experiment. Each block contained two treatments: 1) the conventional weed management program and 2) the post-emergence weed management program. The vineyards were selected due to the persistent problem weeds. One vineyards had a problem managing *Setaria spp.* with the conventional program, and the other one vineyard had patchy problem areas of perennial weeds such *Convolvulus arvensis* and *Cirsium arvense (L.) Scop.*

It was applied the post-emergence herbicide Vegepron DS (diuron 165 g/l + simazine 80 g/l); the post-emergence herbicides Glyfos Bio (glyphosate 360 g/l), Dominator (glyphosate 360 g/l), Towchdown System 4 (glyphosate 360 g/l), when first weeds were10-15 centimeters in height. This typically occurred during the last week in May- the first week in June. A second application was to be made when the weed regrowth reached a height of 10-15-20 centimeters, typically in mid-July.

Weed ratings were conducted in both the conventional and post-emergence plots prior to the first post-emergent application, three weeks after the first application, and three weeks after the second application. A final evaluation was conducted in first-September prior to harvest. The assessment involved identification of weed species present and the percent of ground cover each species represented. A total percent ground cover was then determined.

RESULTS AND DISCUSSIONS

The 2004 growing season was warm (as determined by accumulated growing degree days or heat units) and received ample to excessive rainfall during the summer months and a second post-emergence herbicide application was necessary; plant growth, as determined by grape vine phenology, was consistently 2 weeks ahead of a 'normal' year. The consistently early growing season are reflected in the spray records for both these blocks. Two applications of glyphosate herbicides at the 5.0 liters /ha rate were used as the post-emergence treatments in both these blocs. Applications were made on May 22 and July 15 which missed the critical stage of weed growth (15-20 centimeters) called for in the protocol.

The results of this program are still very encouraging. Not only did we see exceptional weed management using the post-emergence program in both of the blocks, there was an example of the cost-saving possibilities of this program in some years. The reduction in the amount of active ingredient applied directly to the soil is also very encouraging.

Table 1

Comparisons of Weed Species and % Cover in Conventional and Postemergence Vineyard Weed Management Programs.

Weed Species	2003		2004	
	Conv [c]	Post [p]	Conv [c]	Post [p]
Digitaria sanguinalis (l.) Scop.	0.2*	0	9.7	0.6
Senecio vulgaris L.	0	0	5.8	0.2
Setaria spp.	0	0	2.6	0.2
Taraxacum officinale Weber	0.7	0.6	2.1	0.6
Daucus carrota L.	0.9	0.2	1.8	0
Plantago maior L.	0.1	0.1	1.5	0.4
Abutilon theophrasti L.	0	0	0.7	0.1
Festuca spp.	0	0	0.6	0
Echinochloa crus-galli	0	0	0.5	0.5
Amaranthus spp.	0.1	0.1	0.4	0
Solanum nigrum L.	0	0	0.3	0
Plantago lanceolata L.	0.1	0	0.3	0
Polygonum spp.	0.1	0	0.1	0.3
Stellaria media L. Vill	0.3	0.2	0.2	1
Poa annua L.	0	0.1	0	0.8
Sorghum halepense (L.)Pers.	0.1	0.2	0	0
Sonchus arvensis L.	0.1	0	0	0
Convolvulus arvensis L.	1.9	2.0	0	0
Total Weed Cover	**4.60**	**3.50**	**26.60**	**4.70**

* Percent ground cover calculated over entire treatment block. Conventional Program[c] Post Emergence Program[p]

There are several ways to evaluate the use of pesticides in vineyards. One common method is to examine the amount of active ingredient applied for the total pesticide program. The postemergence weed management program greatly reduced the amount of active ingredients applied to vineyards in the experiment. The total amount of active ingredient applied due to herbicide use was 20% lower with the postemergence program when compared with the growers traditional herbicide program (3.25 kg. a.i. ./ha sprayed vs. 4.0 kg. a.i. a.i./acre sprayed).

Table 2

Comparison of Herbicide Rates of a Conventional and Postemergence Herbicide Program in Valea Cãlugãreascã

Treatment	Date	Herbicide	Rate
2003 Conventional	March 6	Vegepron DS	6.0 L/ha*
	June 16	Glyfos Byo	5.0 L/ha
	August 25	Dominator	2.0 L/ha (spots)
2003 Postemergence	June 5	Dominator	5.0 L/ha
	July 25	Dominator	4.0 L/ha
2004 Conventional	March 11	Vegepron DS	6.0 L/ha
	June 14	Dominator	5.0 L/ha
	August 9	Dominator	2.0 L/ha (spots)
2004 Postemergence	May 21	Dominator	5.0 L/ha
	July 15	Touchdown System 4	5.0 L/ha

* Per hertar sprayed

It is important to realize that that the term, per hectar sprayed, is used due to herbicide applications being made only to the herbicide strip under the vine. The total area covered by the herbicide strip, in a particular hectar, will vary due to width of the strip and the distance between rows. In general, a grower in the Dealu Mare region will cover 2.5 to 3 hectars of vineyard before applying herbicide to an area equal to an actual hectar of land.

CONCLUSIONS

It is feasible to eliminate use of pre-emergent herbicides and control weeds with several well-timed post-emergent applications. Dense stands of grasses such as *Digitaria sanguinalis (L.) Scop.* and *Agropyron repens (L.) P.B.* are particularly hard to control post-emergent.

Glifosate provided excellent management of foxtail and velvetleaf

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ENZYME ACTIVITIES IN TECHNOGENIC SOIL RESULTING FROM THE RECULTIVATION OF THE BAUXITE MINE FROM PĂDUREA CRAIULUI (ROMANIA)

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Abstract*. Actual and potential dehydrogenase, catalase, urease, acid and alkaline phosphatase activities and nonenzymatic catalytic activities were determined in the 0–10, 10–20, 20–30 and 30–40 cm layers of the soil from bauxite mine spoils (Pădurea Craiului Mountains) submitted to biological recultivation. It was found that each activity decreased with increasing sampling depth. In the recultivated soil, higher enzymatic activities were recorded than in the native soil. Both of them were less enzyme-active than the forest soil. Soil enzyme activities were strongly intercorrelated whereas the nonenzymatic catalytic activity was weakly correlated with enzymatic activities.*

Rezumat. *Activităţile enzimatice (dehidrogenazică actuală şi potenţială, catalazică, ureazică, fosfatazică acidă şi alcalină) şi activitatea catalitică neenzimatică au fost determinate la patru adâncimi: 0-10, 10-20, 20-30, 30-40, întrun sol dintr-o mină de bauxită din Munţii Pădurea Craiului supus recultivării biologice. Activităţile enzimatice şi neenzimatică studiate au scăzut cu adâncimea. S-a constatat că activităţile enzimatice au fost mai ridicate în solul recultivat comparativ cu solul nativ dar mai mici decât în solul de pădure. S-au putut stabili corelaţii pozitive între activităţile enzimatice studiate.*

INTRODUCTION

Technogenic soils are soils that form during the technical and biological recultivation of overburdens, tailings and other spoils and wastes resulting from mining and other industrial activities. At the same time, all these wastes constitute a dangerous source of environmental pollution (Harris et.al., 1989; Kiss et.al., 1991).

The evolution of technogenic soils is the process of transforming all these wastes into agricultural or forest soils or into soils used for other purposes (parks etc). Simultaneously, this process is accompanied by reduction or elimination of the polluting effects of wastes on the environment (Persson, 1988).

The practical importance of this process is growing because the development of mining and other industries leads to increasing amounts of wastes and, therefore, the recultivation of wastelands becomes more and more a major economic necessity (Ross et.al., 1992).

The evolution of technogenic soils, which reflects the efficiency of recultivation, is studied using many physical, chemical and biological methods (Stroo et.al., 1985). Enzymological methods have also been applied and it has been

found that the level of enzymatic activity is a good indicator of the degree of evolution of technogenic soils.

The present paper deals with the enzymatic potential in the profiles (0–40 cm) of spoil plots in the bauxite mine from Pădurea Craiului Mountains (Romania).

MATERIAL AND METHODS

In August 2007, soil was sampled from the 0–10, 10–20, 20–30 and 30–40 cm depths of the three plots in a soil from bauxite mine spoils (Pădurea Craiului Mountains).

The soil samples were collected from native soil (P1), recultivated soil (P2) and from the nearby forest soil (P3). The recultivation with ryegrass (*Lolium multiflorum L.*) and meadow clover (*Trifolium pratense L.*) was installed in 2006.

The soil samples were allowed to air-dry, then ground and passed through a 2 mm sieve and, finally, used for enzymological analyses.

Enzymological analyses

Two enzymatic activities (actual and potential dehydrogenase) were determined according to the methods described in (Kiss et. al., 1985). Dehydrogenase activities are expressed in mg of triphenylformazan (TPF) produced from 2,3,5-triphenyltetrazolium chloride (TTC) by 10 g of soil in 24 hours.

Catalase activity has been determined using the permanganometric method. The same technique was used for the determination of nonenzymatic catalytic activity, but the soil samples have been thermically inactivated by autoclaving (Kiss et. al., 1985). Catalase and nonenzymatic catalytic activities are expressed as mg of H_2O_2 decomposed by 1g of soil in 1 hour. Urease activity is determined according to the method described in (Kiss et. al., 1989) and is expressed in mg of NH_4/100g soil/24 hours. For the determination of phosphatase activities, disodium phenylphosphate served as enzyme substrate. Two activities are measured: acid phosphatase activity in reaction mixtures to which acetate buffer (pH 5.0) was added, and alkaline phosphatase activity in reaction mixtures treated with borax buffer (pH 9.4). The buffer solutions were prepared as recommended by (Ohlinger, 1996). Phosphatase activities are expressed in mg phenol/g soil/2 hours.

The activity values were submitted to statistical evaluation by the two *t* test (Sachs, 2002) and the correlations between the enzymatic activities were determined according to the methods described in (Samuel et. al., 1999).

RESULTS AND DISCUSSIONS

Results of the enzymological analyses are presented in *Table 1*, and those of the statistical evaluation are summarised in *Table 2*.

Variation of soil enzymatic activities in dependence of sampling depth

It is evident from *Table 1* that each activity decreased with sampling depth in all plots.

Enzymological data

For enzymological evaluation of the three plots, the results obtained in the four soil layers analysed were considered together.

Significant ($p<0.05$ to $p<0.001$) and unsignificant ($p>0.05$ to $p>0.10$) differences were registered in the soil enzymatic activities depending on the kind of enzymatic activity and the type of the plot.

The difference between the two plots: native and recultivated was significant (at least at $p<0.05$), while catalase and alkaline phosphatase were unsignificantly higher ($p>0.10$ and $p>0.05$, respectively) in the recultivated soil.

One can see from *Table 2*, that the enzymatic activities were always higher in the 0 – 40 cm layer of the forest soil in comparison with the native soil. In the forest soil, the activities were significantly higher (at least at $p<0.02$), excepting alkaline phosphatase activity which was only unsignificantly higher ($p>0.05$) than in the native soil.

Comparision of plots P2 and P3 reveals that each of the six enzymatic activities determined was significantly higher (at least at $p<0.05$) in the forest than in the recultivated soil, excepting actual and potential dehydrogenase activities which were unsignificantly higher ($p>0.10$).

Statistical data

Simple correlation (r) between enzymatic activities in the 0–40 cm layer (*Table 3*) showed that soil enzyme activities were strongly intercorrelated ($r=0.434$ to $r=0.939$), whereas nonenzymatic catalytic activtity was weakly correlated ($r=0.250$ to $r=0.372$) with enzymatic activities.

CONCLUSIONS

Our results are in good agreement with the literature data (Drăgan-Bularda et.al., 1987; Fresquez et.al., 1982; Lindemann et.al., 1984) and constitute novelties for the enzymological characterisation of a soil from bauxite mine spoils.

The literature reviewed (Uzbeck, 1991; Wigfull et.al., 1987) shows that application of enzymological methods makes it possible to indicate the degree of evolution of technogenic soils, the transformation of overburdens and other spoils and wastes into agricultural and forest soils, the efficiency of the recultivation measures applied.

In comparison with microbiological parameters, the enzymes are more synthetic indicators of the evolution of technogenic soils because they reflect a) due to their accumulation in form of humic complexes, the past of technogenic soils, and b) due to their catalytic activity, which plays a key role in nutrient cycles, the present biological status of these soils.

Table 1

Enzymatic activities in soil from bauxite mine spoils (Pădurea Craiului Mountains)

Soil enzymatic activity*	Soil depth (cm)	Plots		
		Native (P1)	Recultivated (P2)	Forest (P3)
ADA	0-10	7.42	9.09	9.80
	10-20	7.00	8.12	9.08
	20-30	6.44	7.56	8.96
	30-40	3.64	6.72	6.16
ADP	0-10	9.52	11.48	14.96
	10-20	7.00	10.92	14.28
	20-30	5.60	9.80	12.43
	30-40	4.06	8.40	7.84
AC	0-10	10.85	10.90	12.60
	10-20	10.10	10.20	11.80
	20-30	9.35	9.70	11.60
	30-40	7.20	9.70	10.60
CAn	0-10	13.70	14.00	14.20
	10-20	12.30	13.50	13.90
	20-30	12.25	13.30	13.50
	30-40	11.85	12.90	13.00
UA	0-10	6.37	9.83	12.99
	10-20	5.83	7.99	10.82
	20-30	5.29	6.66	8.33
	30-40	4.79	5.99	7.99
AcPA	0-10	0.188	0.281	0.352
	10-20	0.179	0.269	0.294
	20-30	0.141	0.183	0.209
	30-40	0.125	0.150	0.195
AlkPA	0-10	0.126	0.133	0.173
	10-20	0.117	0.125	0.160
	20-30	0.098	0.105	0.155
	30-40	0.070	0.090	0.141

*ADA – Actual dehydrogenase activity.
PDA – Potential dehydrogenase activity.
CA – Catalase activity.
CAn – Nonenzymatic catalytic activity.
UA – Urease activity.
AcPA – Acid phosphatase activity.
AlkPA – Alkaline phosphatase activity.

Table 2

Significance of the differences between enzymatic and nonenzymatic catalytic activities in soil from bauxite mine spoils (Pădurea Craiului Mountains)

Area	Soil enzymatic activity*	Soil depth (cm)	Mean activity values			Significance of the differences
			a	b	a - b	
Native soil (a) versus recultivated soil (b)	ADA	0 – 40	6.12	7.87	-1.75	0.05>p>0.02
	ADP	0 – 40	6.54	10.15	-3.61	0.01>p>0.002
	AC	0 – 40	9.37	10.12	-0.75	p>0.10
	CAn	0 – 40	12.52	13.42	-0.90	0.02>p>0.01
	UA	0 – 40	5.57	7.61	-2.04	0.05>p>0.02
	AcPA	0 – 40	0.158	0.220	-0.06	0.05>p>0.02
	AlkPA	0 – 40	0.102	0.113	-0.01	0.10>p>0.05
Native soil (a) versus forest soil (b)	ADA	0 – 40	6.12	8.50	-2.38	0.0001>p
	ADP	0 – 40	6.54	12.37	-5.83	0.01>p>0.002
	AC	0 – 40	9.37	11.65	-2.28	0.02>p>0.01
	CAn	0 – 40	12.52	13.65	-1.13	0.02>p>0.01
	UA	0 – 40	5.57	10.03	-4.46	0.02>p>0.01
	AcPA	0 – 40	0.158	0.262	-0.10	0.01>p>0.002
	AlkPA	0 – 40	0.102	0.113	-0.01	0.10>p>0.05
Recultivated soil (a) versus forest soil (b)	ADA	0 – 40	7.87	8.50	-0.63	p>0.10
	ADP	0 – 40	10.15	12.37	-2.22	p>0.10
	AC	0 – 40	10.12	11.65	-1.53	0.01>p>0.002
	CAn	0 – 40	13.42	13.65	-0.23	0.05>p>0.02
	UA	0 – 40	7.61	10.03	-2.42	0.01>p>0.002
	AcPA	0 – 40	0.220	0.262	-0.04	0.05>p>0.02
	AlkPA	0 – 40	0.113	0.113	0.00	0.05>p>0.02

*ADA – Actual dehydrogenase activity.
PDA – Potential dehydrogenase activity.
CA – Catalase activity.
CAn – Nonenzymatic catalytic activity.
UA – Urease activity.
AcPA – Acid phosphatase activity.
AlkPA – Alkaline phosphatase activity.

Table 3

Simple correlations (r) between soil enzyme activities in soil from bauxite mine spoils

Variables*	ADA	PDA	CA	CAn	UA	AcPA	AlkPA
ADA	-	-	-	-	-	-	-
PDA	0.931	-	-	-	-	-	-
CA	0910	0.434	-	-	-	-	-
CAn	0.882	0.932	0.851	-	-	-	-
UA	0.814	0.902	0.842	0.372	-	-	-
AcPA	0.793	0.877	0.806	0.250	0.939	-	-
AlkPA	0.809	0.842	0.860	0.269	0.785	0.789	-

*ADA – Actual dehydrogenase activity.
PDA – Potential dehydrogenase activity.
CA – Catalase activity.
CAn – Nonenzymatic catalytic activity.
UA – Urease activity.
AcPA – Acid phosphatase activity.
AlkPA – Alkaline phosphatase activity.

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THE ISOLATION AND CHARACTERIZATION OF THE MAIN MOULD SPECIES FROM THE WINEGROWING AREA BANU MARACINE

IZOLAREA ŞI CARACTERIZAREA UNOR SPECII DE MUCEGAIURI DIN ECOTOPUL VITICOL BANU MĂRĂCINE

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Abstract. *The moulds are sapropphyte fungi with high degradation power of the substrate. These fungi agree as habitat the grape berries in different development stages, but most frequent during the maturation phase. In this phase the berry lose from the vitality and the peel become more fragile, thus under the action of rainfall or wind, many berries fall on the soil becoming an excelent developing substrate for all the microorganisms species. In the laboratory we have set an experiment for testing different composition of culture media necessary for the isolation of the mould species found in the soil samples, the control variant being the sterilized distilled water, in a sterile Petri plate, where has been inoculated mould spores.*

Rezumat. *Mucegaiurile sunt fungi saprofiți dotați cu o mare putere de degradare a substratului. Aceşti fungi agrează ca habitat boabele de struguri aflate în diferite stadii de dezvoltare, dar cel mai frecvent în cursul fazei de maturare. În această fază, bobul îşi mai pierde din vitalitatea sa şi pieliţa devine mai fragilă, astfel că în urma unor ploi sau vânturi, multe boabe de struguri cad pe sol devenind un excelent substrat de dezvoltare pentru toate speciile de microorganisme. În laborator am efectuat un experiment pentru a testa diferite compoziții a unor medii de cultură necesare izolării speciilor de mucegaiuri găsite în probele de sol, repetiția martor fiind apa distilată sterilizată simplă, pusă într-o placă Petri sterilă, în care au fost inoculați spori de mucegai.*

The research has been made at the Didactical Station Banu Maracine, and has focused on the identification of the main mould species that can affect the wine during the fermentation process. During 2007 in the winegrowing center Banu Maracine there has been collected samples from the grapes and soil. These samples has been analyzed in laboratory in order to a corect identify of the mould species.

MATERIALS AND METHODS

During 2007 in the winegrowing center Banu Maracine there has been collected samples from the grapes and soil. These samples has been analyzed in laboratory in order to a corect identify of the mould species, that can affect the wine during the fermentation process.

In the laboratory we have set an experiment for testing different composition of culture media necessary for the isolation of the mould species found in the soil

samples, the control variant being the sterilized distilled water, in a sterile Petri plate, where has been inoculated mould spores. After 16 hours of incubation at 28°C, we have observed mould hyphe developed on the plates lied oriented toward the dense area of the disttiled water condense period.

RESULTS AND DISCUSSIONS

For the isolation and purification of the moulds culture in laboratory, there has been used minimal solid medium YPD on which has been inoculated (fig. 1) the spores collected during the separation phase of the yeast cells (endogenous multiplication) or through the inoculation of the oidium article (fig.2) separated from the hyphe.

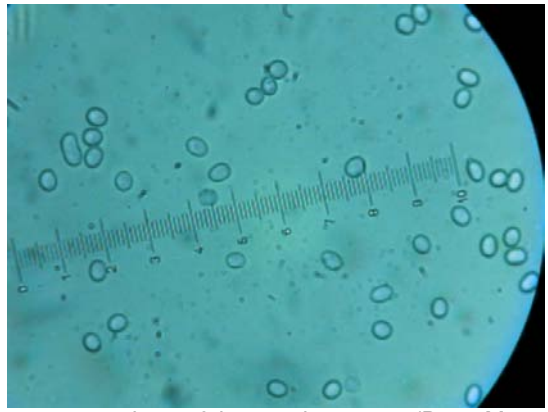

Fig. 1. Pure spores culture of the species *Mucor* (Banu Mărăcine, 2007)

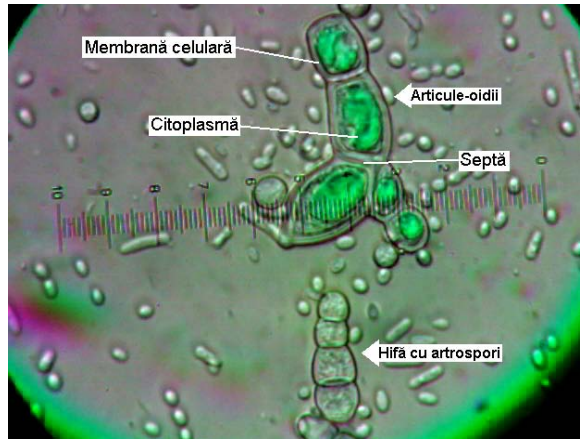

Fig. 2. Hyphe fragments collected in order to innoculate on solid medium (Banu Mărăcine, 2007)

The identification of the different mould species has been made through morphological analyze of the developed culture, focused on the distinct biological elements: the shape and dimensions of the hyphe, the shape and dimensions of the

spores, the structure of the biological multiplication elements (artrospores, blastospores, clamidospores, sterigma, etc.).

On solid medium, the species *Aspergillus* has developed colonies with white micelium which quickly become pale yellow and finally grey-black due to the maturation of the sterigma (fig. 3). The species it's recognized by the conidiophore finished with inflated vesicula on which are the phialides (sterigma) broom shape. The spores have different colours, depending on the species being produced in the long chanels at the end of philides.

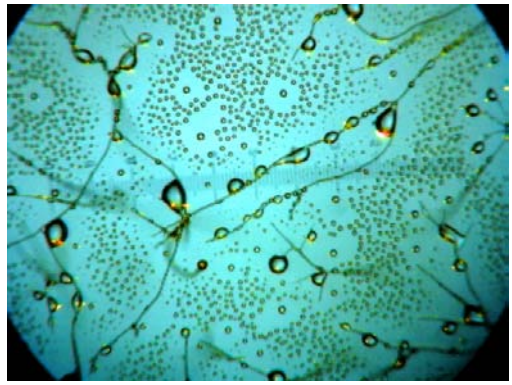

Fig. 3. Hyphe of the species *Aspergillus niger* (Banu Mărăcine, 2007)

The species *Penicillium* formed green colonies characteristic to the conidia (fig. 4). The ramificated part of the phialides, developed at one terminal of the stipes, it's the biological system on which the species can be recognized and morphological identified using a microscop. *Penicillium* can form three types of spores, produced by the ramificated system (penicyles) and are named mono-verticilated, bi-verticilated respectively tri-verticilated. It's the most spreaded species of mould in the soil of the viticultural ecosystem Banu Maracine and the most harmful for the vinification process.

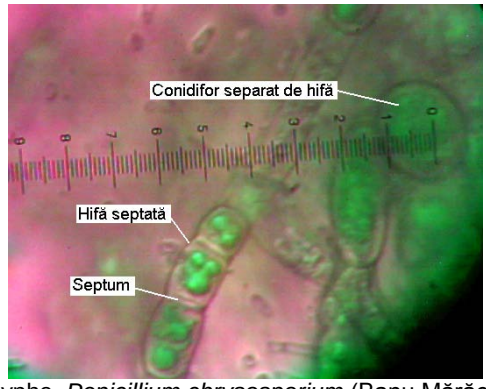

Fig. 4. Septate hyphe, *Penicillium chrysosporium* (Banu Mărăcine, 2007)

The species *Mucor* (fig. 5) develop very rapid a white micelium which become gre due to the abundence of the sporangiophores verticals, spherical, where the spores are produced.

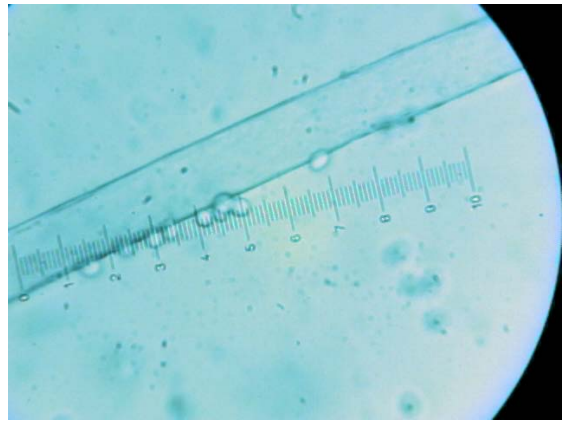

Fig. 5. Non-septate hyphe, *Mucor racemosus* (Banu Mărăcine, 2007)

CONCLUSIONS

During 2007 in the winegrowing center Banu Maracine, based on the samples collected from grapes and soil, there has been identified the follwing mould species: *Aspergillus niger, Penicillium chrysosporium, Mucor racemosus*.

From the mould species identified in the winegrowing center Banu Maracine *Penicillium chrysosporium* it's the most spreaded species of mould in the soil of the viticultural ecosystem Banu Maracine and the most harmful for the vinification process.

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"IN VITRO" TESTS OF SOME FUNGICIDES AND THE USE OF THOSE IN GRAPE VINE GRAY MOLD CONTROL

TESTAREA "IN VITRO" A UNOR FUNGICIDE ÎN VEDEREA UTILIZĂRII ACESTORA ÎN COMBATEREA PUTREGAIULUI CENUŞIU AL VIȚEI DE VIE

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Abstract. *In the laboratory experience realized in 2007, it has been tested some fungicides which are mention in literature like having efficiency in combat of Botryotinia fuckeliana (de Bary) Whetzel fungus. The experience scope, it was the identification of the most efficient substances for obtaining an optimal treatments plan applied against grape vine gray mold. The achievement of this desideratum could create favorable premises to elaborate an integrated combat system for grape vine disease.*

Rezumat. *În cadrul unei experiențe de laborator realizată în anul 2007, au fost testate o serie de fungicide citate în literatură ca având eficacitate în combaterea ciupercii Botryotinia fuckeliana (de Bary) Whetzel. Scopul realizării experienței a fost acela de a identifica cele mai eficiente substanțe în vederea optimizării schemei de tratamente, aplicate împotriva putregaiului cenuşiu al viței de vie. Realizarea acestui deziderat ar putea crea premise favorabile elaborării unui sistem de combatere integrată a bolilor la vița de vie.*

MATERIAL AND METHOD

The experience was made in 2007 and consists in testing of 10 fungicides with different active substances used in *Botryotinia fuckeliana* (de Bary) Whetzel fungus control.

We follow the fungicides effect using "the including substances method in the nutritive media (poisoned food)" (Baicu T. 1968). The substances concentration was the same with the concentration recommended to be used in the field, the tested substances being includes in the nutritive media. The nutritive media used was very favorable for the fungus development, respective PDA media.

Each test was done in Petri dishes using 3 repetitions and the fungus inoculation has been done with the sterile dowser in the center of dishes. The samples were included in incubator at 22°C being kipped for 5 days. After 3 and 5 days from inoculation it was done the measurements.

The registered values were reported to standard untreated variant. For the experiences we used Petri dishes that have the same dimensions, which surfaces have been calculated. The Petri dish surface has been calculated using the formula: $\pi R^2 = 3,14 * 5^2$. The ray (R) = 5 cm. The dish surface (S) = 78,5 cm^2

RESULTS AND DISCUSSIONS

The obtained results after 3 days from inoculation relieve some fungicides which bring under control the development of *Botryotinia fuckeliana (de Bary) Whetzel* fungus (table no. 1).

Table 1

The occupied surface of the fungus and the tested fungicides efficiency after 3 days from inoculation

Crt. no.	The fungicide	Rep.	The surface ocupied by the fungus				The fungici defficiency (%)
			cm^2	The average (cm^2)	% from dishes surface	The average (%)	
1	Teldor 500 SC	R1	0	0	0,00	**0**	**100**
		R2	0		0,00		
		R3	0		0,00		
2	Bravo 500 SC	R1	7	3,67	8,92	**4,67**	**95,33**
		R2	4		5,10		
		R3	0		0,00		
3	Sumilex 50 PU	R1	0	0	0,00	**0**	**100**
		R2	0		0,00		
		R3	0		0,00		
4	Topsin 70 PU	R1	15	14,67	19,11	18,68	81,32
		R2	10		12,74		
		R3	19		24,20		
5	Bavistin 50 DF	R1	28	26,33	35,67	33,55	66,45
		R2	27		34,39		
		R3	24		30,57		
6	Calidan	R1	0	0	0,00	**0,00**	**100**
		R2	0		0,00		
		R3	0		0,00		
7	Folpan 80 WDG	R1	10	15,67	12,74	19,96	80,04
		R2	11		14,01		
		R3	26		33,12		
8	Merpan 80 WDG	R1	21	18,67	26,75	23,78	76,22
		R2	15		19,11		
		R3	20		25,48		
9	Novozir	R1	12	13,33	15,29	16,99	83,01
		R2	22		28,03		
		R3	6		7,64		
10	Shavit F 72 WP	R1	5	11,33	6,37	14,44	85,56
		R2	14		17,83		
		R3	15		19,11		
11	Martor netratat	R1	43	38,67	54,78	49,26	50,74
		R2	34		43,31		
		R3	39		49,68		

After 5 days from inoculation the fungicides relieved after first phases (after 3 days from inoculation) confirm the efficiency maintaining under control the development of *Botryotinia fuckeliana* (de Bary*) Whetzel* fungus (table 2).

Table 2

The occupied surface of the fungus and the tested fungicides efficiency after 5 days from inoculation

Crt. no.	The fungicide	Rep.	The surface ocupied by the fungus				The fungici defficiency (%)
			cm^2	The average (cm^2)	% from dishes surface	The average (%)	
1	Teldor 500 SC	R1	0	0,00	0,00	**0,00**	**100**
		R2	0		0,00		
		R3	0		0,00		
2	Bravo 500 SC	R1	17	8,67	21,66	**11,04**	**88,96**
		R2	9		11,46		
		R3	0		0,00		
3	Sumilex 50 PU	R1	0	0,00	0,00	**0,00**	**100**
		R2	0		0,00		
		R3	0		0,00		
4	Topsin 70 PU	R1	68	69,67	86,62	88,75	11,25
		R2	67		85,35		
		R3	74		94,27		
5	Bavistin 50 DF	R1	77	77,17	98,09	98,30	1,7
		R2	78,5		100,00		
		R3	76		96,82		
6	Calidan	R1	0	0,00	0,00	**0,00**	**100**
		R2	0		0,00		
		R3	0		0,00		
7	Folpan 80 WDG	R1	59	69,33	75,16	88,32	11,68
		R2	72		91,72		
		R3	77		98,09		
8	Merpan 80 WDG	R1	76	77,17	96,82	98,30	1,7
		R2	77		98,09		
		R3	78,5		100,00		
9	Novozir	R1	78,5	76,33	100,00	97,24	2,76
		R2	78,5		100,00		
		R3	72		91,72		
10	Shavit F 72 WP	R1	16	52,67	20,38	67,09	32,91
		R2	72		91,72		
		R3	70		89,17		
11	Martor netratat	R1	78,5	78,50	100,00	100,0	0
		R2	78,5		100,00		
		R3	78,5		100,00		

At the end of the experience the fungicides with the highest efficiency (100%) were: Teldor 500 SC, Sumilex 50 PU and Calidan. From the other tested fungicides excellent worker manifest the fungicide Bravo 500 SC, which presented a good efficiency after 3 days, when allow to the fungus to occupy 4,67% from the dish surface and also after 5 days when the fungus develop proportion was 11,04%.

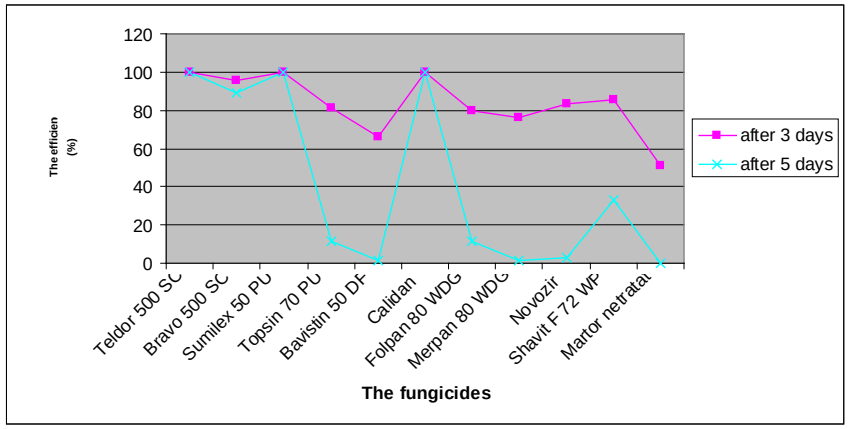

Fig. 1 – The efficiency of the tested fungicides for *Botryotinia fuckeliana* (de Bary) Whetzel fungus control.

CONCLUSIONS

At the end of the experience we can concluded:

- between all 10 fungicides tested against the pathogenic agent Botryotinia fuckeliana *(de Bary) Whetzel*, the highest efficiency (100%) was proved by the fungicides: Teldor 500 SC, Sumilex 50 PU and Calidan.

- besides of those, excellent worker manifest the fungicide Bravo 500 SC, which presented a good efficiency (88,96%), after 3 days from the inoculation.

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INTEGRATED CONTROL OF THE GRAPES GREY MOULD PRODUCED OF *BOTRYOTINIA FUCKELIANA* (OF BARY) WHETZEL, C.F. *BOTRYTIS CINEREA* PERS IN THE VINEYARDS MURFATLAR CONDITIONS

COMBATEREA INTEGRATĂ A PUTREGAIULUI CENUȚIU AL MSTRUGURILOR *BOTRYOTINIA FUCKELIANA* (OF BARY) WHETZEL, F.C. *BOTRYTIS CINEREA* IN CONDIȚIILE PODGORIEI MURFATLAR

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Abstract. *The grape grey moulds, produced by fungus Botryotinia fuckeliana (of Bary) Whetzel, c.f. Botrytis cinerea Pers., is consider beside by downy mildew and powdery milew most prejudicial complaints of vine. In favorable years, with precipitationes in excess, chiefly in second half summers, damage catch up to 70-80% from production and just besides.*

In period 2003-2007 we tried in the frame experiences of RDSVW Murfatlar, some schedules of integrated pest management control. They have demonstratet in a first row that decrease number of treatments for the grapes grey mould frecvently utilized in production, mixted (biological preparates on the strength of Trichoderma harzianum) with diverse selective chemical fungicide don't arise rezidium problem, on grapes and in wine and prevent botrytis attack.

Rezumat. *Putregaiul cenusiu al strugurilor produs de ciuperca Botryotinia fuckeliana f.c. Botrytis cinerea este considerat alaturi de mana si fainare unul dintre factorii importanti ai pierderilor de recolta la vita de vie. Astfel, ca in anii favorabili cu precipitatii in exces mai ales in cea de-a doua parte a verii dijmuirea recoltei de struguri poate ajunge pana la 70-80%.*

In perioada 2003-2007, am incercat la SCDVV Murfatlar cateva scheme de combatere integrate a acestei ciuperci pe soiul Sauvignon. Experimentarile au demonstrate in primul rand ca tratamentele antibotritice reduc frecventa atacului, iar amestecurile de preparate biologice pe baza de Trichodermma hartianum cu fungicide chimice selective nu ridica probleme de remanenta a reziduurilor pe struguri sau in vin si previn in mod evident atacul.

MATERIAL AND METHOD

Field tests.For the realization of some result regarding integrated control of grapes grey mould at RDSVV Murfatlar, during 2003-2007 observations were much on 500 grapes for each experimental variants of different research laboratory for instance – agrotechnick, agrochemistry, irrigate before grape with 1-2 days to follow evolution of botrytis attack.

The experiments were mode on Sauvignon variety. On the follow experimental variants observations were mode.

Agrotechnical – plants notes were mode regarding Botrytis attack in 4 variant: clossicat conduct on 1,5/1,2 m distances; classical conduct on 3/1,2 m distances, semiconduct on 2/1,2 m and conduct on 3/1,2 m and in the experimental variants in green workes it was notated Botrytis attack at partial leafless of 25% of leafs in the grapes area, 2 turies leafless and the ripering of variety with 2 week before harvest.

Agrochemistry – soil fertilization – was natural Botrytis attack in 4 variants: rother 50 to/ha; N/P/K – 100/100/100;N/P/K – 400/400/400; spring culture between heans with harley and for fertilization in 4 treatements with Greenzit NPK single without fitosanitary treatments.In the frame on experimental variants of irrigation, observation about grape's grey mould attack regarded 3 methodes of irrigation for instance: through ploughing, aspersion and dripping. This experimentation had also a variant for control untrateadet.

In the frame of Plant Protection laboratory, during 2002-2006 it was teasted biological action of some fungicides the chemical and biological control of grapes grey mould. Each year the experiments had also some plantes untrateated antibotrytic. In all years of the location experiements had a Sauvignon variety in randomizated placement, with 5 repetition coming each 50 blocks of each variant, on a surface of 100 mp. Plantation is was situated on the production background and is semihigh drived with distance between plantas of 2/ 1,2 m.

Treatments were executed by handwork with a pump screams Calimax with 10 liters solution/ 100 mp. The application of these treatement was mode adhibition each year at 4 phenologic standard moment: A - immediately after flowery, B - grape's chuster, C - ripporing, D – before harvesting with 2-3 week.

Date's of treatements application was: 13. 06; 02. 07; 12. 08 and 02. 09 in 2003; 19. 06; 11. 07; 01. 08 and 27. 08 in 2004; 18. 06; 07. 07; 13. 08; 03. 09 in 2005; 17. 06; 13. 07; 18. 08 and 27. 09 in 2006 and 15. 06; 18. 07; 06. 08; 17. 08 in 2007.

The grapes gray mould attack noting was in the scale 0-6 on cca. 500 grapes each variant with 1-2 days before beginning hardvest. With these dates was calculated of attack degree on each variant and obtained values stated to the interpretation of results. For a good evalue of using fungicides it was calculated through Abbott formulate the interest efficacity (E) against untratated of control in each year of experimentated.

$$E = \frac{\text{G. A.\% untratated control - G. A.\% at variant X 100}}{\text{G. A.\% at untratated control}}$$

RESULTS AND DISCUSSIONS

Control of pathogen with cultural practices.

Cultural practice represented all the tehnologies applied to the total amount to soil or plant following interrupted contact between pathogen and plant. Cultural practice contain main measures to prevent attacks of pathogen by diminuation pests and deseases population, and increasing the resistence of vine species, much as introduction of new sortes more resistences to pests and pathogen attack.

Rational nutrition of wine has a very big importance. This can determinate a better development of plants which can opposite good resistence to attack. It's also know that excessive nutrition with nitrogen can produce predispositions at attack white potassium and phosphorus can have the viceverse effect.

In modern viticulture conduct of water is very importance regarding pest and pathogen attacks. Irrational irrigation often may increase the danger of pests and diseases attacks. Cultural practice of plant, control of weeds, plantation distance and different conducting form. Green works are means through we can prevent attacks of pathogen. Cultural practice apparently complicate less concrete has the adventage to be chaper, unpoluated and without secondary effect on humans been and environment.

Observations made in Murfatlar vineyard during 2003-2007 taked in experimental variants from Sauvignon sort in parcele with untrateated plant (fig. 1) explain that the attack of grapes grey mould is bigger at classic conduct of vine with small distances between rows and also at bigger dosess of fertilizer specially with nitrogen (fig. 2), and the using of furrow and dripping irrigation (fig. 3), systems and methods witch assure in general a favorable microclimate for the deseases development.

Worthily remark, green works (fig.4) like: leafless applied in two stages until total grapes leafless at Sauvignon sort where assure a substantial reduct of the grapes grey mould in comparision with untreatated variant.

Efficacity of cultural practice on the grapes grey mould calculated through About formulate on superior valuee of 50% only in variants who assurea a good aeration and lightning of vine fruits.

Looking over the dates from figure 5 who represented efficacity in field of some fungicides in control of grapes grey mould we can established at the beginning of the experimental years that only 2004 and 2006 they acived the best attacks on Sauvignon variety in the natural condition of infection. So, at the untreateated plants in the 2004 year, the grapes grey mould had the degree of GA was 34,3% and in 2005 the degree of GA was 24%.

Regarding the fungicides efficacity these reduced siminificatively almost years the *Botrytis cinerea* attack.

Remarked at the beginning a very good efficacity up to 80% on biological fungicide Trichodex WP based on the Trichoderma harzianum at doses of only 2 kg/ ha.

Among chemical fungicide is detached Switch 62, 5 WP fungicide at the doses of only 0,6 kg/ ha realised in all the year of experimentation values of efficacity was up to 90% after the 4 standard treatment application (A, B, C, D).

Follows in order synergic mixture like: Calidan SC at 2 kg/ ha, Konker at 1,5 kg/ha and Pyrus at 1,5 kg/ha with superior efficacity value up to 80%. It maintains in the forwards a good f efficacity up 80% with fungicides with contact actions like: Rovral 50 SC at 1,0 kg/ha, Ronilan 50 DF at1,0 kg/ha and Sumilex 50 Fl at 1,0 kg/ha which improved the conditions form like as intent suspension. Produced Mythos to 3, 0 kg/ha and Teldor 500 SC at 0,8 l/ha don’t raised efficacity in all the years of experimentations more then 80%.

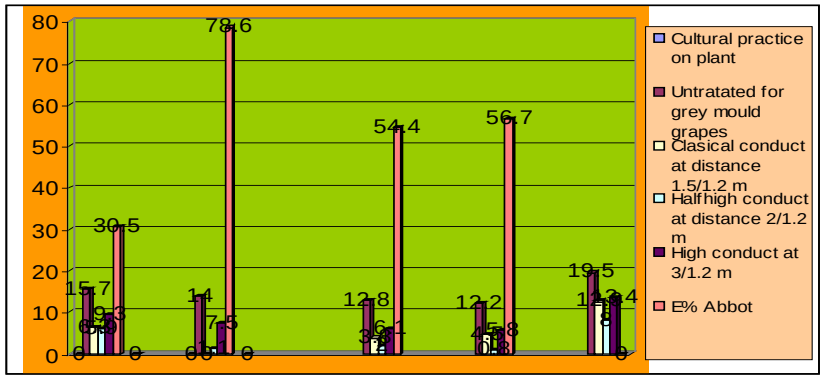

Fig. 1 - The influences of conduced forms and plantation distances about the grey mould grapes attacks in Murfatlar vineyard, in untreatated parceles, on Sauvignon variety

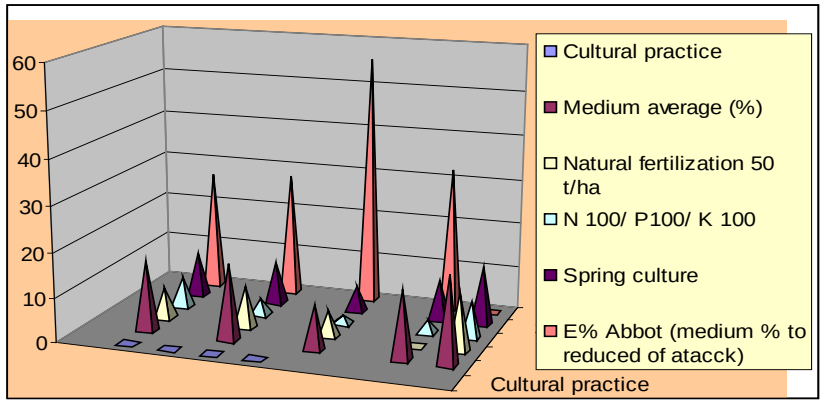

Fig. 2 - The Influence of different of types and doses of chemical and natural fertilizers the about grey mould grapes attacks in Murfatlar vineyard, in untreatated parceles, on Sauvignon variety

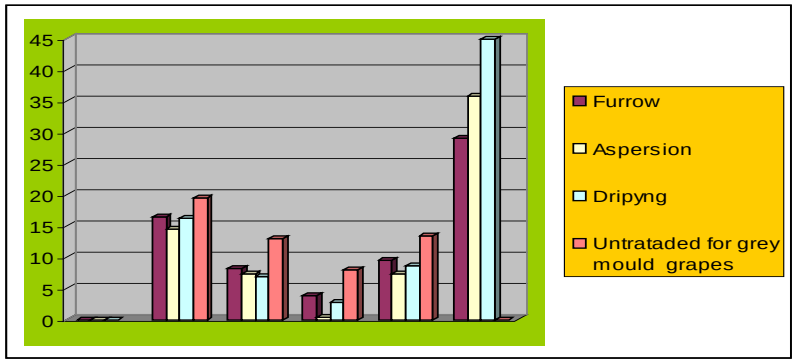

Fig. 3 - The Influence of different of method of irrigation about the grey mould grapes attacks in Murfatlar vineyard, in untreatated parceles, on Sauvignon variety

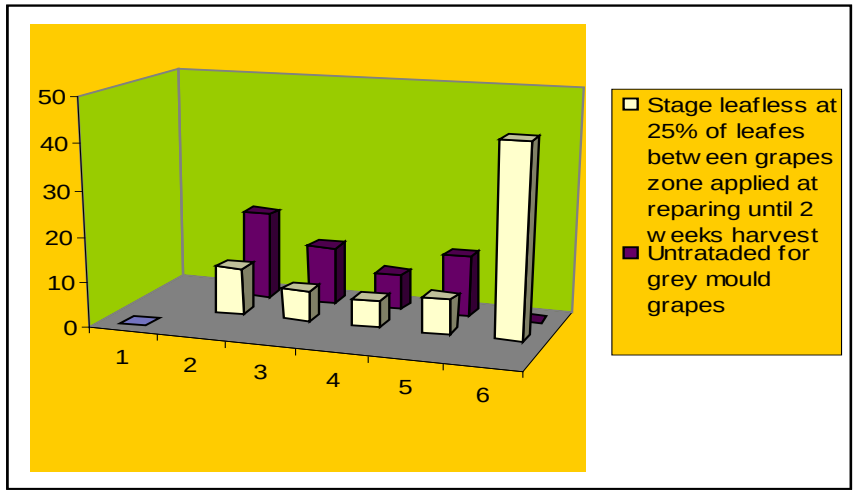

Fig. 4 - The Influence of the stage leafless about the grey mould grapes attacks in Murfatlar vineyard, in untreatated parceles, on Sauvignon variety

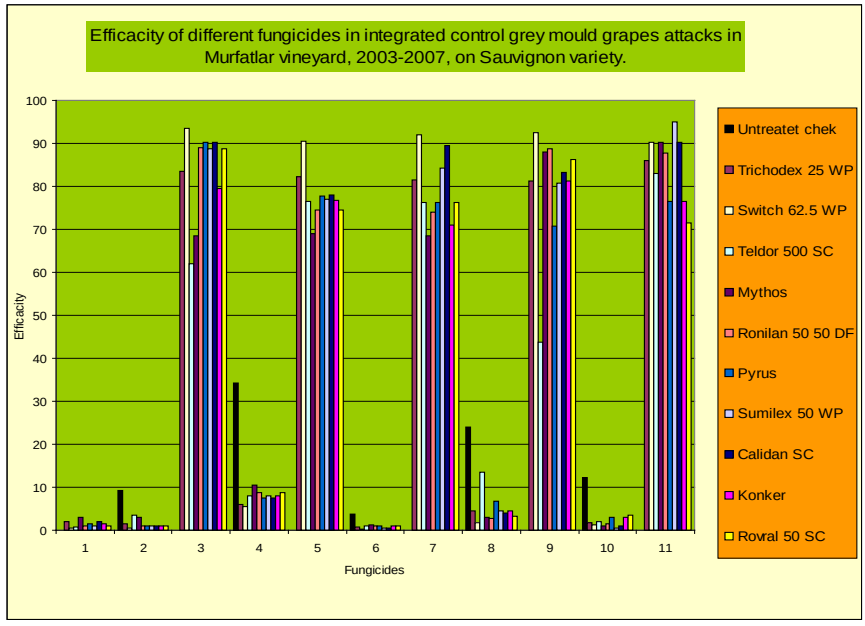

Fig. 5 – Efficacity of different fungicides in integrated control grey mould grapes attacks in Murfatlar vineyard, 2003-2007, on Sauvignon variety

CONCLUSIONS

It was obtained results who desire to be studied in the following years to give some practical solutions useful for the production regarding the reduce numbers of treatements for to use in viticulture with more curage cultural practice, in complex with biological and chemical meanings.

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RESEARCHES ON THE DEGREE OF ATTACK OF PATHOGEN *PODOSPHAERA LEUCOTRICHA (ELL.et EV) SALM* IN THE CLIMATIC CONDITIONS OF YEAR 2007 AT S.C.D.P. IASY

CERCETĂRI ASUPRA GRADULUI DE ATAC AL PATOGENULUI *PODOSPHAERA LEUCOTRICHA* (ELL.et EV.) SALM. ÎN CONDIȚIILE ANULUI 2007 la S.C.D.P. IAŞI

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Abstract: *The paper presents the results of observations on the evolution of pathogen Podosphaera leucotricha (Ell.et Ev)Salm for the breeds Idared 1st year, Idared 2nd year, Golden spur 1st year, reflected in the statistic calculation of the degree of attack in the climatic conditions of year 2007 during the vegetation period.*

Rezumat: *Lucrarea prezintă rezultatele observațiilor privind evoluția patogenului Podosphaera leucotrichae (Ell.et Ev)Salm la soiurile Idared, Golden Spur reflectate prin calculul satistic al gradului de atac în condițiile climatice ale anului 2007. Observațiile s-au desfaşurat pe tot parcursul anului 2007 în timpul perioadei de vegetatie*

MATERIAL AND METHOD

We studied the degree of attack for apple tree mildew *Podosphaera leucotricha(Ell.et Ev)Salm*. For all breeds, we focused on three variants, each variant containing 5 repetitions and each repetition containing 10 apple trees.

Table 1

Degree of attack of pathogen Podosphaera leucotricha in the climatic conditions of year 2007 at SCDP Iasy

Var. / Breedsl	V_1	V_2	V_3	V
Idared an I	2,0010	0,3331	0,4672	2,8013
Golden spur an I.	1,7810	1,3104	2,4406	5,532
Idared an II	0,5015	1,2211	0,1318	1,8544
B	4,2835	2,8646	3,0396	X =10,1877

Podosphaera leuchotricha (Ell. Et Ev.) Salm – apple tree mildew

Fig 1.*Podosphaera leucotricha (Ell.et Ev) Salm*

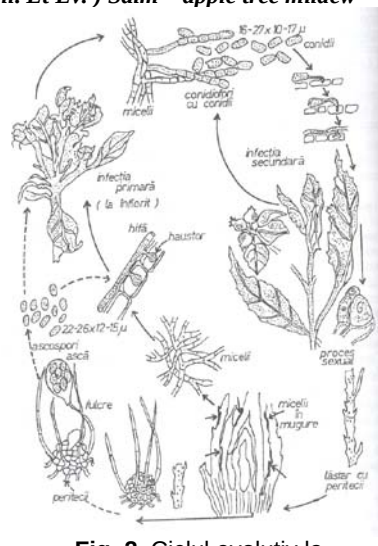

Fig. 2. Ciclul evolutiv la *Podosphaera leucotricha (Ell.et Ev) Salm.*

Mildew is one of the most important diseases that frequently attacks apple trees. In the favorable years, the disease produces important damages for the sensitive breeds registering 37 – 80% leaves attacked, 46-98% offshoots attacked, 6-20% from inflorescences and 8-25 % from the vegetative buds.

Photo 1. Attack of pathogen *Podosphaera leucotricha* (Ell.et Ev)Salm –Golden spur

Symptoms. Mildew appears from the beginning of budding and then on the vegetative buds from the offshoots attacked in the previous year. The mildew attack manifested on leaves. The trees strongly affected by mildew in the first part of the vegetation period lose their leaves at the end of May.

Photo.2. Attack of pathogen *Podosphaera leucotricha (*Ell.et Ev) Salm –Offshoot attacked.

The organs attacked by mildew are covered by a white dirty powdery coat made from mycelium, conidiophores and the fungus conidia. The vegetative and floral buds attacked by mildew largely evolve up to the beginning of budding then they get covered by a white dirty powdery coat and finally they get red, dry off and fall.(Photo.1, Photo 2)

Photo 3 . Attack of pathogen *Podosphaera leucotricha (Ell.et Ev)Salm* -Idared I.

A part of the floral buds attacked evolve up to the phase of inflorescence spreading afterwards they dry off; others reach the blooming phase when they get covered completely by mildew. These buds have deformed leaves, flowers with elongated greenish petals covered by mildew. The flowers attacked are sterile, dry off very quickly and fall. They registered very rare cases of mildew attack on apple tree fruits. The offshoots attacked are covered by a white dirty coat, they do not grow normally, the wood does not ripen and in most cases it dries off in summer or gets nipped during the interval December-March. When there is a large percentage of attacked offshoots (more than 20%), trees are on the wane, the production decreases for at least 2-3 years due to the fact that there are no branches for 2-3 years on which fruits might form.

Biology of the pathogen agent. The fungus *Podosphaera leucotricha (Ell.et Ev)* Salm., has a conidian shape *Oidium farinosum* Cke. This fungus producing mildew on apple trees belongs to the sub-phylum *Ascomycotina,* cl. *Ascomycetes. Ord. Erysiphales, fam. Erysiphaceae*.(fig.1, fig.2)

On the surface of the organs attacked develops the fungus mycelium, hyaline, septum-like, ramified from where appear spherical haustoria penetrating the epidermis cells. On the mycelium, on the surface of the organs attacked, appear simple, long conidiophores on which show up chains of unicellular ellipsoidal conidia cut off at their ends.

Their dimensions vary between 16-27 µm in length and 10-17 µm width. During the vegetation period, the pathogen agent breeds by conidia. The temperature of 18-22°C, accompanied by humidity of 90-100 % resulted from dew, fog or rain favors the fungus breeding, the germination of conidia and the penetration of haustoria in the cells of the host plant. The fungus feeds on the epidermis cells and the mesophile cells.

During winter the fungus resists as a resistance mycelium between the buds scales on the offshoots; perithecia appear on offshoots or the leaves attacked; the conidia from the previous year remain at the branch insertion, on the surface of the offshoots and buds attacked.

Perithecia are generally spherical with 3-11 appendices with their tops dichotomically ramified but in certain cases they are simple. These are situated in the upper part of perithecia. Each perithecium has a single ascus with ellipsoidal unicellular ascospores. Ascospores are 22-24 µm long and 12-15 µm wide. The damages caused by this disease vary deepening on the breed sensitivity.

Photo 4. Attack of pathogen *Podosphaera leucotricha* (Ell.et Ev)Salm -Idared II.

RESULTS AND DISCUSSIONS

From the thermal viewpoint, the agricultural year 2006-2007 was a normal year having an annual average temperature of 12,7°C. In the vegetation period (IV-IX), the average temperature was 15,37°C. The lowest temperature was registered on February 10th namely – 20,4°C, and the maximum temperature of the year was registered on July 15th namely 40,0°C. From the precipitations viewpoint, this agricultural year was characterized as a “”droughty” year since it registered a volume of precipitations of about 463,2 mm.

Table 2

Climatic conditions of zear 2007 at SCDP Iasy

Month	Temperature °C			Precip. mm.	Relative humidity
	12,4	- 2,7	32,5		
	6,8	-3,5	18,4	18,0	84
	2,8	-6,7	14,5	2,8	88
	4,5	-9,8	16,9	26,0	78
	1,3	-20,4	17,6	25,2	86
	8,1	-2,0	21,6	26,2	71
	11,0	0,8	24,7	29,6	59
	19,6	0,0	38,8	33,4	62
	23,1	12,5	36,5	22,0	60
	25,2	11,4	40,0	45,0	54
	22,5	11,3	37,1	112	75
	16,0	4,3	26,7	87,8	79
Total	**153,3**			**463,2**	**877**

Taking into account that the agricultural year 2007 was characterized as a doughty year (with the main climatic features presented in table no. 2) and after the statistic calculation of the degree of attack we noticed the following results presented in table no. 3.

Table 3

Synthesis of experimental results

Var.	Degree of attack	D	Significantly
V_2	1,8440	+0,7121	xx
Media	1,1319	-	-
V_1	0,9337	- 0,1982	-
V_3	0,6181	- 0,5138	0

DL 5 % = 32,4410 % 0,3672
DL 1 % = 53,7945 % 0,6089
DL 0,1 % = 100,48 % 1,1373

CONCLUSIONS

From the synthesis table of the experimental results (table no. 3) it results that:

- the difference of the degree of attack + 0,7121 obtained for variant 2 V_2 (Golden Spur) is significantly positive as compared to the average.

- the difference of the degree of attack – 0,1982 obtained for variant 1 V_1 (Idared 1st year) is insignificantly negative as compared to the average.

- the difference of the degree of attack – 0,5138 obtained for variant 3 V_3 (Idared 2nd year) is significantly negative as compared to the average.

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RESEARCH CONCERNING THE BIOLOGY OF THE GRAPEVINE EXCORIOSIS (*PHOMOPSIS VITICOLA* SACC.*)* UNDER THE CONDITIONS OF THE VINEYARDS IN VRANCEA

CERCETĂRI PRIVIND BIOLOGIA EXCORIOZEI VIȚEI DE VIE (*PHOMOPSIS VITICOLA* SACC.) ÎN CONDIȚIILE PODGORIILOR DIN VRANCEA

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Abstract. *The pathogenic agent Phomopsis viticola Sacc. produces the disease called "Phomopsis cane and leaf spot", and was first detected in our country during 1958-1960 (Crisan,1962). It is the second most important lignicolous pathogenic agent contributing to the decline of grapevine plantations. Recently the disease spread throughout all the vineyards, producing serious damage (Rafaila, 1970; Oprea and Dumitru, 1988/1989; Marmureanu and Contributors, 1990). Plants lose vigor and partially or entirely dry, thus having a negative influence on the yielding capacity. This disease has a significant economic impact since it may endanger the existence of viticultural plantations. This paper presents a synthesis of the role of the lignicolous fungi Phomopsis viticola Sacc. witch the main characteristics concerning its influence in the decline of the grapevine, its distribution and biological paramete.*

Rezumat. *Phomopsis viticola Sacc. este agentul patogen care produce boala denumita "Excorioza vitei" de vie, fiind semnalata pentru prima data la noi in tara in perioada anilor 1958-1960, (Crisan,1962) si ca importanta al doilea agent patogen lignicol care contribuie la declinul plantatiilor de vita de vie. In ultima perioada, boala s-a extins in toate podgoriile, producand pagube insemnate (Rafaila, 1970; Oprea si Dumitru, 1988/1989; Marmureanu si colab.,1990). Plantele isi pierd vigoarea, se usuca partial sau total, cu influente negative asupra capacitatii de productie. Impactul economic al acestei boli este mare, deoarece poate pune in pericol existenta plantatiilor viticole. In lucrarea de fata sunt prezentate, in sinteza, rolul ciupercii lignicole Phomopsis viticola Sacc. si principalele caracteristici cu priviere la influenta acesteia in declinul vitei de vie, raspandirea si parametrii biologici.*

KEY WORDS: parasite, fungus, in vitro, etiologic agent, culture environment.

The etiological agent of the grapevine excoriosis - *Phomopsis viticola* Sacc. is the second most important pathogenic agent contributing to the decline of grapevine plantations (Oprea and Dumitru 1988/1989). In our country, the disease spread, causing significant damage. (Crisan. 1962; Rafaila, 1970; Oprea and Dumitru,1988/1989; Marmureanu and Contributors, 1990; Podosu and Oprea, 1999). In the vineyards of the

Vrancea district, (Tica, 1990), grapevine excoriosis has been studied under the characteristic pedoclimatical conditions, with the purpose of establishing the necessary measures so as to reduce the damage caused by the disease spreading.

MATERIAL AND RESEARCH METHOD

The biologic material consists of grapevine arms, shoot and roots, withered or dry, collected from plantations which showed signs of decline. The samples were kept in the humid chamber at temperatures of 18-22˚C for 3 weeks. After the treatment, the characteristic fructification has appeared, and fungi were isolated on a GCA medium and then purified in test tubes or Petri dishes. The in vitro biological aspects seeked to determine the influence of some agarised culture media (Tuitte, 1969; Constantinescu, 1974), of the GCA culture medium reactions and the effect of temperature and relative humidity on the growth and spore-production of the fungus.

The expansion of the colonies has been observed daily by measuring their diameter; the spore-production was observed macroscopically and microscopically. The resulting data have been processed statistically by analyzing the variant.

On the basis of the observations made in plantations it as been established that during the offshoot growth phase, damage is significant, and the influence of this damage on the quantity and quality of the yield has been assessed.

RESULTS AND DISCUSSIONS

The research in the vitcultural area in Vrancea materialized by highlighting the lignicolous pathogenic agents involved in the decline of grapevine plants (Fig.1). By examining the diseased biological material, the following lignicolous pathogenical agents were observed: *Eutypa lata* with a frequency of 47.8%; *Phomopsis viticola* Sacc. with 34.8%; *Stereum hirsutum* with 7.8%; *Phoma uvicola* with 4.8%; *Diplodia vitis* with 4.8%.

The typical sympathology of the grapevine has been described, worldwide, by various authors and the debates lasted for 80 years (Bulit and Contributors.,1972; Galet, 1977, 1991; Emmett and Contributors,1992 and others.) They all expressed suggestively the manifestation of the disease: “spotted anthracnose” in France, “bark necrosis” in Italy, “dead arms disease” in U.S.A., “the black spot disease” in Germany etc.

In our country, Oprea and Dumitru (1988/1989), Marmureanu and Contributors. (1990) have presented the symptoms of excoriosis in the premature death of the grapevine, considering it a focal point disease. Its spreading is due primarily to collecting material from diseased vine shoots and using it for grafting, which caused damage starting in the nursery.

The first symptoms appear at the beginning of the growing season, as dark spots at the basis of the shoots, isolated or joined, of 0,5-2,0 x 0,3-1,0 cm in size. The growing infection produces ulcerations, kills the buds at the base of the shoots, leaving only those at the top still viable, which leads to losing the fruit bearing elements, and the offshoot growth phenological phase is delayed. During the summer, round, brown-black spots, with a yellow-orange halo towards the center will appear on the leaves, the leaf stalks, on the racemes and the pedicles. In the case of a severe attack, the

offshoots do not grow properly and spread out in the form of a fan, coming off easily. After the start of the ripening, the grapes rot and are covered by the pycnids typical of the pathogen.

The pathogenic agent. The French, Italian and German authors consider that the *Phomopsis viticola* Sacc. fungus is the pathogenic agent of the grapevine excoriosis (Bulit and Contributors, 1973; Pezet, 1974, 1976; Bulit and Bugaret, 1975; Pezet and Ducrot, 1978; Bugaret and Contributors,1980, 1983; Bulit, 1980; Mansencol,1982; Dubos and Contributors,1983; Bugaret and Pezet, 1985; Cavani and Contributors, 1987; Kast, 1988, 1989, 1991; Bugaret and Clerjeau, 1991 etc).

In our country, Crisan (1962), Rafaila (1970) and later, Hulea and Contributors, (1984, 1987) as well as Oprea and Dumitru (1988/1989) noted the presence of grapevine excoriosis, ascribing it to the *Phomopsis viticola* Sacc. pathogenic agent. Isolating the pathogen was obtained by keeping the contaminated material in the humid chamber, where the necrosis affected areas began to show the pycnids typical for the fungus, with orange cilia, and pycnospores of the alpha and beta type, with a role in spreading the disease.

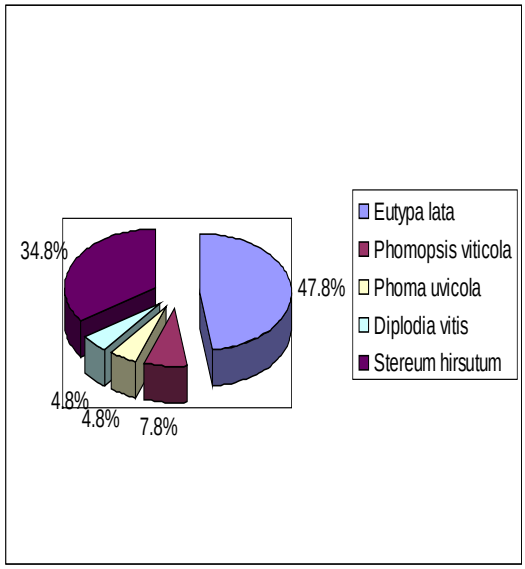

Fig.1: The frequency of lignicolous fungi associated with the decline of grapevine in the vineyards of Vrancea

Data about the two categories of pycnospores can be found in research presented by Pezet (1974) and also Beffa and Contributors. (1988), pointing to their importance in the biology of the fungus.

Epidemiological elements:

a) Life cycle. The *Phomopsis viticola* Sacc. fungus survives the winter in the form of pycnids, on the arms situated at the basis and as mycelium in the dormant buds (Bulit and Contributors,1973).During winter, the pycnids formed in autumn mature. The pycnospores start to form near the end of winter (in February) and are present in large quantities in the offshoot growth phenological phase. According to Bugaret (1975), for spreading the infection, a continuous humidity lasting 7-10 hours, at temperatures of 15-18°C is sufficient. The most sensitive to infections are the young offshoots,

from the beginning of the offshoot growth until the spring rains (Boniface and Contributors, 1981).

b) Spreading. *Phomopsis viticola Sacc.* is spread over all grapevine growing areas, except for South America (Smith and Contributors, 1988).

In the Vrancea vineyards, after observations in the field, the presence of the *Phomopsis viticola* Sacc. fungus was detected in the three vineyards, a follows:

-in the Odobesti vineyard, in the varieties: Regal Feteasca, Italian Riesling, Sarba, Furmint, Chasselas dore, Odobesti Golden, Plavaie;

-in the Panciu vineyard, in the varieties: Regal Feteasca, Italian Riesling, Sarba, Chasselas dore, Rkatiteli, Aligote;

-in the Cotesti vineyard, in the varieties: Regal Feteasca, Italian Riesling, Sarba, Chasselas dore, Aligote, Plavaie, White Feteasca, Hamburg Muscat, Afuz-Ali.

The loss percentage in the vineyards situated in river meadows, on low, cold and humid terrains reached 35%.

c) Biology. From the V.W.R.-D.S. Odobesti collection, the pathogen was isolated, observing the biology of the fungus, the influence and reaction of some „in vitro" culture media and also the influence of temperature and atmosphere humidity on the growth and fructification of the fungus.

-Concerning some culture media (Fig.2) it has been noted that the fungus spore-production was very good in the GCA medium, good on the malt extract and typical medium for *Phomopsis viticola* and absent on the Blakslee and Czapek culture media.

-Concerning the pH of the culture medium, it has been observed (Fig. 3) that the fungus grew and produced spores starting with a neutral pH(7.0) to a strong basic one(10.0-11.0)

-The temperature factor holds a very important role in the growth and spore production of the pathogen, so that between 16 and 30°C the growth was vey good and the optimal growth temperature was between 18 and 30°C (Fig.4)

-The relative humidity is another important factor conditioning the growth and development of the *Phomopsis viticola* Sacc. Fungus. Under conditions of low relative humidity 31-38 % the growth was not substantial (0,1-0,4 cm in diameter), with white, feeble colonies with no production of spores (Fig. 5). At a high relative humidity, of 95% the colonies became thick, normally dveloped and with a good production of spores.

Concerning grapevine varieties behaviour, in the Vrancea area, toward the attack of this pathogen under natural infection conditions (Table 1), it was found that it is different in the same variety depending on the pedological and climatic conditions of the vineyard. Thus, a resistence has been proved in the varieties: Merlot, Francusa, Chasselas dore, Aligote, (GA=0,1-1,3%) and even Hamburg Muscat (GA=5,8%).

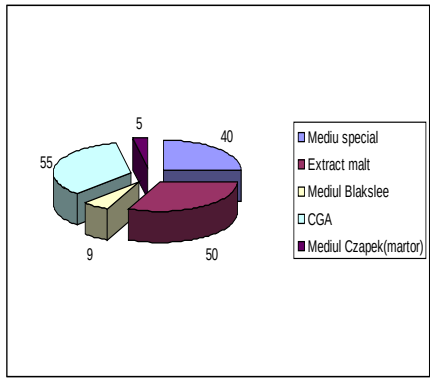

Fig.2 The influence of various culture environments on the evolution of *Phomopsis viticola* Sacc.

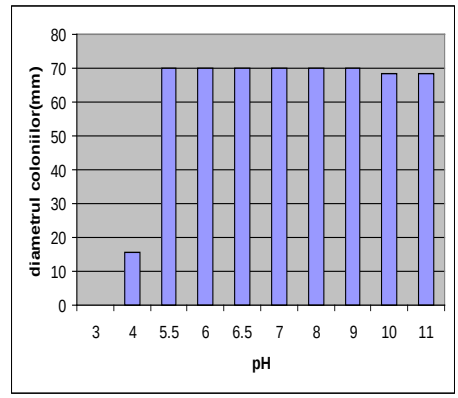

Fig.3 The influence of pH values in culture environments on the evolution of *Phomopsis viticola* Sacc

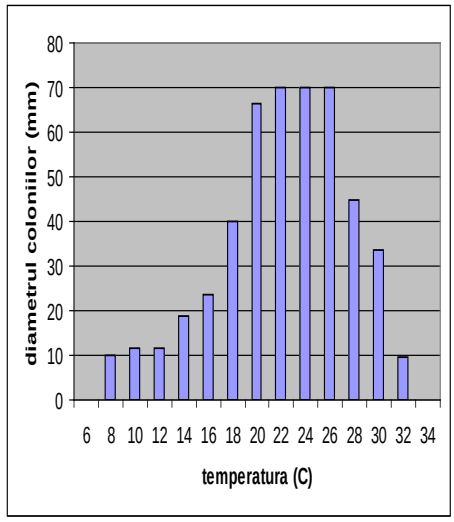

Fig.4 The influence of temperature on the evolution of *Phomopsis viticola* Sacc.

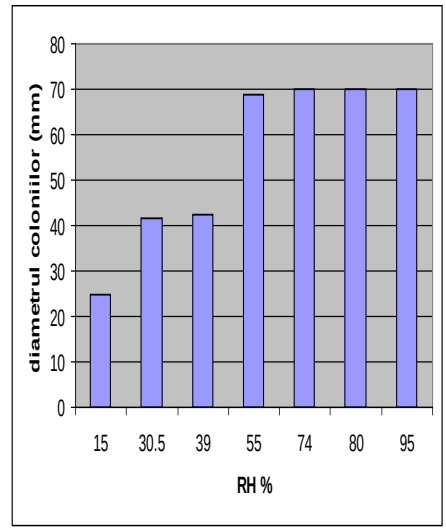

Fig.5 The influence of relative humidity on the evolution of *Phomopsis viticola* Sacc.

From the data obtained in the experiment but also from the data in the specialized literature, the Merlot variety is showing resistance in Vrancea, in the Dealul Mare vineyard and those in France, while the Aligote and Chasselas dore varieties, which became resistent in Romania, are sensitive to the pathogen in France (Smith and Contributors, 1988).

Generally, excoriosis produces significant damage (Bolay,1979; Bulit,1980; Kast,1988; Smith and Contributors,1988) in the live fruit bearing plantations. The grape yield in the 6 studied varieties (Table 2) decreased in the attacked plants with 48,8% (Plavaie) to 5,9% (Chasselas dore), followed by Odobesti Golden and Sarba (local varieties), Furmint and Italian Riesling, and the most sensitive, the Plavaie variety.

Table 1

Grapevine varieties behavior under the *Phomopsis viticola* Sacc.attack, in the conditions of the vineyards in Vrancea

Variety	Odobesti		Cotesti		Panciu	
	GA %	Calificativul	GA %	Calificativul	GA %	Calificativul
Royal Feteasca	14,2	S	10,9	S	1,7	R
Italian Riesling	2,2	R	10,5	S	8,4	MR
Sarba	1,3	R	11,4	S	2,9	R
Chasselas dore	0,3	R	0,7	R	0,4	R
Aligote	-	-	1,3	R	0,6	R
Rkatiteli	-	-	3,9	R	5,8	MR
Galbena de Odobesti	17,3	S	8,1	MR	-	-
Merlot	0,1	R	0,4	R	-	-
Furmint	13,9	S	6,6	MR	-	-
Francusa	0,2	R	0,2	R	-	-
Plavaie	16,6	S	52,4	FS	-	-
White Feteasca	4,2	R	10,3	S	-	-
Hamburg Muscat	1,5	R	2,2	R	-	-
Afuz-Ali	12,3	S	22,2	S	-	-

The sugar content was also lower in plants attacked by excoriosis (between 126-197 g/l) compared to the healthy grapevine plants (between 140 g/l and 210 g/l).

Table 2

The influence of various culture environments on the evolution of *Phomopsis viticola* Sacc.

Variety	Healthy vines			Contaminated vines			Yield compared to the control %
	Average yield Kg/vine	Quality		Average yield Kg/vine	Quality		
		Sugar g/l	Acidity g/l H_2SO_4		Sugar g/l	Acidity g/l H_2SO_4	
Plavaie	1,860	166,1	4,5	0,960	164.0	4,2	51,6
Odobesti Golden	5,465	163,5	5,5	3,920	160,3	5,3	71,7
Furmint	5,475	180,5	6,3	3,540	176,2	6,5	64,6
Italian Riesling	6,420	187,3	5,7	3,870	178,3	6,7	60,3
Sarba	5,300	209,7	5,3	3,860	197,4	4,9	72,8
Chasselas dore	6,130	139,6	7,4	5,770	125,8	6,5	94,1
Average	**5,108**	**174,4**	**5,8**	**3,653**	**165,5**	**5,6**	**69,2**

CONCLUSIONS

During research, a massive spread of the *Phomopsis viticola* Sacc. fungus (the aetiological agent of the grapevine exoriosis) has been observed, causing significant damage also under the pedological and climatic conditions in Vrancea, especially in the ofsoot growth phenological phase. Along with other ligrnicolous pathogenic agents: *Eutypa lata*, *Stereum hirsutum*, *Phoma uvicola* and *Diplodia vitis* and the factors determining the weakness of the grapevine plants, contribute substantially to their premature death.

Based on the study of grapevine behaviour under excoriosis attack, in the conditions present in the vineyards of Vrancea, a degree of resistance has been established for each variety, and the most resistant were Chasselas dore, Merlot, Aligote, Hamburg Muscat; varieties with a behaviour oscilating between high resistance and medium resistance were: Plavaie, Odobesti Golden, Furmint, Royal Feteasca, Italian Riesling and Sarba; the Afuz-Ali variety proved to be the most sensitive.

If the environmental conditions do not determine a severe reaction of the pathogenic agent, production loss of up to 50% may be recorded, where quality and quantity are concerned.

It is reccommended that in the plantations affected by excoriosis phitosanitay quarantine measures be applied together with attack recognition, being elliminated from breeding.

In plantations where the attack does not produce significant damage, rational long cuts arereccomended, by keeping the healthy shoots, limiting the centers of contagion and thus the spread of th disease.

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EUTYPA LATA – A FUNGUS INVOLVED IN THE BIOLOGICAL DECLINE OF THE VINE

EUTYPA LATA – CIUPERCĂ IMPLICATĂ ÎN DECLINUL BIOLOGIC AL VIȚEI DE VIE

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Abstract. *A vine debilitating phenomenon has been pointed out in our country's vineyards, followed by a mass-drying process. The mycological analysis done on the vine's wood affected by necrosis have distinguished the presence of fungi specialized in bark and wood degradation, most significant being Eutypa lata (Pers.), Tul., Phomopsis viticola Sacc., Stereum hirsutum (Wild), Fr., Phellinus igniarius (L. ex Fr.) Quel., Valsa vitis (Schwein.) Fuck. Following the losses caused by these pathogens, several researches have been initiated in order to study more thoroughly the ligneous fungi on vine. Thus, the symptoms and biology of Eutypa lata fungus have been studied, in the north-eastern regions of Moldavia's ecological background, through research on the Iasi and Cotnari vineyards.*

Rezumat. *În plantațiile viticole din țara noastră a fost semnalat un fenomen de debilitare a butucilor de viță de vie, urmat de uscarea în masă a acestora. Analizele micologice, efectuate pe lemnul necrozat al acestor butuci, au pus în evidență prezența unor ciuperci specializate în degradarea scoarței și a lemnului, cele mai importante fiind: Eutypa lata (Pers.) Tul., Phomopsis viticola Sacc., Stereum hirsutum (Wild) Fr., Phellinus igniarius (L. Ex Fr.) Quel., Valsa vitis (Schwein) Fuck. Ca urmare, a pagubelor produse de acești patogeni, s-au inițiat cercetări care să aprofundeze studiul ciupercilor lignicole la vița de vie. Astfel, în condițiile ecologice din N-E Moldovei, s-a urmărit în plantațiile viticole din podgoriile Iași și Cotnari, studiul simptomelor și biologia ciupercii Eutypa lata.*

The decline of the grape vine is a slow phenomenon caused by the wood and bark fungi, strongly influenced by the crop conditions, by the stress the plants are submitted to, because of the modification of the leading forms and the large scale mechanization in viticulture, and not last, by the climatic changes.

Thanks to the great number of phytosanitary treatments made during the last decades, especially for the prevention and combating of the main pathogen agents of the grape vine, there have intervened major modifications of the micro-flora at the level of the injuries provoked by the cuttings and the disappearance of the specific antagonists.

Therefore, in viticulture, all these aspects assert the elimination or limitation of the action of the favoring and release factors and the good knowledge of the wood and bark pathogenetic agents, as well as their acting mode, for and efficient combating.

In our country, the researches regarding the decline of the win-growing

plantations have been fragmentary, and the prevention and combating of the pathogenetic agents that attack the grape vine wood are seldom correctly applied in production, because of the insufficient knowledge of their biology and semeiology.

MATERIAL AND METHODS

The observations have been made on 7 representative genera for the North Eastern Moldavian area, meaning: Aligoté, Muscat Ottonel, Feteasca regala, Feteasca alba, Merlot, Grasa de Cotnari and Francusa.

The assay of the material samples meant to relieve the *Eutypa lata* fungus was made after a prior terrain examination with the manual eyeglass, in order to underline the fructifications.

The gathered material was detached in convenient fragments; it was introduced into bags together with a label containing more data regarding: the sampling place, the plant (species, genus, stock), eventually, data regarding the fungus.

In the laboratory, it was first made a preliminary exam with the naked eye, then with the binocular eyeglass, in order to observe certain superficial features, like the symptoms produced on the attacked organ, the form, color, type of fructification etc. The section was hand made, using grape vine razors and scissors. The section thickness was realized according to the material, because most of the fructifications are extremely brittle and they do not endure fine sections.

From each necrosis area there have been scraped 5 wood fragments under the form of little cubes with a side of 1 cm. These have been disinfected by tubbing for 20 minutes in a solution of baclor 60g/l. Then, the wood fragments were passed on sterile Petri dishes, coated with filter paper, in order to absorb the solution surplus.

In the end, the wood portions have been introduced into Petri dishes, and the methods used for the isolation and identification of the endophyte fungi, from the multi-annual wood of the grape vine are the current ones in the laboratory technique (Grosclaude, 1975): from the affected wood there have been detached tissue fragments from under the bark, with a length of 0, 3 – 0, 5 cm and a thickness of 0,5 mm, that have been placed on a culture ambient (CGA). From the numerous colonies formed on the ambient, those that are specific to the searched fungus have been purified.

If the fungi colonies are present but weakly developed, the material is introduced into the damp chamber, for 24 or 48 hours, at room temperature. The material samples that the fructifications represented by pycnidia or perithecia are not completely mature, they are kept in biological cages and periodically analyzed.

RESULTS AND DISCUSSIONS

The diseases that lead to the death of the grape vines are insidious diseases, and the parasites that generate them are mostly swamp fungi that penetrate the plants through the lesions provoked by the cuttings and that slowly develop during more years. The attack frequently appears through the appearance of some foliar symptoms or through the drying of a ramification, then, for a while, the situation seems to stabilize itself, but this is only an apparent come-back.

The death of the entire plant always intervenes when the quantity of toxins issued by the parasite fungus reaches such a level that the metabolism of the plant is completely disturbed. The resistance opposed by the host plant does not seem

to be related to the presence of the resistance genes; it is more about its tolerance, manifested or not, according to the characteristics of the genus and to the cultural and climatic conditions. These particularities explain the great variability regarding the answer of the grape vines from the same parcel and the behavior differences of the same genus in different culture conditions.

In order to determine the characteristic symptoms of the *Eutypa lata* attack periodical observations have been made in natural conditions, in different production win-growing plantations from three units: S.C.D.V.V. Iasi, S.C. Vinia S.A. and S.C. Cotnari S.A. Therefore, multiple grape vines have been relieved and marked, in order to keep the disease manifestation mode under observation during the year.

We should also specify that on the plantations the grape vines have been selected from, the program of the phytosanitary interventions did not include special treatments of combating of the *Eutypa lata* pathogen agent.

On the other hand, after the laboratory analyses, on the vegetal material that was sampled with characteristic symptoms for the attack of this pathogen, it was possible to make a direct connection between its presence and the disease symptoms. Even from the spring beginning, in the case of the marked grape vines, which were suspected of the attack of the *Eutypa lata* fungus, there have been noticed a delay of the vegetal departure with 5 – 10 days in comparison with the healthy grape vines. The diseased grape vines presented an abundant shooting which did not evolve normally, remaining short and with close internodes.

The observations made in Cozmesti – SC Vinia SA, on the Feteasca regala genus, the shoots had a limited growth of 15-20 cm, with 3-5 cm internodes, in comparison with a healthy grape vine, whose shoot reached 60-80 cm with internodes of 10-12 cm. (Photo 1,2,).

Photo. 1

Photo. 2

In the case of the unfit shoots the leaves remained small, with a diameter of 3-5 cm, in comparison with the diameter of the leaves on the healthy shoots, which have a diameter of 8-10 cm. (Photo 3).

Photo 3.

Photo. 4

Photo. 5.

As the attack is more advanced, the leaves acquire a green stick aspect; they look deformed or slightly inturned, with marginal necrosis of the limb. (Photo 4, 5).

The inflorescences develop normally until the blossom, and sometimes after fecundation, the flowers abort. After the blossom there was noticed a phenomenon of millerandage, the grape has an unequal development and reduced sugar content.

In the case of the strong attacks, on the stalks and on the limbs there appear longitudinal, deep cracks, with ulcerations around the big injuries resulted from the cuttings.

The symptom can easily be confounded with the effect of the extended droughts during the summer period.

In a longitudinal section, there have been noticed necroses in the xylem, which is the spot of the primary infections. The borders of the infected areas became from reddish-brown to violaceous. The affected wood comprised well defined areas (Photo 6, 7).

Photo. 6

Photo. 7

The *Eutypa lata* produces a selective destruction of the cellulose, because the lignin is not transformed, which confers a dark color to the wood. The wood cracks in three rectangular plans, which also explains the slight break of the attacked branches, when the bending resistance is tested, and this is called the "carrot test". Sometimes, the described symptoms can be met only on one of the limbs, but subsequently the attack progresses comprising the entire grape vine that begins to decline, and in a few years it dies.

The biology of the pathogen agent. The *Eutypa lata* (Pers.) Tul. (Syn.: *Eutypa armeniacae* (Hansf.) Carter), fam. Diaporthaceae, ord. Sphaeriales, cl. Pyrenomycetes, subkingdom Ascomycotina, f.c. Cytosporina sp.

The *Eutypa lata* fungus was hard to isolate and purify from the diseased vegetal material, because it cohabits with other micromycets that have concomitantly developed on the culture ambient (Phoma, Melanospora).

On the CGA ambient, the fungus has formed white, felt colonies, whose limits rose on the sides of the Petri dish (Photo no. 8).

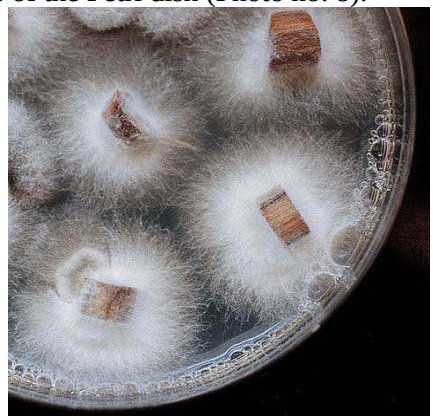

Photo. 8

The fragments from the grape vines affected by this fungus have been examined

in laboratory conditions. After 3-4 weeks, the fructifications of the fungus formed on the wood that was kept in the humid room, with temperatures above 20^{o} C.

The perithecia formed only on the multi-annual wood and they are partially sunk in the substratum: they have a globular form, black color, and each of them has 8 ascospors.

The ascospors, which are placed in one row, have a light yellow color and they have been eliminated through the perithecia neck in a grey gelatinous mass.

On the chords that are infected with *Eutypa lata*, kept in laboratory conditions, at a high humidity of 95%, there were formed black spherical pycnidiae, which are easily visible with the naked eye.

After 20 days, a great number of pycnospors formed, eliminated from an orange gelatinous mass, under the form of cordons called cirrus.

The inoculum main source is represented by the fungus ascospors and the optimum moment of the infection is the spring, on february-april and the autumn, on september-december. The germination temperature of the ascospors is between $+1^{o}$ C and 32^{o} C, with an optimum between 22^{o} C – 25^{o} C and a germination period of 11-12 hours. The most favorable conditions for the infection are met during the cutting periods, when there are created open lesions, especially in the multi-annual wood that scars hardly, representing real entry gates for the pathogen agent.

CONCLUSIONS

1. ***Eutypa lata*** represents one of the main pathogens that determine the shortening of the exploitation period of the grape vines;

2. The periodical analysis of the win-growing plantations for the tracing of the attack pest hole and the clearance of the symptomatic and sere grape vines and their burning;

3. The complete elimination of the sere wood from the grape vines during the cutting and the limitation of the number and surface of the cut lesions;

4. The disposal of the biological material with obvious attack symptoms from multiplication.

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PRELIMINARY RESULTS CONCERNING THE CONTROL OF WINE PESTS AND DISEASES UNDER THE CONDITION AGROCLIMATIC OF DEALU BUJORULUI VINEYARD

REZULTATE PRELIMINARE PRIVIND COMBATEREA PRINCIPALELOR BOLI SI DAUNATORI AI VIȚEI DE VIE IN CONDITIILE AGROCLIMATICE DIN PODGORIA DEALU BUJORULUI

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Abstract. *At the Research Station for the vine growing and Bujoru, in to 2007 does experimentation have a program of combat integrate has principals pests and diseases of vine in the plantation Dealu Bujorului or has introduction of the pesticide has last generation as are: Calypso 480 SC, Reldan 40 EC, Expo Max WDG, Falcon 460 EC, Demitan si Acrobat MZ 90/600 WP. This products plant health to apply in a number to low of treatments has to ensure effectiveness exceptional in the combater's principal of agent's pathogen and pests and diseases one in the wine plantation.*

Rezumat: *In anul 2007 la S.C.D.V.V. Bujoru a fost experimentat un program de combatere integrata a principalelor boli si daunatori ai vitei de vie din podgoria Dealu Bujoru in care au fost introduse pesticide de ultima generatie cum ar fi: Calypso 480 SC, Reldan 40 EC, Expo Max WDG, Falcon 460 EC, Demitan si Acrobat MZ 90/600 WP. Aceste produse fitosanitare aplicate intr-un numar redus de tratamente au asigurat o eficacitate deosebita in combaterea principalelilor agenti patogeni si daunatori din plantatiile viticole.*

MATERIAL AND METHOD

The pest control of vineyard represents a technological measure important for the production's quality maintenance as well as for the maintenance of the productive potential of the vineyard plantations. Because now days the pesticides are found in a large variety, to establish the specific kind of pest-killers to be used it is necessary to consider their biological and economical efficiency as well as the extent in which they are able to reduce the grapes' pollution as well as the entire ecosystem pollution.

The purpose of using new pesticides was to combatthe main pathogens in Dealu Bujorului vineyard in a context in which the climate factors' deviation from the usual annual average affects their biology, their occurrence as well as their evolution.

The experimental lots were located within a plantation started in 1980 including two grape vine sorts: Aligote and Feteasca regala which has as a partner the mother plant Berlandieri X Riparia S0 4-4 with a leading form bilateral cordon semiînalt with a plantation distance of 2/1,20 m. The vine leaves and grapes were carefully observed and marked (on a scale from 0 to 6).

This way there were determined the frequency and the intensity of the attack of the wine manna (*Plasmopara viticola – Berk et Curt*), wine mildew (*Uncinula necator – Schw. Burr*), grey rot(*Botrytis cinerea -Pers*) and grape moth (*Lobesia botrana – Den et Schiff*) on wine.

RESULTS AND DISCUSSIONS

The wine Manna (*Plasmopara viticola-Bert et Curt*)

The climate conditions during May, June and July did not favour the occurrence and the evaluation of this pest. The initial infections occurred in the first decade of June. There was no evidence of vine pathogen attack on the leaves and the grape clusters which were kept under control with the help of phytotherapeutical treatments.

The wine Mildew (*Uncinula necator - Schw-Burr)*

There were favouring conditions for the vine mildew development during the vine vegetation period. The mildew attack was noticed after the budding period and during the growth of the vine copes. After that, sixteen mildew generations were recorded. They were kept under control through five phytotherapy treatments. According to the observations regarding the frequency and the intensity of the mildew attack on vine it was noticed that 0,36% of Feteasca regala sort and 0,57% of the Aligote sort were damaged. In the experimental lots, the disease evolution was kept under control, very little evidence of the pathogen attack being found for all experimental designs. On grape clusters the pathogen attack was insignificant. Only 0,02% of the witness sort –Cabernet Sauvignon showed the evidence of the mildew attack (Table 4).

The Grape Moth (*Lobesia botrana - Den et Schiff)*

The grape moth is a pathogen very frequently met in the south eastern vine yards of Moldavia. It produces great damage, especially in the third generation. Under the ecological conditions of S.C.D.V.V. Bujoru the pathogen has three generations a year. Three traps/ha with synthetic sexual attractive substance, type ATRABOT, were installed in the vineyards in order to establish the population level, the best moment to apply the treatment methods and last but not least, to warn and monitor the whole process. Given the 2007 climate conditions, the grape moth had a very large biological reserve, the average number of the captured butterflies exceeding the level of damage 100captured butterflies/trap/week) for all generations. It have been noticed that the pathogen attack frequency per inflorescence was 26,33% on design III and 37,33% on Cabernet Sauvignon. The larva attack frequency on grapes reached 35,33% on Design III and 45,33% on the witness sort- Cabernet Sauvignon. Analyzing the climate data recorded at Targu Bujor weather station it have been noticed that during the vegetative rest the lowest absolute temperatures did not drop under the vine endurance to cold (-18 C). On 24/02/2007 was recorded the lowest temperature (12 C) which did not affect the vine buds viability from the experimental lots. The climate conditions of the spring were less usual for this period of time being characterised by high average temperatures compared to the normal standards. The average temperatures of May, June and July where higher than the normal average temperatures; several hot days with a maximum absolute temperature of 34,0 C on May the 23rd , 37,8C on June the 26th, 41,0C on July the 28th and 40,0C on August the 24th and 25th being recorded.

The active vegetation period started with low and unevenly distributed precipitations. On 28/06/2007 severe weather conditions including thunderstorms, abundant precipitations (65,5%) and hale was recorded.

Table 1

The Vine Pathogens and Deseases Attack Degree on Vine at S.C.D.V.V. Bujoru in 2007

Num.	Sort	The Manna Attack (*Plasmopara viticola*)						The Wine Mildew (*Uncinula necator*)						The Grape Moth Frequency of damaged inflorescence %		
		Leaves			Grape Cluster			Leaves			Grape Cluster					
		F	I	GA %	F	I	GA %	F	I	GA %	F	I	GA %	G I	G II	G III
1.	Aligoté – Design. I	0	0	0	0	0	0	10,66	5,38	0,57	0	0	0	36,0	40,33	Grapes affected by hale
2.	Feteasca regala – Design. II	0	0	0	0	0	0	7,0	5,1	0,36	0	0	0	28,33	41,33	-//-
3.	Feteasca regala – Design. III	0	0	0	0	0	0	9,33	4,5	0,41	0	0	0	26,33	35,33	-//-
4.	Witness Sort - Cabernet Sauvignon	0	0	0	0	0	0	20,0	12,15	0,32	1,0	2,0	0,02	37.33	45.33	16,33

These weather conditions affected the integrity of the vines from the experimental lots. For this reason, an immediate treatment with copper sulphate was applied to reduce the damage, which was necessary because the grapes and copes were vulnerable to the attack of the vine manna, gray rot, and anthrocosis and because the lesions produced by hale act as opened doors for the pathogens. To maintain the vine healthy, there were phytotherapeutical treatments applied to the experimental lots using: Sulfavit 80 PU, Sulfavit 95 PP, copper sulphate, Expo Max WDG, Reldan 40 EC, Ridomil Gold Plus 42,5 WP, Falcon 460 EC. The treatments were applied as according to the warnings. A type MPSP 3- 300 machine was used and the treatments were adjusted depending on the targeted pathogens. The quality of the solution that was used was 400/ha for the first two treatments. The following treatments used 900- 1000 L/ha of solution.

The Tested wine Sorts per Each Experimental design:

1. Aligote -1st design
2. Feteasca regala-2nd design
3. Feteasca regala-3rd design
4. Witness - Cabernet Sauvignon

The results regarding the efficiency of the phytotherapeutical products applied to the experimental designs are presented in Table 1. The climate conditions from the first part of the vegetation period did not favoured the occurrence and evolution of the vine pathogens (manna, mildew a.s.o). The preliminary results confirmed the efficiency of fungicides Expo Max WDG, Falcon 460, Acrobat MZ 290/600WP, a.s.o. In the insecticides category Reldan 40 EC proved itself a little bit better than Calypso 480 SC. However we found as necessary to repeat the experiment during another year with weather conditions which favour more the occurrence and development of the vine pathogens.

CONCLUSIONS

The Wine Manna – Although the pathogen biological reserve from the previous year was a large one, the weather conditions -which didn't favour the occurrence and development of the vine manna- led to a lack of evidence of the pathogen presence in the experimental lots. Normally when the weather conditions favour the pathogen evolution (frequent precipitation, high atmospheric humidity, the persistence of water on the grape leaves, foggy, humid days) there is more wine damage.

The Vine Mildew was kept under control with the help of the phytotherapeutical treatments.

The Grape Moth. The large biological reserve from the previous year and the easy winter favoured the massif occurrence and development of the pathogen exceeding the economic damage level of the captured moths/ trap/week.

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RESEARCH ABOUT DIFFRENT PESTS FROM THE GOLDEN MARIGOLD (*CALENDULA OFFICINALIS)* USED BY NATURAL REMEDY

CERCETĂRI PRIVIND DIFERITE SPECII DE INSECTE DĂUNĂTOARE LA *CALENDULA OFFICINALIS* UTILIZATĂ PENTRU OBȚINEREA DE REMEDII NATURALE

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Abstract: *The Golden Marigold (Calendula officinalis) is un de most populary herbs to use by traditionale medicine. In the traditional Medicine this herbs is utilize by depurative effect and by his quality: emollient,sedative, regenerating, etc. The Golden Marigold has some pests species. The reconise of this pests, the relation plant- pests, and the ecological treatments applied are usefull to the cultivators.*

Rezumat. *Gălbeneaua sau filimica este una din speciile cele mai populare, utilizate în medicina tradițională. În medicina tradițională se folosesc florile sau organele aeriene, datorită proprietăților depurative, emoliente, calmante şi epitelizante. Planta prezintă câteva specii de insecte dăunătoare. Recunoaşterea lor, urmărirea relației plată-dăunători şi cunoaşterea metodelor ecologice de combatere sunt utile cultivatorilor.*

LE BOIS D`UVRAGE ET LA METHODE DE RECHERCHE

Les recherches ont ete effectue sur la culture de chanterelle (*Calendula officinalis)* située dans la collection des plantes médicinales de USAMV-Iaşi et aussi sur la culture de chanterelle d`une exploitation privée, située au bord de Iaşi. Dans les deux situations les plants cultivée sont destinée pur réaliser des nombreux remèdes naturelles, utilisée dans la médecine traditionaliste.

Les plants de chanterelle sont de milieu taille et ont les fleurs jaunes, brune ou oranges. Pur les remèdes naturelles sont utilisée les parts aériens ou les fleurs.

Ainsi que les organes des plants ont un odeur particulaire, la chanterelle a quelques ravageurs. Ceux ravageurs appartient de *Nematoda, Annelida-Oligochaeta, Insecta-Lepidoptera, Coleoptera, Diptera, Homoptera et Heteroptera.*

Les plants de chanterelle de chaque location ont ete observée et évalué chaque semaine, d`après le début du mais (le debout de floraison) et jusque a la fin du septembre (a la fin de floraison). Chaque fois on analysé 100 plant de chaque location, le fleurs, les feuille, les rejets fertiles. On a collecté les ravageurs et on a fait des calcules statistique sur la densité numérique de chaque espèce, sur la manière d`attaque, la réaction des plants, les pourcentage de plantes attaqué etc.

Les espèces déterminé on a ete enregistré dans de tabelles pour pouvoir voir l`évolution du cycle biologique de chaque espèces, la densité numérique des ravageurs,l`espèce dominante, la réaction des plantes et les damages produits.

LES RESULTÉS ACCROCHÉE

La littérature spécialisé mentionne quelques ravageurs pour la chanterelle (la calendule, *Calendula officinalis)*, qui appartient a la *Nematoda-fam. Heteroderidae; Annelida-clasa Oligochaeta; Insecta-ord.Lepidoptera, Homoptera, Coleoptera, Heteroptera.* Les espèces de ravageurs présentes dans les cultures de chanterelle de Europe et de notre pays sont présente dans le tableau nr. 1.

Tableau 1

Les principaux ravageurs des chanterelles

Nr.crt.	Grupe sistematique	Order	Familie	Nome scientifique	Nome populaire
1	*Nematoda*	*Tylenchida*	*Heteroderidae*	*Meloidogyne spp.*	Les nematodes galigenes
2.	*Annelida-Oligochaeta*	*Opistopora*	*Lumbricidae*	*Lumbricus terestris*	Le lumbrique de terre
3.	*Mollusca-Gasteropoda*	*Megastropoda*	*Limacidae*	*Limax spp.*	-
4.	*Insecta*	*Lepidoptera*	*Arctiidae*	*Cerastis faceta*	-
5.	*Insecta*	*Lepidoptera*	*Noctuidae*	*Chrysodeixis chalcides*	-
6.	*Insecta*	*Lepidoptera*	*Noctuidae*	*Chloridea peltigera*	-
7.	*Insecta*	*Lepidoptera*	*Noctuidae*	*Mamestra brassicae*	-
8.	*Insecta*	*Homoptera*	*Aphididae*	*Brachycaudus helichrysi*	-
9.	*Insecta*	*Coleoptera*	*Cerambicidae*	*Plagionotus chrysantemi*	-
10.	*Insecta*	*Coleoptera*	*Curculionidae*	*Apion carduorum*	-
11.	*Insecta*	*Diptera*	*Agromyzidae*	*Phytomiza atricornis*	-
12.	*Insecta*	*Diptera*	*Agromyzidae*	*Tryponeva stellata*	-

Pendant l`époque des recherches, on a observer chaque semaine cent (100) plants de la collection universitaire et cent plants de domaine privée. Les observations concérnent les fleurs, les tiges floriferes, les feuilles. On a collecté chaque espèce existante sur les plantes, on lui déterminé et enregistre. Nous avons aussi enregistrer le nombre des individus, l`éstade d`évolution biologique, la densité sur chaque plante, e l`exprésion d`attaque.

Dans la culture de chanterelle de collection universitaire on a signalée les ravageurs suivantes:

- *Brachycaudus helichrysi* (*Homoptera-Aphididae)* présente sur les plants étudie de mai- après septembre, sur 30-40 plante, avec beaucoup des individus. Le pourcentaged`attaque sur la compléte époque de végétation est de 35%. (fig. 1)

Fig. 1-*Brachycaudus helichrysi*

-*Phytomyza atricornis (Diptera-Agromyzidae)* – présente sur les plants étudié en proportion de 10-12%. (fig. 2).

Fig. 2- *Phytomyza atricornis*

-*Tryponeva stellata* (*Diptera*) –presente accidentalment.

-*Mamestra brassicae (Lepidoptera-Noctuidae)* - présente accidentellement.

Dans la culture de chanterelle de l`exploitation particulaire on a signalé les ravageurs suivantes:

- *Brachycaudus helichrysi* (*Homoptera-Aphididae)* - présente sur les plantes étudié en proportion de 35 %.
- *Mamestra brassicae (Lepidoptera-Noctuidae)* - présente sur les plantes étudié en proportion de 10-15%.
- *Phytomyza atricornis (Diptera-Agromyzidae)* - présente sur les plantes étudié en proportion de 5%.

- *Apion carduorum (Coleoptera-Curculionidae*) - présente sur les plantes étudié en proportion de 5%.
- *Lygus pratensis (Heteroptera-Myridae)* - présente accidentellement.

L`espèce dominante, avec un presence de 30-35% sur les plants étudie est *Brachycaudus helichrysi* (*Homoptera-Aphididae).*

Espèce commune en Europe et Amerique, elle est présente dans notre pays dans les plantations du prunier et sur les plants composites, du famille botanique *Compositae*. Se présente sur deux formes : forme ou femelle sans ailles et forme ou femelle avec des ailles.

Les femelles sans ailles sont óvoides, vért-brunès, de 1,5-2,0 mm, avec les yeux rouges et les pattés jaunes.

Les femelles avec des ailles volante sont de 1,5-2,0 mm, comme dimensions, on le tête et le thorax noir, l`abdomen jaune et les ailles irisante.

Le ravageur a comme premier hôte le prunier et comme des hôtes secondaires diverses espèces de *Boraginacea, Asteraceae* et *Scrophulariaceae.* Pendant la époque de végétation présente 8-12 générations.

Les pouilles se localisent sur les rejets fertiles et alterrent la forme de feuilles et des fleurs.

Ainsi on constate des diverses ravageurs sur les plants de chanterelle, mais leur présence n`est pas signifiante pour la production et ne nècesite pas des traitements pour la lutte contre elles.

CONCLUSIONS

- La chanterelle est une plante importante dans la mèdecine traditionnelle et elle est cultivé dans le dèrièr temps sur de surfaces larges, pour produire la mattiéré premier pour des tisanes, extraites alcooliques et des pommades.
- La chanterelle cultivé dans les champs industrielles a quelques ravageurs, comme: *Brachycaudus helichrysi* (*Homoptera-Aphididae), Phytomyza atricornis (Diptera-Agromyzidae)*, *Apion carduorum (Coleoptera-Curculionidae*), *Mamestra brassicae (Lepidoptera-Noctuidae), Lygus pratensis (Heteroptera-Myridae)*.
- La présence des ravageurs dans les champs avec des chanterelles dépende de conditions climatiques, de la présence des divers hérbs au bord de la culture, plants avec des ravageurs communes.
- Ainsi que on signalé diverses espèces des ravageurs, leur densité est négligeable, exception de *Brachycaudus helichrysi* qui est dominant e relativement fréquent sur les plants.
- On a pas fait des traitements chimiques parceque la culture est écologique et la densité des ravageurs ne les nécésites pas.
- On a constaté aussi que la présence de chanterelle est pozitive parceque elle manifeste la propriété de répulsion sur diverses espèces d`insectes, comme les fourmis.

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DIADEGMA GERMANICA HORSTMAN, 1973 (HYMENOPTERA: ICHNEUMONIDAE), AN IMPORTANT PARASITOID OF GRAPE LEAF-ROLLER *SPARGANOTHIS PILLERIANA* (DEN. ET SCHIFF.) LARVAE IN SOUTHERN VINEYARDS OF ROMANIA

DIADEGMA GERMANICA HORST. (HYMENOPTERA: ICHNEUMONIDAE), UN PARAZITOID IMPORTANT CU ROL ÎN LIMITAREA POPULAȚIILOR MOLIEI FRUNZELOR VIȚEI DE VIE, *SPARGANOTHIS PILLERIANA* (DEN. ET SCHIFF.), ÎN UNELE PODGORII DIN SUDUL ROMÂNIEI

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Abstract. *As a result of the rearing of grape leaf-roller Sparganothis pilleriana (Den. et Schiff) larvae collected in 1998, 2000-2003 from two vineyards, Ştefăneşti (Ag) and Dăbuleni (Dj), Diadegma germanica Horst. was obtained as a primary and solitary endoparasitoid. The host parasitizing begins at the end of April or in early May, depending on the local and annual climatic conditions. The flight of the adults of D. germanica resulting from larvae of S. pilleriana is deferred by cca. 10 days as against that of the butterflies of S. pilleriana. Sex-ratio has a sub-unit value: 0.64%. The contribution of that parasitoid to the limitation of grape leaf-roller larvae is 3.4%. The higher value of the parasitization ratio (11.84%) was recorded in Dăbuleni vineyards. The host-parasitoid relationship is new to science.*

Rezumat. *În perioada 2000-2003, în două regiuni viticole din sudul României, Ştefăneşti – Argeş şi Dăbuleni – Dolj, au fost colectate şi crescute în laborator larve de Sparganothis pilleriana (Den. et Schiff.). În urma creşterilor, printre parazitoizii obţinuţi, s-a remarcat ihneumonidul Diadegma germanica Horst., un endoparazitoid primar, larvar şi solitar. Specia a parazitat larve tinere, de vârsta a II- şi a III-a, fiind prezentă în vii încă de la sfârşitul lunii aprilie, începutul lunii mai, în funcţie de condiţiile climatice locale şi anuale. În cadrul complexului de parazitoizi al speciei Sparganothis pilleriana Den. et Schiff., parazitoidul a realizat un procentaj global de parazitare de 2,39%, situându-se pe locul 3 ca importanţă, după Brachymeria intermedia (Nees) şi Nemorilla maculosa (Meig.). Specia este mult mai activă în Dăbuleni decât în Ştefăneşti, procentajul de parazitare atingând 11,84%. Relaţia Diadegma germanica Horst. – Sparganothis pilleriana (Den. et Schiff.) este nouă pentru ştiinţă.*

After the ovophagous parasitoids, those of the young larvae have a major significance in reducing the populations of a large number of agricultural pests, as the latter have a contribution to annihilating the host, before it can cause significant damage. Such a parasitoid is *Diadegma germanica* Horst. There are in the literature few data regarding its role in reducing the pest populations. Like

other species belonging to the genus *Diadegma,* this is a primary, larvar and solitary endoparasitoid (Mills and Carl, 1991). In Romania, the species is noted for the first time by Diaconu (1999), who obtains a ♀ out of a larva of *Hedya pruniana* Hb. (Tortricidae) collected in the village Crăcăoani (NT).

MATERIAL AND METHODS

The observations were carried out in two vineyards in southern Romania, viz. Ştefăneşti and Dăbuleni. The vineyards of Ştefăneşti, located in the central southern region of the Wallachian hills, and characterized by a rather wet and cool climate, presents a small *Sparganothis pilleriana* (Den. et Schiff.) population. In the vineyards of Dăbuleni, located in southern Oltenia near the Danube, with a climate characterized by Mediterranean influences, the *S. pilleriana* population is well developed. The host larvae were done over the period of activity of the host, i.e. May to July, in the years 1998, 2000-2003. The caterpillars were reared in isolation up to the apparition of tortricid or parasitoid adults, their food being the vine leaves. 28 individuals of *Diadegma germanica* Horst. were produced under laboratory conditions.

RESULTS AND DISCUSSIONS

The species *Diadegma germanica* Horst. is obtained for the first time out of larvae of *Sparganothis pilleriana* (Den. et Schiff.).

As other species of *Diadegma*, the present one parasitizes young larvae, and the parasitized caterpillar continues its development without seeming to be affected by the presence of the parasitoid (Bărbuceanu, 2007).

After the larva of *D. germanica* reaches its complete stage of development, it begins to wave its cocoon, without however getting away from the remains of the parasitized larva.

At the beginning, the cocoon is coloured uniformly, but after cca. 24 hours a median transversal ring appears, of a darker colour. The cocoon is oblong, of a regular shape, and its size has seen a variation during the period of the study, from 4 mm to 6 mm in length, and from 1.5 mm to 2 mm in breadth.

The colour of the cocoons under observation has varied from a transparent shade of whitish-cream to cream, and cream-brownish, even black in a cocoon collected in Ştefăneşti, in the year 2003.

The outer shell of the cocoon is made up of two layers, one internal, of significant substance, and of a darker colour and another one, placed outwardly, and made up of a slighter fabric of whitish-cream silky threads, which give further nuances shades to the cocoon's colour. The median ring is narrow and, as a rule, rather clearly coloured.

Out of the smaller cocoons, which were on average as big as 4.96/1.73 mm, the males hatched, and out of the larger cocoons, sized from 5.18 mm to 1.81 mm, merged the females, which are normally bigger than the males.

The eclosion of the adults' takes place through an opening located in a terminal area, sometimes slightly laterally, having more or less jagged sides.

The parasitoid's period of activity

The parasitoid is present in the vineyards as early as the end of April and the beginning of May, in keeping with the local and annual climatic conditions.

In the vineyard at Dăbuleni, in the conditions of the year 2000, the first parasitized larvae of *S. pilleriana* Den. et Schiff. were collected on the 9th May; the parasitoid was also present in the cocoon stage, which means that the parasitizing occurred in the latter half of April; the larvae of *S. pilleriana* Den. et Schiff. collected on the 26th May were parasitized as well. In 2002, the first parasitized larvae were collected on the 27th May.

The flight of the adults of *D. germanica* which resulted from the larvae of *S. pilleriana* collected in the year 2000 at Dăbuleni was extended over the period 22 May – 9 June, so the whole duration was of nearly three weeks. The flight of the parasitoid was deferred by cca. 10 days, as compared to that of the butterflies of *S. pilleriana* (Fig. 1).

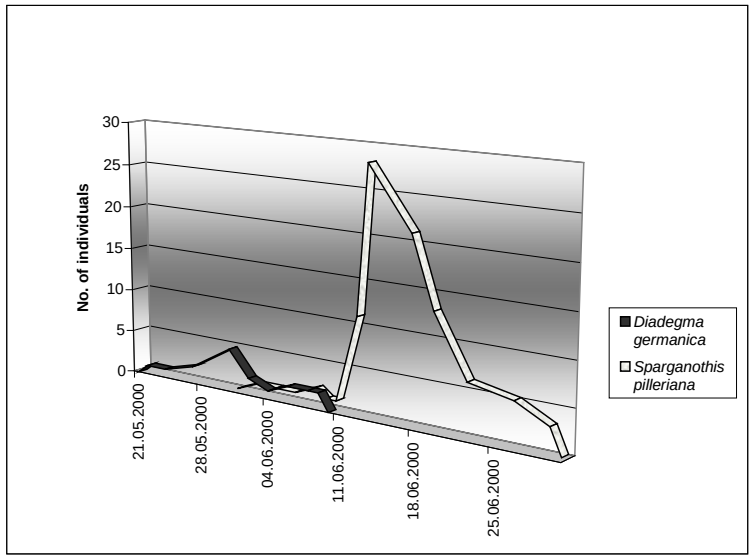

Fig. 1. The dynamics of the occurrence of the adults of *Diadegma germanica* Horst. and *S. pilleriana* (Den. et Schiff.) out of caterpillars collected at Dăbuleni, in 2000

In the location of Ştefăneşti, the parasitised larvae of *S. pilleriana* (Den. et Schiff.) were collected on the 19th May and 4th June 2002, and on the 1st June 2003 the parasitoid was also collected in the cocoon stage. It seems that the parasitising of the young larvae ocurred over the month of May; the adults hatched on the 13rd June 2002.

Fed on sugar syrup, the adults of *Diadegma germanica* Horst. lived for 7-20 days.

Sex-ratio

In 2000, in Dăbuleni 18 specimens of *D. germanica* were obtained out of larvae of *S. pilleriana*, out of which 7♂♂ and 11 ♀♀. The sex-ratio has a sub-unit value: 0.64% (Fig. 2)

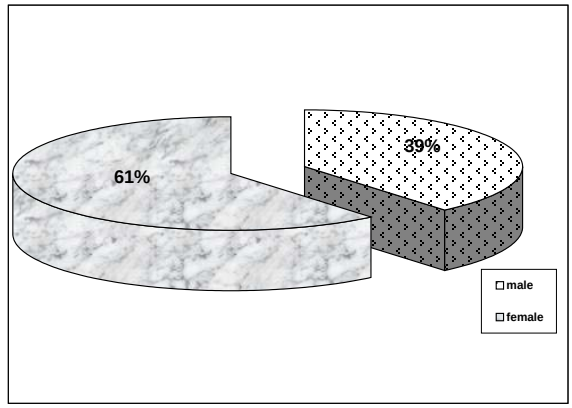

Fig. 2. Sex ratio of *Diadegma germanica* obtained from *Sparganothis pilleriana* (Den. et Schiff.) caterpillars - Dăbuleni, in 2000

The importance of the species in reducing the host larvae

The fact that the species attacks young larvae accounts for its being extremely valuable in reducing the populations of *Sparganothis pilleriana* (Den. et Schiff.).

The parasitoid achieved a global percentage of parasitizing the larvae of *Sparganothis pilleriana* Den. et Schiff. of 3.4% (Table 1). In Dăbuleni, the parasitizing percentage was of 4.96%.

The species was come across in the years 2000 and 2002, its presence being more visible in the year 2000, when it was the main larvar parasitoid, contributing to annihilating the larvae in a proportion 11.84%; in the year 2002, the percentage of parasitizing of *S. pilleriana* Den. et Schiff. larvae was 2.29% (Fig. 3).

In Ştefăneşti, the activity of the species was more reduced, and the global parasitizing percent achieved was of 1.75%. *D. germanica* Horst. was obtained only in the years 2002 and 2003, and the parasitizing percentages of the larvae recorded low values (Fig. 4). Its absence in the other years was probably due to the small number of samples, or its preference for other hosts.

Table 1

The role of *D. germanica* in reducing of. *S. pilleriana* (Den. et Schiff.) **larvae**

Locality	Year	No. of larvae collected	No. of larvae parasitized	%	*Diadegma germanica*	
					No.	%
Ştefăneşti (AG)	1998	24	4	16.67	-	-
	2000	48	9	18.75	-	-
	2001	103	10	9.71	-	-
	2002	118	13	11.02	4	3.39
	2003	107	24	22.43	3	2.80
Subtotal		400	60	15	7	1.75
Dăbuleni (DJ)	2000	152	33	21.71	18	11.84
	2001	140	31	22.14	-	-
	2002	131	13	9.92	3	2.29
Subtotal		423	77	18.2	21	4.96
Total		823	137	16.65	28	3.4

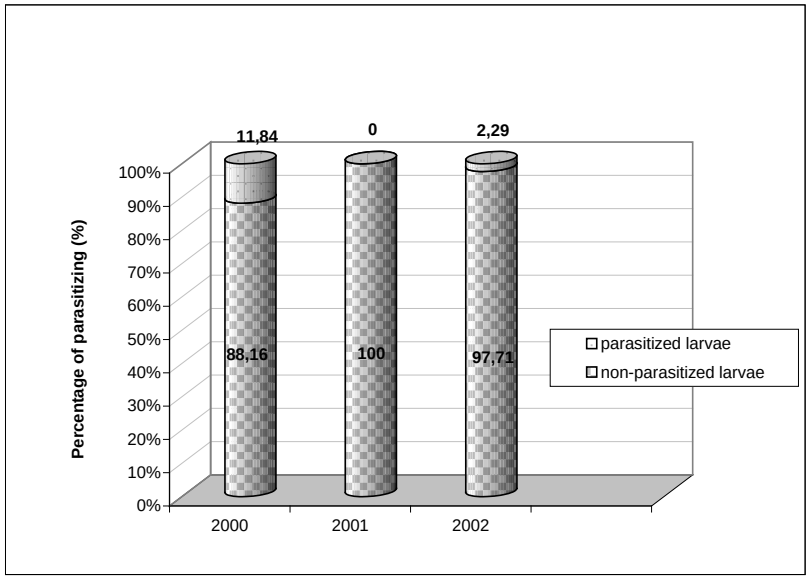

Fig. 3. The percentage of parasitizing of *Sparganothis pilleriana* caterpillars by *Diadegma germanica* Horst., in Dăbuleni

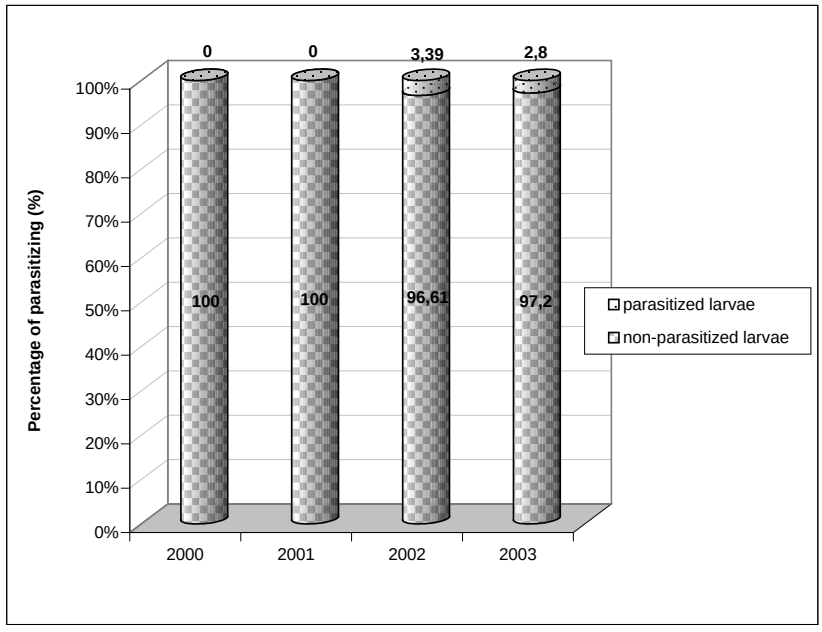

Fig. 4. The percentage of parasitizing of *Sparganothis pilleriana* caterpillars by *Diadegma germanica* Horst., in Ştefăneşti

CONCLUSIONS

The fact that the species attacks young larvae makes it a highly valuable in reducing the populations of *Sparganothis pilleriana* Den. et Schiff.

The host parasitizing begins in the end of April or in the early of May, depending on the local and annual climatic conditions.

The flight of the adults of *D. germanica* resulting from larvae of *S. pilleriana* was deferred by cca. 10 days as compared to that of the butterflies of *S. pilleriana.*

The sex-ratio recorded a sub-unit value, i.e. 0.64%.

The contribution of that parasitoid to the limitation of the grape leaf-roller larvae is of 3.4%.

The species was much more active in Dăbuleni, where a value of 11.84% was recorded in parasitizing the larvae.

The *Diadegma germanica* Horst. – *Sparganothis pilleriana* (Den. et Schiff.) relationship is new to science.

ACKNOWLEDGEMENTS

We wish to express our sincere thanks to Professor Constantin Pisică, PhD of the "Al. I. Cuza" University of Iaşi, the Faculty of Biology, who identified the *Diadegma germanica* species.

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THE EVOLUTION OF *BLENNOCAMPA PUSIILA* KLUG. PEST AND THE SETTLEMENT OF TREATMENTS WARNING GRAPHICS

EVOLUȚIA DĂUNĂTORULUI *BLENNOCAMPA PUSIILA* KLUG. ŞI ÎNTOCMIREA GRAFICULUI DE AVERTIZARE A TRATAMENTELOR

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Abstracts. *In the ecological conditions from Iassy we followed the evolution of Blennocampa pusilla Klug. After making different observations it was established that this species has one generation per year. Synthesis tables were made for Blennocampa pusilla Klug. species. The authors created pest biological fiches based on these tables. The biological, ecological and phenological criteria were the factors taken into consideration for settling down the treatments warning graphics. Evolution and warnings graphics for treatments were based on biological, ecological and phenological criteria. One treatment was warned for every year.*

Rezumat. *În condițiile ecologice de la Iaşi s-a urmărit evoluția viespii sucitoare a trandafirului – Blennocampa pusilla Klug. În urma observațiilor făcute s-a stabilit că acest dăunător prezintă o generație pe an. S-au întocmit tabelele de sinteză a speciei Blennocampa pusilla Klug. pe baza cărora s-au întocmit fişele biologice ale dăunătorului. Graficele de evoluție şi avertizare tratamentelor s-au întocmit pe baza criteriilor: biologic, ecologic şi fenologic. Pe baza datelor criteriilor: biologic, ecologic şi fenologic s-au întocmit graficele de avertizare a tratamentelor. S-a avertizat câte un tratament pentru fiecare an.*

MATERIAL AND METHOD

There were done the synthesis tables for *Blennocampa pusilla Klug.,* in which are presented the development stages and their duration, depending by the active temperatures amount.

The warning of the treatments was elaborated using the following criterions:

1) *The biological criterion* – which consist in surveillance of the pest biological development;
2) *The ecological criterion* – climatic conditions registration: air temperature, air humidity and the rainfalls.
3) *The phenological criterion* – surveillance of the growing and flowering stages of the rose.

The data provided by these criterions, were enrolled in a diagram and, from their correlation, resulted the warnings. The evolution diagrams and the warnings (presented in **1, 2** and **3 figures**) issued from the data provided by the three criterions: biological, ecological and phenological one.

The rose wasp *Blennocampa pusilla Klug*. had one year generation. In this situation was applied one chemical treatment.

In the year of **2004**, the treatment was warned between 05 July and 12 July, in the year **2005** between 03 July and 10 July, and in the year **2006** between 01 July and 08 July.

There were used the following chemical products:

- Fastac 10 EC, in 0,02% concentration;
- Talstar 10 EC, in 0,04% concentration;
- Reldan 40 SC, in 0,08% concentration.

RESULTS AND DISCUSSIONS

In the tables number 1, 2 and 3, are presented the synthesis data for *Blennocampa pusilla Klug.* specie, for 2004-2006 period, which reveal that this specie has one year generation and resist during the winter time in the soil, as a larva.

In the diagrams number 1, 2 and 3, are presented the evolution and the treatments' warnings for *Blennocampa pusilla Klug.*, for the three years tacked into consideration.

Table 1

The synthesis table for *Blennocampa pusilla* Klug.
in the year 2004, for the laşi county ecological conditions

Nr. crt.	Biological stage of the development	The first apparition data	The last apparition data	The active temperatures amount $\Sigma(t_n-t_0)$
1.	Poop	27 IV	10 V	52,4
2.	Adult (G_1)	11 V	16 VI	297,6
3.	Egg	12 VI	19 VI	340,5
4.	Larva	20 VI	winter	679,4

t_0 = 9ºC – the inferior threshold for development, from which the pest begin its activity in the spring

Table 2

The synthesis table for *Blennocampa pusilla* Klug.
in the year 2005, for the laşi county ecological conditions

Nr. crt.	Biological stage of the development	The first apparition data	The last apparition data	The active temperatures amount $\Sigma(t_n-t_0)$
1.	Pupă	28 IV	19 V	95,4
2.	Adult (G_1)	20 V	17 VI	310,4
3.	Ou	15 VI	30 VI	520,2
4.	Larvă	31 VI	iernează	720,0

t_0 = 9ºC – the inferior threshold for development, from which the pest begin its activity in the spring

Table 3

The synthesis table for *Blennocampa pusilla* Klug.
in the year 2006, for the laşi county ecological conditions

Nr. crt.	Biological stage of the development	The first apparition data	The last apparition data	The active temperatures amount $\Sigma(t_n-t_0)$
1.	Pupă	24 IV	11 V	72,6
2.	Adult (G_1)	12 V	16 VI	210,7
3.	Ou	14 VI	24 VI	480,1
4.	Larvă	25 XI	iernează	610,2

t_0 = 9ºC – the inferior threshold for development, from which the pest begin its activity in the spring

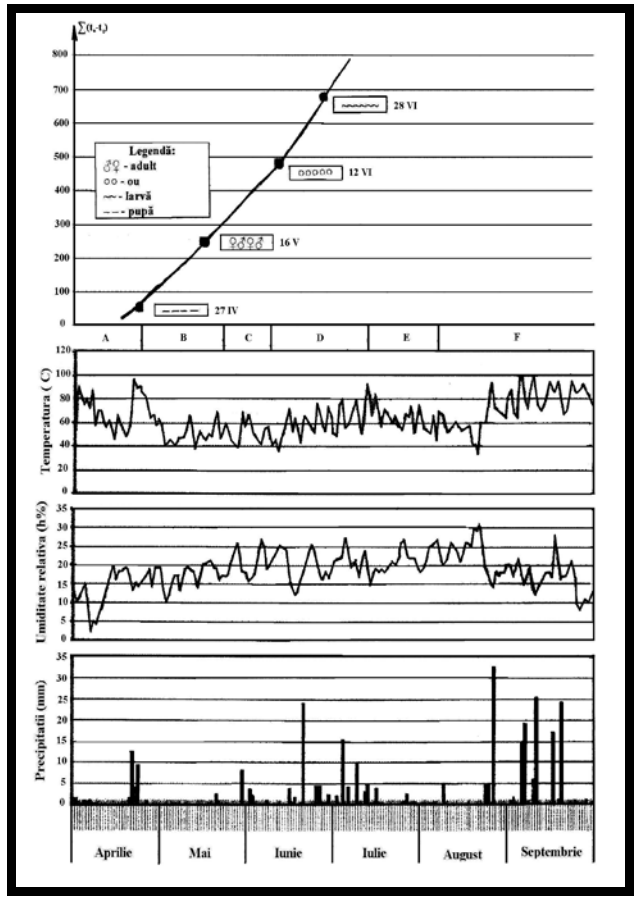

Fig. 1. THE EVOLUTION DIAGRAM AND THE TREATMENTS' WARNINGS FOR THE BLENNOCAMPA PUSILLA KLUG. SPECIE, IN THE YEAR 2004

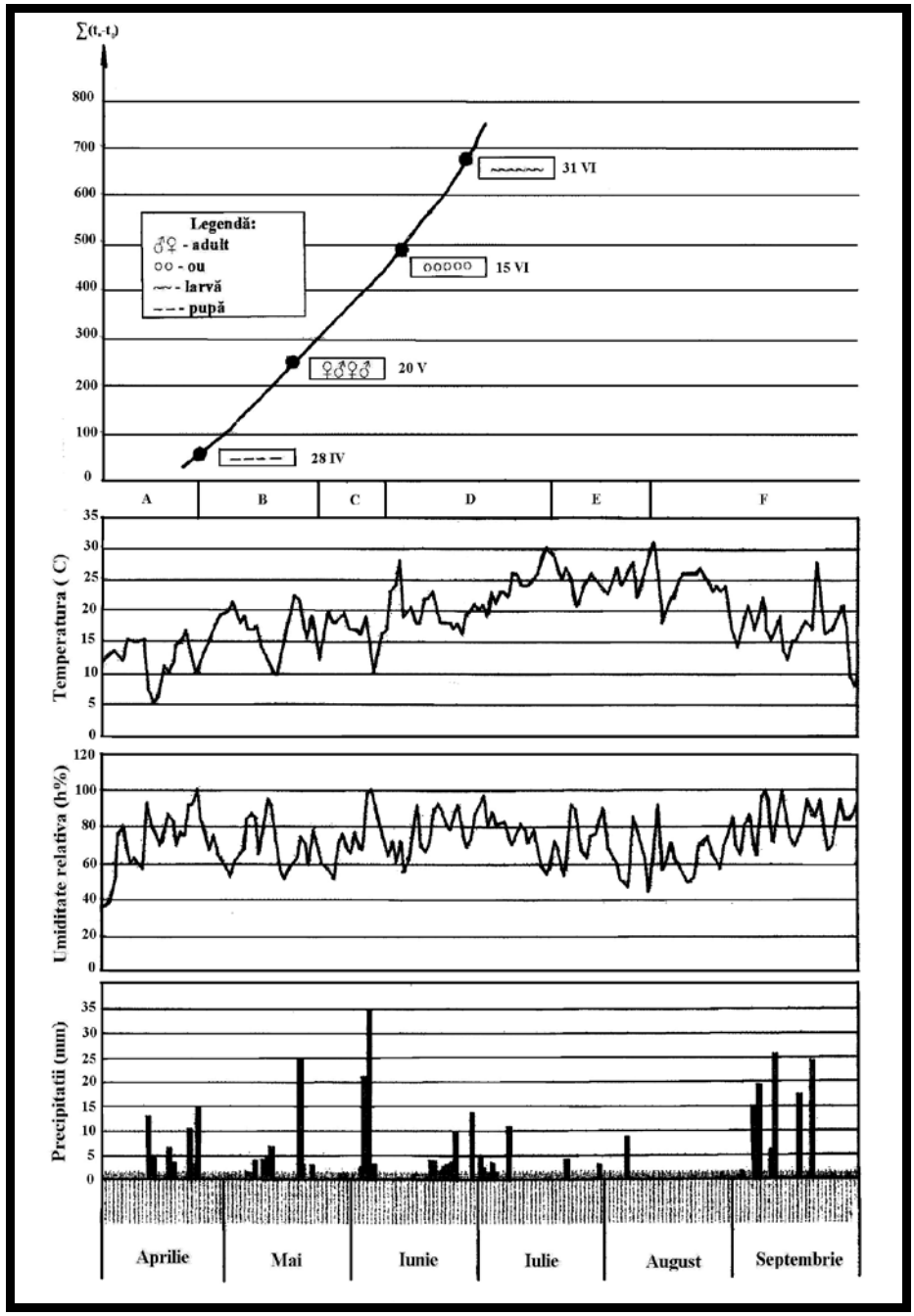

Fig. 1. THE EVOLUTION DIAGRAM AND THE TREATMENTS' WARNINGS FOR THE BLENNOCAMPA PUSILLA KLUG. SPECIE, IN THE YEAR 2005

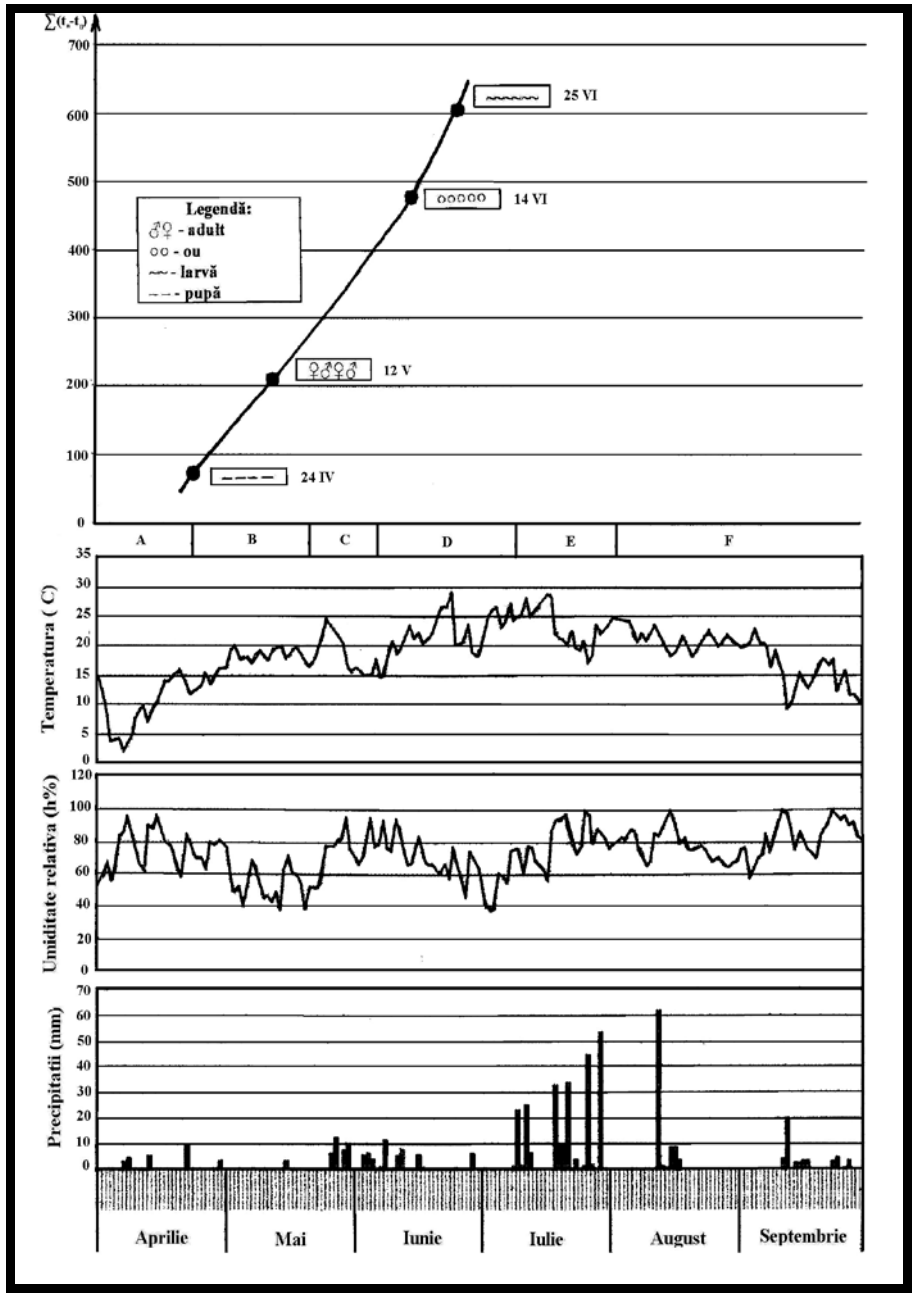

Fig. 3. THE EVOLUTION DIAGRAM AND THE TREATMENTS' WARNINGS FOR THE BLENNOCAMPA PUSILLA KLUG. SPECIE, IN THE YEAR 2006

CONCLUSIONS

In the ecological conditions of the Iassy county, the roses' wasp *Blennocampa pusilla Klug.* has one generation, that evolved as it follows:

•G_I = 11 May – 20 June;

The rebuttal of *Blennocampa pusilla Klug.* specie, based on the warned treatments application, according to the pest evolution and in correlation with the temperature, humidity of the air and the rainfalls.

Tacking into account the biological and ecological data obtained, was warned a treatment for the first generation G_I.

In the year **2004**, the treatment was warned as it follows:

T1 = 05 July – 21 June for G_I generation;

In the year **2005**, the treatments period was:

T1 = 03 July – 10 July for G_I;

In the year **2006**, the treatment period was:

T1 = 01 July – 08 June for G_I.

The treatment for every generation were based on organophosphoric and pyretroides products:

- Fastac 10 EC in concentration by 0,02%;
- Talstar 10 EC, in concentration by 0,04%;
- Reldan 40 SC, in concentration by 0,08%.

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DYNAMICS OF POPULATIONS OF APPLE MINING MOTHS CORRELATED WITH THEIR NATURAL ENEMIES IN DIFFERENT CONDITIONS OF PHYTO-SANITARY PROTECTION

DINAMICA POPULAȚIILOR DE MOLII MINIERE CORELATĂ CU DUŞMANII LOR NATURALI ÎN CONDIȚII DIFERITE DE PROTECȚIE FITOSANITARĂ A MĂRULUI LA SCDP IAŞI

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Abstract. *Observations were effectuated comparatively in 2007 on two surfaces of intensive apple culture from SCDP Iaşi, farm no. 6 Sârca, one being treated conventionally (blank test) and another one without treatments with chemical insecticides (ecologically). On both surfaces predominated the species Phyllonorycter blancardella F., Phyllonorycter corylifoliella Hbn., but we also noticed sporadically the species Stigmella malella and Leucoptera malifoliella.*

Rezumat. *Observaţiile s-au efectuat în cursul anului 2007, în mod comparativ pe două loturi de măr intensiv din cadrul SCDP Iaşi, ferma nr. 6 Sârca, unul fiind tratat convenţional (martor) şi altul fără tratamente cu insecticide chimice (ecologic). Pe ambele suprafeţe au predominat speciile Phyllonorycter blancardella F., Phyllonorycter corylifoliella Hbn., sporadic fiind semnalate şi speciile Stigmella malella şi Leucoptera malifoliella .*

In Romanian we know as pests in the tree plantations a number of 21 species of mining micro-Lepidoptera belonging to the order Lepidoptera.

On the apple plantations from SCDP Iaşi we encountered the following species: *Phyllonorycter corylifoliella, Phyllonorycter blancardella, Stigmella malella* and *Leucoptera scitella.* Among these, predominant were the species *Phyllonorycter corylifoliella* and *Phyllonorycter blancardella.*

MATERIAL AND METHOD

The researches on the dynamics of populations of mining moths were effectuated in 2007 on an intensive apple tree plantation situated at SCDP Iaşi.

We made observations on the predominant species *Phyllonorycter corylifoliella* Hbn. and *Phyllonorycter blancardella* F.

For both species, we pursued the dynamics of evolution of attack correlated with their natural enemies and the average density of mines on leaves in conditions of chemical and biologic fighting**.**

RESULTS AND DISCUTIONS

According to the researches made by Baggiolini (1960), Pătrăşcanu Elena (1963), Drosu Sonica (1996), Frasin Loredana (2005), both the plated miner and the marbled moth have 3 generations /year.

In ecologic conditions, in 2007 the first adults appeared in the interval June 8^{th} -11^{th}.

In tables no. 1 and 2 we present the dynamics of evolution of attack for *Phyllonorycter corylifoliella* Hbn and *Phyllonorycter blancardella* F. correlated with their natural enemies in conditions of chemical and biologic fighting.

Thus, the biologic fighting was made by launching trichogramma, wasps obtained at the Institute for Biologic Researches Iasi whereas the chemical fighting was made by means of insecticides.

From table no. 1 it results that for the ecologic variant from a total of 291 leaves analyzed, 236 leaves were attacked, namely 81%. From these 181 (76,7%) were mined by *Phyllonorycter corylifoliella* Hbn., 16 (11.4%) by *Phyllonorycter blancardella* F and 41 (17,4%) leaves were mined by both species.

For the chemical variant we analyzed 174 leaves out of which only 5 (29,3%) were attacked.

From table no. 2 it results that for the ecologic variant from a total of 111 leaves analyzed, 55 leaves presented mines with larvae unattacked (larvae, pupae or live pupal exuviae), 32 leaves (28,8%) contained mines with ravaged larvae (dead) and 24 (21,6%) contained parasitized larvae.

For the chemical variant we analyzed 92 leaves out of which 39(42,3%) presented mines with unattacked larvae, 20(21,7%) larvae with unattacked mines, 20 (21,7%) with ravaged larvae 33 (354,8%) parasitized larvae.

Both variants had on the surface of their leaves one mine, 2 or even 3 with *Phyllonorycter corylifoliella* Hbn., *Phyllonorycter blancardella* F. and with both species (tab. 3).

For example, for the ecologic variant the highest density was 9 mines / leaf both with *Phyllonorycter corylifoliella* Hbn. and *Phyllonorycter blancardella* F.

Table 1

Dynamics of evolution of attack of the mining moths (*Phyllonorycter corylifoliella* and *Phyllonorycter blancardella*) correlated with their natural enemies in conditions of chemical and biologic fighting

Variant	Leaves analyzed	Out of witch followed species:							
		Total Leaves attacked		Phyllonorycter corylifoliella Hbn		Phyllonorycter blancardella F.		Phyllonorycter corylifoliella Hbn + Phyllonorycter blancardella F.	
		Number	%	Number	%	Number	%	Number	%
ECOLOGIC	291	236	81	181	76,7	16	11,4	41	17,4
CHIMIC	174	51	29,3	34	66,7	7	13,7	10	19,6

Table 2

Effect of enthomophagous (predators and parasites) on the mining larvae depending on the fighting system

Variant	Larvaes analyzed	Larvaes unattacked		Larvaes ravaged		Larvaes parasitized	
		Number	%	Number	%	Number	%
ECOLOGIC	111	55	49,5	32	28,8	24	21,6
CHIMIC	92	39	42,3	20	21,7	33	35,8

CONCLUSIONS

- In 2007, on the apple tree plantations from SCDP Iaşi, *Phyllonorycter balncardella* F. and *Phyllonorycter corylifoliella* Hbn. predominated as mining species.
- For the ecologic variant, the species *Phyllonorycter corylifoliella* Hbn registered a damaging attack of 76,7%, and for the chemical variant a damaging attack of 66,7%.
- For the species *Phyllonorycter blancardella F*., the percentage of mined leaves was 11,4% for the ecologic variant whereas for the chemical variant it was 13,7%.
- The highest density of mines on leaves was registered for the species *Phyllonorycter corylifoliella* Hbn (102 leaves with more than 3 mines).

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EVOLUTION OF THE DEGREE OF ATTACK OF TORTRICIDS AT APPLE TREES IN THE ECOLOGIC CONDITIONS FROM SCDP IAŞI

EVOLUȚIA NIVELULUI DE ATAC AL TORTRICIDELOR CARPOFAGE LA MĂR, EXPLOATAT ÎN CONDIȚII ECOLOGICE LA SCDP IAŞI

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Abstract. *The experiments were effectuated within the farm no. 6 Sârca of SCDP Iaşi, on an intensive apple tree plantation with the breeds Idared, Jonathan and Generos. On a surface of 1 ha they eliminated the chemical treatments to fight against the specific pests and they were replaced by other means of fighting such as oophagous wasps of the type Trichogramma (Hym.,Trichogrammatidae). They used as a blank test a similar surface exploited conventionally. The evolution of the attack degree was pursued comparatively for the main species of apple tortricids, apple worm - Cydia pomonella L. and fruit skin moth - Adoxophyes orana Hbn.*

Rezumat. *Experienţele s-au efectuat în cadrul fermei nr. 6 Sârca, a SCDP Iaşi, într-o plantaţie intensivă de măr cu soiurile Idared, Jonathan şi Generos.Pe o suprafaţă de 1 ha au fost eliminate tratamentele chimice pentru combaterea dăunătorilor specifici, acestea fiind înlocuite cu alte mijloace de combatere, aşa cum sunt viespile oofage din genul Trichogramma (Hym.,Trichogrammatidae). Ca martor s-a folosit o suprafaţă similară exploatată convenţional. Evoluţia nivelului de atac a fost urmărită în mod comparativ la principalele specii de tortricide ale mărului, viermele merelor - Cydia pomonella L. şi molia pieliţei fructelor - Adoxophyes orana Hbn.*

At present, both on the international and national level they intensified researches on the biologic fighting against diseases and pests to reduce the pollution of the environment and to eliminate the toxic wastes from fruits.

Among the useful zoophagous insects, Trichogramma spp. has the largest use in fighting against pests in fruit growing.

MATERIAL AND METHOD

The experiment was effectuated at farm no. 6 Sârca, on an intensive apple tree plantation of 1 ha with the breeds Idared, Jonathan and Generos. On this surface they eliminated the chemical treatments to fight against the specific pests and they

were replaced by other means of fighting such as oophagous wasps of the type Trichogramma. These were obtained and prepared at the Institute for Biologic Researches of Iaşi. They used as a blank test a similar surface exploited conventionally (chemically).

Observations and determinations effectuated focused on the density of butterflies, the flight periods and the percentage of fruits attacked by the two species.

The climatic conditions, especially temperature, influence significantly the evolution and attack of the species *Cydia pomonella* L and *Adoxophyes orana* Hbn.
The average and maximum daily and monthly temperatures from 2007 were favourable for the development of pests (table 1). For example, since April, they registered an average temperature of 11,0^{0}C, reaching up to 25,2 ^{0}C in July. The maximum temperature reached 38,8^{0}C in May and 40,0^{0}C in July what favors the evolution of pests.

Table 1

The main climatic conditions from march-September 2007

Month	Temperature ^{0}C			Rainfalls	HUMIDITY
	MEDIUM	MINIMUM	MAXIMUM		
III	8,1	-2,0	22,6	26,7	71
IV	11,0	0,8	24,7	29,6	59
V	19,6	0,0	38,8	33,4	62
VI	23,1	12,5	36,5	22,0	60
VII	25,2	11,4	40,0	45,0	54
VIII	22,0	11,3	37,1	112	75
IX	16,0	4,3	26,7	87,8	79

RESULTS AND DISCUSSIONS

On the surface of 1 ha (ecologic experiment), where they did not apply treatments with insecticides, the fighting was made by means of Trichogramma. In 2007, at SCDP Iaşi they made 5 launches.

The launching of trichogramma found at the beginning (hatching) of appearance of adults was effectuated manually by introducing the little plates in the tree canopy. They placed a little plate every 5 trees.

The optimum moment of launching the trichogramma was established by using the information supplied by the traps with synthetic sexual pheromones of the type AtraPOM, for Cydia pomonella L and ATRARET for *Adoxophyes orana* Hbn. Thus, the first adults of *Cydia pomonella* L. were captured on May 8th.

The first launching was made on April 24th, the other being effectuated at an interval of about three weeks on the following dates: (May 9th, May 28th, June 11th, July 11th).

On the plot exploited conventionally (chemically) they effectuated a number of five treatments presented in (table 2).

Table 2

Chemical treatments applied to fight against the main apple pests – 2007 SCDP Iaşi

Trat	Pests	Dates of effectuate	Insecticides	Substance Activ	Dose l,kg/ha
1	*Cydia pomonella* G1T1, *Adoxophyes orana* and others	14 mai	Calypso 480 SC	Tiacloprid	0,4
2	*Cydia pomonella* G1T2, A*doxophyes orana* and San Jose	29 mai	Palas 50 EC	Malation	4,5
3	*Cydia pomonella* G2 T1, and others	22 iunie	Mospilan 20 SP	Acetamiprid	0,3
4	*Cydia pomonella* G2T2	5 iulie	Reldan 40 EC	Clorpirifos	2
5	San Jose, *Cydia pomonella, Adoxophyes orana* and others	17 iulie	Calypso 480 SC	Tiacloprid	0,4

The effectiveness of the biologic methods by means of Trichogramma was expressed by the frequency of the fruits attacked, existing on the tree when harvesting (table 3). Determinations were effectuated by 10 trees per variant (diagonally).

Table 3

Frequency of fruits attacked on the tree when harvesting in 2007

Variant/variety	Fruits analysed	Fruits unattecked		Fruits attacked				Fruits total attacked	
				Adoxophyes orana		Cydia pomonella			
		number	%	number	%	number	%	Number	%
ECOLOGIC	138	43	31	50	69	40	55,2	90	65,2
CHIMIC	130	121	93	4,8	3,0	5	3,8	2	6,9

From table no. 3 it results that from a total of 138 fruits analysed, for the ecologic variant, 43 (31%) fruits remained unattacked and 90 (65,2%) were attacked. Among these 50 (69%) were attacked by *Adoxophyes orana* Hbn. and 40 (55,2%) by *Cydia pomonella* L. We must mention that the attack of the apple worm was quite drastic so that at the beginning of the harvesting a large number of apples had fallen due to the stings. This year they might have started the creation of a balance between the populations of parasites-predators and those of the main apple pests.

For the chemical variant they analyzed 130 fruits out of which 121 (93,0%) remained unattacked and 9 (6,9%) were attacked. From these, 4 (3,0%) were attacked by *Adoxophyes orana* Hbn. and 5 (3,8%) by *Cydia pomonella* L.

CONCLUSIONS

1. In 2007, at SCDP Iaşi, the climatic conditions were favourable for the evolution and attack of the apple worm and the fruit skin moth.

2. After observations, the percentage of fruits attacked was 65,2% for the variant to which they applied the method of biologic fighting as compared to 6,9% fruits attacked for the blank test variant, chemically treated.

3. After the first year of research, the biologic effectiveness of *Trichogramma embryophagum* was 34,8%

4. As for the chemical method, the effectiveness of the treatments applied was 90,4%.

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RESULTS OBTAINED REGARDING THE CONTROL OF THE HARMFUL ORGANISMS FOR THE VINEGRAPE, USING A TECHNOLOGICAL SCHEME WITH POLLUTION LOW RISK

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Abstract. *In the vineyard from the Didactical Station Banu Maracine, in the climatic conditions of the year 2007 we have applied a treatment scheme with low risk of pollution, focused on the reorientation of the viticultural system toward technologies based on biological principles in order to improve the self-adjustment capacity of the viticultural ecosystem. As a result in 2007, in the vineyard of the S.D. Banu Maracine we have applied a technological scheme focused on destroing the weeds only through the mechanical weeding on the interval between the rows and manual weeding on the rows, for controling the diseases there has been used inorganic products accepetd by the biological viticulture and less products of organic synthesis, and for controling the pests there has been used products with low degree of toxicity from the pyrethrinoids group and biological products, as well a series of bio-technological methods based on the male mass traping.*

Rezumat. *În plantațiile de viță de vie din Stațiunea Didactică Banu Mărăcine în condițiile climatice ale anului 2007 am aplicat o schemă de tratament cu risc redus de poluare vizând reorientarea sistemului de producție viticolă spre tehnologii bazate mai mult pe principii biologice în vederea ameliorării capacității de autoreglare a agroecosistemului zonal. Ca urmare în anul 2007, în plantația de viță de vie a Stațiunii Didactice Banu Mărăcine ne-am propus să aplicăm o schemă tehnologica în care s-a avut în vedere distrugerea buruienilor numai prin lucrarea de prășit care s-a efectuat mecanic pe intervalul dintre rânduri și manual pe rând, în combaterea bolilor s-au utilizat preponderent produse anorganice acceptate în cadrul viticulturii biologice și mai puțin produse de sinteză organică, iar pentru combaterea dăunătorilor animali s-au folosit produse cu grad redus de toxicitate din grupa piretrinoizilor și a preparatelor biologice, precum și o serie de metode biotehnologice bazate pe capturarea în masă a masculilor.*

In order to establish the control technological scheme in viticulture, we have to use the products with mixt action and less toxic, using the right doses (1,3), for reducing the number of treatments, promoting the biological products and biological methods used for controling the diseases and pests, decreasing the negative effects of the chemical treatments (2).

MATERIALS AND METHODS

The treatment scheme has been applied at the variety Fetească albă on a surface of 2500 m^2, made from 700 vine logs.

The control of the weeds has been made through mechanical weeding between the rows and manual weeding on the rows.

The products used, and the number of treatments are presented in the technological scheme scheme for controling the diseases, pests and weeds.

The control degree of the weeds has been estimated by numbering the weeds species on m^2 after the weeding.

The evolution of the phytopathgen agents has been followed through direct observation in the field and determination in the laboratory with the microscop ML 4, establishing the spectrum of the phytopathogen agents active during the vegetation period. The pathogen agents attack has been recorded on different organs (leaves, grapes). The observation has been made on 200 organs, recording the frequency and intensity on the scale 0-6 and there has been calculated the attack degree for each pathogen.

The density of the acarian populations has been estimated through visual controls during the vegetative repose and the vegetation period, prevailing samples and analyze of the collected samples in field and laboratory. Also, has been calculated: the attack frequency and intensity, as well the attack degree.

The surveillance of the moth generation has been made on the capture recorded in the pheromonal traps ***atraBOT***, ***atraAMBIG*** (fig. 5), and ***atraPil*** (fig. 6). The pheromonal traps has been installed at the end of Aprilie begining of May, 3 traps/ha. The reading of the traps has been made every 7 days, the captured butterflies being recorded and removed with, the replace of the pheromonal capsule and the adhesive parts of the traps has been made every 4-5 weeks. For capturing other insects species there has been used food traps and yellow sticky plates.

RESULTS AND DISCUSSIONS

The The year 2007 has been characterized by an excesive droughtnes climate with very high temperature during winter-spring and spring-summer (table 1).

Regarding the air relative humidity, had low values during April-September of 36%-66%, which favorized the instalation of a very accented hydric stress climat. We have to notify the droughtness climat, with pluvio-metric deficite of 42,8 mm respectively 48,6 mm (table 2). Besides the fact that there has been recorded a long period of droughtness, the air average temperature during the vegetation period, has been higher than the multiannual average (table 1).

Table.1

The climatic conditions during the research period (2006-2007)

Month	Average temperature (°C)		Rainfall (mm)		Relative humidity (%)
	Monthly average	Multiannual monthly average	Monthly sum	Multiannual monthly sum	
2006					
October	12,4	11,4	13,0	39,2	75,0
November	7,4	5,6	7,0	47,0	73,0
December	1,6	0,2	32,0	45,0	90.0
2007					
January	5,5	-2,6	17,6	36,4	69,0
February	4,0	-0,2	36,9	31,4	72,0
March	7,6	4,8	51,3	35,0	64,0
April	12,9	11,4	0,0	42,8	46,0
May	18,7	16,8	93,6	61,7	60,0
June	23,0	20,9	57,6	63,8	57,0
July	26,5	22,1	5,6	54,6	36,0
August	23,0	22,0	148,6	43,6	66,0

Month	Average temperature (°C)		Rainfall (mm)		Relative humidity (%)
	Monthly average	Multiannual monthly average	Monthly sum	Multiannual monthly sum	
September	15,6	17,5	65,6	38,0	71,0
Total/Average		10,8		538,5	

There has been used the following technological scheme for controling the diseases, pests and weeds:

Nr. crt.	Phenophase	Harmful organism	Products	Dose %	Observation
1	Copse de 5 – 10 cm	Uncinula necator, acarians, scale, moths	Sulphur Pheromonal traps Talstar 10 EC	4 kg/ha 3 trap./ha 0,3 l/ha	
2	Copse de 30 – 50 cm	Plasmopara viticola Elsinoë ampelina Pseudopeziza tracheiphilla Uncinula necator moth G_1 weeds	Champion 50 WP Sulfomat PU Pheromonal traps	3,0 Kg/ha 4,0 Kg/ha 3 buc./ha Weeding	Before the treatment there has been made the weeding Mechanical weeding on the interval and manual weeding on the row
3	Before blooming	Plasmopara viticola Uncinula necator moth G_1	Alcupral 50 PU Sulf muiabil Faster 10 EC Pheromonal traps	3 Kg/ha 4,0 Kg/ha 0,3 l/ha 3 buc/ha	Safety obligatory treatment
4	After blooming	Plasmopara viticola Elsinoë ampelina Pseudopeziza tracheiphilla Uncinula necator Botryotinia fuckeliana	Mikal M Sulphur Teldor 500 SC Pheromonal traps	3,5 kg/ha 4 kg/ha 0,8 l/ha 3 buc/ha	Safety treatment High pression for infection, imposed a treatment with an systemic product Critical stage, the treatment it's preventive very important for later control of the disease
5	The grapes grow	Plasmopara viticola Uncinula necator Acarieni, scale chafer	Funguran 04 50 WP Sulfomat PU Talstar 10 EC Pheromonal traps	2,0 Kg/ha 4 kg/ha 0,3 l/ha 3 buc/ha	
6	The compaction of the grapes	Plasmopara viticola Uncinula necator moth G_2 weeds	Champion 50 WP Sulphur Foray 48 B (Biobit XL) Pheromonal traps	3 kg/ha 4 kg/ha 1 l/ha 3 buc/ha	Mechanical weeding on the interval and manual weeding on the row
7	3 weeks before harvest	Botryotinia fuckeliana moth G_3	Teldor 500 SC Dipel ES	0,8 l/ha 1 l/ha	

The analyze of the floristic composition before the weeding has shown that in the vineyard from the S.D. Banu Maracine the weeding degree it's high (106 weeds/m^2).

Regarding the decreasing of the weeding degree, as it can be observed in the table 2, has been made by mechanical and manual weeding, destroying the weeds in a percentage of 62,3%. The monocotyledonate species has been destroyed in a percentage of 55,1%, and the dicotyledonate in a percentage of 64,9%.

Table 2

Decreasing of the weeding degree

Weeds species	Natural weeding state weed/m^2	Nr. weed/m^2 after weeding	Nr. weed distroyed / m^2	Thecontrol degree (%)
Setaria pumila	8	4	4	50,0
Poa pratensis	6	2	4	66,6
Sorghum halepense	3	2	1	33,3
Elymus (Agropyron) repens	4	2	2	50,0
Hordeum murinum	1	0	1	100
Bromus sterilis	2	1	1	50,0
Bromus arvensis	2	1	1	50,0
Bromus hordeaceus	2	1	1	50,0
TOTAL MONOCOTILEDONATE	**29**	**13**	**16**	**55,1**
Stellaria media	18	5	13	72,2
Cardaria draba	17	7	10	58,8
Lamium purpureum	13	6	7	53,8
Vicia grandiflora	12	0	12	100
Taraxacum officinale	8	3	5	62,5
Cirsium arvense	6	4	2	33,3
Amaranthus retroflexus	3	2	1	33,3
TOTAL DICOTYLEDONATE	**77**	**27**	**50**	**64,9**
MONOCOTYLEDONATE + DICOTYLEDONATE	**106**	**40**	**66**	**62,3**

Within the control scheme of the diseases and pests the treatments has been made as follow: first treatment has been applied on 20.IV. for controling the powdery mildew using Sulphurus 4 kg-ha. The second treatment has been applied on 3.V., when the copses had 30-50 cm length, for controling the grapevine downey mildew, the powdery mildew, the grapevine antracnose and the grapevine roter brenner, using the products Champion 3 kg/ha and Sulfomat 4 kg/ha. In the same phenophase for controling the moth G1 and acarians has been used the product Nissorun. The third treatment has been applied on 15.V., before blooming, for controling the pathogens *Plasmopara viticola, Uncinula necator,* using the product Alcupral 3 kg/ha and Sulphur 4 kg/ha, and for controling the moth G1 there has been used the product Faster. This treatment it's an obligatory safety treatment. The forth treatment has been applied on 31 V, after blooming, for controling the fungi *Plasmopara viticola, Uncinula necator, Elsinoë ampelina, Pseudopeziza tracheiphilla,* using the products Mikal 3,5 kg/ha and Sulphur 4 kg/ha, and for controling the fungus *Botryotinia fuckeliana* there has been used the product Teldor 0,8 l/ha. The fifth treatment has been applied on 15 VI, during the grapes growth, for controling the grapevine downey mildew and powdery mildew, using the product Funguran 2,0 kg/ha and Sulfomat 4 kg/ha. For controling the acarians, scale and chaffers there has been used the product Talstar 10 EC dose 0,3 l/ha and pheromonal traps. The sixth treatment has been applied on 1 VII during the grapes compaction, for controling the grapevine downey mildew, the powdery mildew and the

grapevine grey mould. There has been used the products Champion 3 kg/ha, Sulphurus 4 kg/ha and Teldor 0,8 l/ha. For controling the moth G2 there has been used the product Foray 48 B (Biobit XL) dose 1 l/ha and pheromonal traps. The seventh treatment has been applied on 4 VIII, for controling the fungus *Botryotinia fuckeliana* using the product Teldor 0,8 l/ha, and for controling the moth G3 there has been used the product Dipel ES dose 1 l/ha and pheromonal traps. For controling the grapevine downey mildew there has been used cooper fungicides with an exception for the treatment after blooming when it's been used an systemic product. All the treatments made for controling the powdery mildew has been made with products based on sulphurus, and for increasing the treatment efficiency these products has been complexed with insecticides, in order to control with the same treatment the pests.

The results of our observations made on the attack of the pathogens and pests after the applying of the controling scheme, are presented in the the following tables and graphs: table 3, fig.1, fig.2, fig.3.

Table 3

The attack degree of the phytopathogen agents after the applying of the controling scheme

The disease and the pathogen agent	GA%	
	On the leaves	On the grapes
Grapevine downey mildew (*Plasmopara viticola*)	0,75	0,07
Powdery mildew (*Uncinula necator*)	0,6	0,1
Grapevine grey mould (*Botryotinia fuckeliana*)	-	0,8
Grapevine antracnose (*Elsinoë ampelina*)	-	0,02
Grapevine roter brenner (*Pseudopeziza tracheiphilla*)	0,001	-

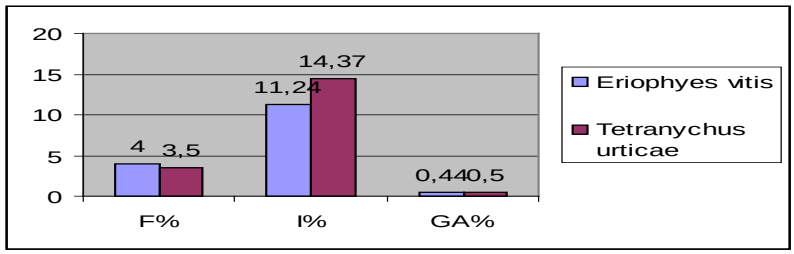

Fig. 1. The frequency, intensity and attack degree produced by the acarians after applying the treatment with Talstar 10 EC.

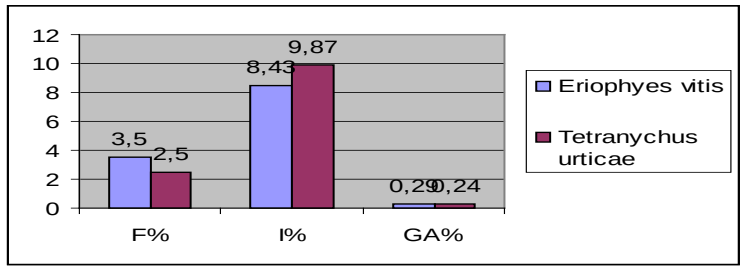

Fig. 2. The frequency, intensity and attack degree produced by the acarians after applying the treatment with Nissorun 10 WP, dose 0,5 kg/ha.

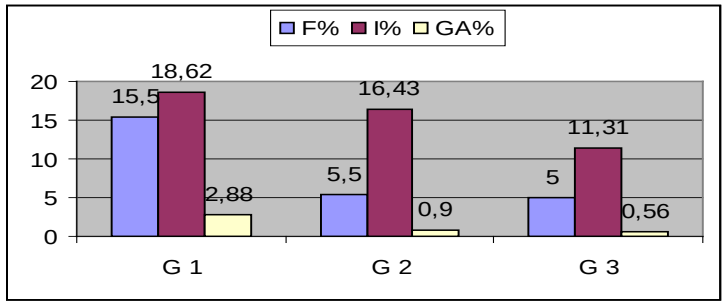

Fig. 3. The frequency, intensity and attack degree produced by the vine moth

CONCLUSIONS

The applying of the weeding has ensured a control of tyhe weeds of 62,3%. The monocotyledonate species has been destroyed in a percentage of 55,1%, and the dicotyledonate in a percentage of 64,9%.

Afetr applying the control treatment of tyhe grapevine downey mildew, the attack degree on the leaves had the value of 0,75%, and on the grapes of 0,07%. The treatments applied for controling the grapevine downey mildew has ensured the control for grapevine antracnose and grapevine roter brenner.

In the S.D. Banu Mărăcine during 2007 the climatic conditions has been unfavourable for the attack of the fungus *Botryotinia fuckeliana*, with low values of the attack degree on the grapes after applying the technologies with pollution risk as well the technologies with pollution low risk.

For controling the acarians from the viticultural ecosysteml Banu Mărăcine there has been applied two chemical treatments at the beginig of May and at the middle of June, and for controling the three generations of the vine moth there has been applied 3 chemical treatements, one for each generation, using the products: Faster 10 EC, dose 0,3 l/ha, Foray 48 B (Biobit XL), dose 1 l/ha and Dipel Es, dose 1 l/ha.

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CONTRIBUTS CONCERNING GLOBODERA SPECIES STUDY (CYST NEMATODES) IN POTATO CROPS FROM SUCEAVA DISTRICT

CONTRIBUȚII PRIVIND STUDIUL SPECIILOR DE GLOBODERA (NEMATOZII CU CHIŞTI) ÎN CULTURILE DE CARTOF DIN JUDEȚUL SUCEAVA

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Abstract. *Globodera rostochiensis and Globodera pallida are the two species of potato cyst nematodes which cause major losses in potato crops (van Riel and Mulder, 1998). The infective juvenile nematodes only move a maximum of about 1 m in the soil. Most movement to new localities is by passive transport. The main routes of spread are infested seed potatoes and movement of soil (e.g. on farm machinery) from infested land to other areas. Infection occurs when the second-stage juvenile hatches from the egg and enters the root near the growing tip by puncturing the epidermal cell walls, and then internal cells in the pericycle, cortex or endodermis. The nematode induces an enlargement of root cells and breakdown of their walls to form a large, syncytial transfer cell. This syncytium provides nutrients for the nematode. Infested potato plants have a reduced root system and, because of the decreased water uptake, plant death can eventually occur.*

Rezumat. *Globodera rostochiensis şi Globodera pallida sunt două specii de nematozi cu chişti ai cartofului care determină pierderi importante culturilor de cartof (van Riel şi Mulder, 1998). Nematodul juvenil infectiv se deplasează maxim aproximativ 1 m prin sol. Deplasarea către noi locaţii se face prin intermediul transporturilor pasive. Principala cale de răspândire o constituie cartoful de sămânţă infestat precum şi solul (ex. deplasarea solului cu maşinile de lucru) din parcelele infestate în alte suprafeţe. Infecţia are loc când al doilea stadiu juvenil eclozează din ou şi intră în rădăcină lângă punctul de creştere prin înţeparea pereţilor celulelor epidermei şi apoi a celulelor interne cu ajutorul stiletului. Eventual el începe să se hrănească pe celulele periciclului cortexului sau endodermului. Nematodul induce o mărire a celulelor rădăcinii şi ruperea pereţilor celulelor pentru a forma o celulă mare de transfer numită sinciţiu. Acest sinciţiu furnizează nutrienţii necesari nematodului. Plantele de cartof infestate prezintă un sistem radicular redus, şi datorită conţinutului scăzut al apei plantele pot chiar să moară.*

MATERIAL AND RESEARCH METHOD

The fields which I made the Globodera species study is located in Calafindeşti village near the Suceava district. The period for this study was included between 2001 and 2004 years. The research purpose was an possibly detection of potato cyst nematodes because in the past near this region it was recorded this quarantine fitosanitary nematodes. The basic requirements of soil sampling to detect or estimate potato cyst nematodes in the soil are that:

1. the final sample examined in the laboratory is large enough to achieve the required accuracy and/or sensitivity;

2. the sample is derived from sufficient points to ensure that it is representative of the area sampled, i.e. as far as possible heterogeneity (patchiness) in the nematode distribution is overcome;

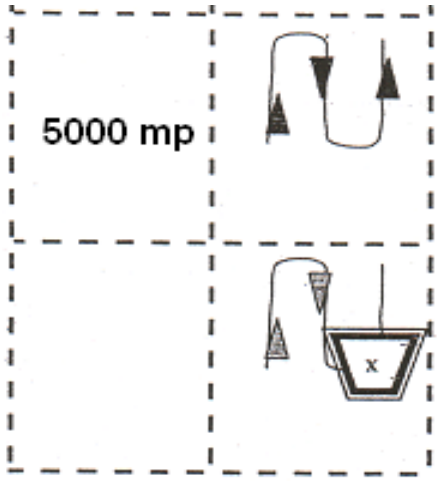
3. the laboratory processing procedures are as efficient and free from operator error as possible, so as to give accurate and consistent results.

The method which I made to take a sample of soil was: take a sample of soil abaut 400 ml (500 g) from 5000 m² area (plough) and 5 cm depth. The sample of soil was analysed in the Suceava Nematology Laboratory and it was made from 100 cores and each of thease cores had abaut 4-5 ml.

The materials which I made to take samples of soils was:

- un auger with 2-3 cm in diameter;
- polietinen bags, permanent markers;
- staks for measures 5000 m² areas;
- water and disinfectant to clean footwears and equipment before to take samples from anather areas;

In 2001 from 2 ha areas which I studied, I took 4 samples of soils. The samples was takes from all the surfaces, like in this sketch (fig.1):



All the informations about the surfaces and the dates of soil samples which I took was recorded on a piece of sheet. On the same sheet I made a sketch of the surfaces which present the distribution of subareas, the place which I took the samples and some characteristic points (the trees, the pillar, the road, the hedge etc.). The bags with samples of soil was closed to forestall some possibly crossed contaminate. This is a method which gave firmness concerning with the manner of took the samples.

Fig. 1. The sketch to takes samples of soil

For extractions of potato cyst nematodes I use Centrifugal method and Arvo can.

This is a semi-automatic extraction method for soil samples developed by J. Schuiling. I made about 250 dried-soil which was sift by an sieve with 4 mm eyes in diameter. The soil-dried is added to a transparent cylindrical container half-filled with water. The contents are swirled with a rotating two-pronged fork at 450-500 rev/min., creating a vortex and causing cysts and similar- sized floating particles to be forced to the centre through a wire-mesh cylinder with 1,5 mm aperture in diameter. The mesh cylinder is fixed above a tube of the same diameter leading down to an autlet. While swirling, more water is added around the inside of the main container washing off any adhering debris and cysts which are channeled to the outlet with the rest. The apparatus cleans itself after each sample processing. The apparatus requires only about 6 l of water per sample. After that the contents was pass through a siev (250 μ) in a funnel in which I put a filter paper about 30 cm in diameter and I filled the filter paper from funnel with water until 2 cm from the top of filter.

The potato cyst nematodes was retrieve from filter paper by examine it at Leica MZ 9,5 stereomicroscope. After that I obtain the next results, like in table 1 and table 2.

RESULTS AND DISCUSSIONS

After extractions and retrieved the potato cyst nematodes from the filter paper, the next step was identification of the species which I found. By this way, I used an optic microscope, Leica DMLB2 respectively, with an DFC 290 foto camera. To see the morfhologycal details, I cut the potato cyst nematodes with an scalpel and I made an perineal patern of vulval zone with all the identification feature: the fenestra, the anus and the cuticular ridges.

Table 1

Extractions results for potato cyst nematodes from 1 and 2 fields in 2001 year

Field	Surface	Year	Sample	Cysts/Sample	Cysts
1	1,5 ha	2001	1	1	1
			2	0	
			3	0	
			4	0	
2	2 ha	2001	5	1	29
			6	25	
			7	3	
			8	0	

Table 2

Extractions results for potato cyst nematodes from 1 and 2 fields in 2004 year

Field	Surface	Year	Sample	Cysts/Sample	Cysts
1	1,5 ha	2004	1	0	0
			2	0	
			3	0	
			4	0	
2	2 ha	2004	5	0	2
			6	2	
			7	0	
			8	0	

Identificaton of these species of potato cyst nematodes I made with micrometric measurements like in table3, table 4 and table 5.

Table 3

Globodera species identification from field 1 in 2001 year

Cyst	No. of cuticular ridges	Anus/ fenestra distance	Fenestra diameter	Granek` s ratio	Viability %	Species
1	19	74,4	21,6	3,4	50	*Globodera rostochiensis*

No. of land: 1
Year : 2001
Surface: 1,5 ha
No. of cysts examined: 1

Table 4

Globodera species identification from field 2 in 2001 year

Cyst	No. Of cuticular ridges	Anus/ fenestra distance	Fenestra diameter	Granek`s ratio	Viability %	Species
1	18	74,4	24	3,1	50	*Globodera rostochiensis*
2	19	64,8	14,4	4,5	50	*Globodera rostochiensis*
3	14	57,6	21,6	2,6	10	*Globodera pallida*
4	25	86,4	19,2	4,5	Non-viable	*Globodera rostochiensis*
5	15	64,8	21,6	3,0	10	*Globodera rostochiensis*
6	20	76,8	19,2	4,0	10	*Globodera rostochiensis*
7	13	52,8	16,8	3,1	Non-viable	*Globodera rostochiensis*
8	20	67,2	16,8	4,0	Non-viable	*Globodera rostochiensis*
9	24	69,6	19,2	3,6	Non-viable	*Globodera rostochiensis*
10	15	57,6	16,8	3,4	Non-viable	*Globogera rostochiensis*

No. of land: 2;
Year: 2001
Surface: 2 ha
No. of cysts examined: 10

Table 5

Globodera species identification from field 2 in 2004 year

Cyst	No. of cuticular ridges	Anus/ fenestra distance	Fenestra diameter	Granek`s ratio	Viability %	Species
1	13	76,8	24,0	3,2	Non-viable	Globodera rostochiensis
2	14	48,0	21,6	2,2	Non-viable	Globodera pallida

No. of land: 2;
Year: 2004
Surface: 2 ha
No of cysts examined: 2

On the slide of microscop I fixed the perineal patern (like in foto 1 and 2) with glycerol and after that I examine it on the microscope at x 100 magnification using the immersion oil.

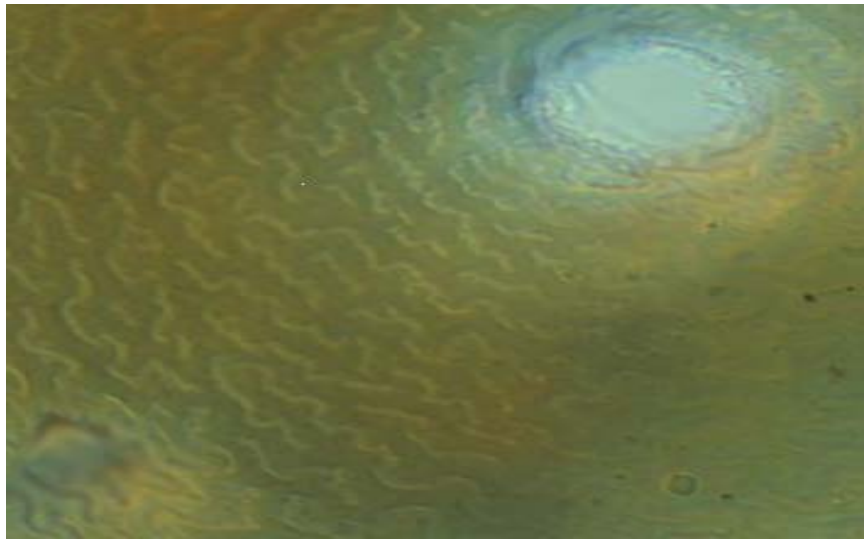


Foto 1. *Globodera rostochiensis*: perineal patern

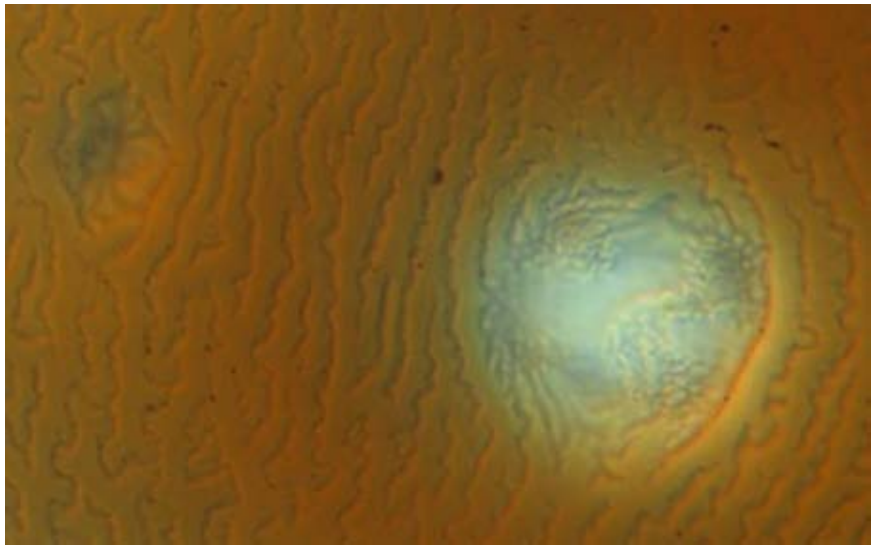


Foto 2. *Globodera pallida*: perineal petern

CONCLUSIONS

1. No sampling method is 100% efficient at detecting potato cyst nematodes in agricultural land. Ultimatly, the chosen method will be a compromise between an acceptable detection level for the type of sample taken and resources available.
2. There is a positive linear relation between potato cyst nematodes sampling intensity and detection exists. For each additional sample taken per given area potato cyst nematodes detection increased by over 7%. In practice is recommended that each additional sample of soil to be taken at higher risk location, e.g. inside gates of lands etc.

3. By the time a potato cyst nematodes is detectable by normal sampling methods, it is already widely distributed throughout the field.

4. However, potato cyst nematodes extraction is stil enough difficult and require a long time and often is conditional by the type of soil and athers factors that reduce the efficiency of this process.

5. In case of fields which I studied for 4 years we can see that if in 2001 the number of potato cyst nematodes was big in field 2 (29 respectively), in 2004 in absence of potato, after 4 years, the number of cyst was only 2.

6. In case of field 1, if in 2001 I detected only 1 cyst, in 2004 in absence of potato, after 4 years we do not detected the potato cyst nematodes.

7. The populations of potato cyst nematodes which I found was mixture and consist of *Globodera pallida* and *Globodera rostochiensis* species, but the *Globodera rostochiensis* population was prevail.

8. In absence of potato, I observed that the number of potato cyst nematodes populations and the viability of these populations was at a low level.

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RESEARCHES REGARDING THE COLEOPTERS FAUNA FROM THE VEGETABLES CROPS

CERCETĂRI CU PRIVIRE LA FAUNA DE COLEOPTERE DIN CULTURILE DE PLANTE LEGUMICOLE

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Abstract. *The material collecting of the vegetables crops has been made in the V.Adamachi Farm Iaşi fields's and greenhouses's. We have done 3 collectings between June 2007 and August 2007. We replaced or filled in the formalin solution of 3-4% concentration and we brought the biological material in the laboratory. We selected the coleopters, identified and stocked them. The collectings took place on 4.07, 18.07 and 19.08.2007. During the entire observations period, we collected 503 coleopters belonging to 26 species. At the first collecting on 4.07 we found 45 coleopters from 10 species. At the second collecting on 18.07 we discovered 105 samples belonging to 9 species. At the third collecting on 19.087 we found 353 coleopters from 20 species. By analysing the material, the most frequently species were: Carabus coriaceus L., Pseudophonus rufipes Mull., Opatrum sabulosum L., Phyllotreta atra F., Phyllotreta nemorum L., Formicomus pedestri Rossi, Cicindela germanica L., Harpalus distinguendus Duft.*

Rezumat. *Colectarea materialului s-a făcut din culturile de legume din camp şi solarii din cadrul fermei V. Adamachi, Iaşi. Au fost efectuate 3 recoltări, în perioada iunie-august 2007., când soluţia de formol 3-4 % concentraţie era completată sau înlocuită şi materialul biologic a fost adus în laborator. Din materialul biologic colectat, au fost reţinute speciile de coleoptere, care au fost apoi determinate şi inventariate. Recoltarea materialului s-a făcut la următoarele date: 4.07; 18.07; 19.08.2007. Pe întreaga perioadă de observaţii, au fost colectate un număr de 503 exemplare de coleoptere, aparţinând la un număr de 26 de specii.Pe recoltări, situaţia a fost următoarea:la recoltarea I-a, care a fost efectuată pe data de 4.07, au fost colectate 45 de exemplare de coleoptere, aparţinând la 10 specii; la a II-a recoltare, care a fost efectuată pe data de 18.07, au fost colectate 105 exemplare de coleoptere, aparţinând la un număr de 9 specii; la a III-a recoltare, care a fost efectuată pe data de19.08, au fost colectate 353 exemplare de coleoptere, aparţinând la un număr de 20 de specii. Analizând materialul colectat s-a constatat că, speciile cel mai frecvent colectate au fost: Carabus coriaceus L., Pseudophonus rufipes Mull., Opatrum sabulosum L., Phyllotreta atra F., Phyllotreta nemorum L., Formicomus pedestri Rossi, Cicindela germanica L., Harpalus distinguendus Duft.*

MATERIALS AND METHODES

Structure and the abundance species of coleopterans to investigate on season of years 2007 starting in from month July feather in month August inclusive, in the vegetables crop.

In coleoptera were meeting with help traps of soil Barber of humid type, the using a solution of Formalin 3-4 %. The meeting materials from trap to make interspace of 10-15

days. To every collected, solution of Formalin age completely or after only case to put back another solution. In every year, they were to make 10-12 collecting. The material collection were brought the in laboratory where separate the species of carabide the were determinate.

RESULTS AND DISCUTIONS

Totally, in 3 collected were collected 25 species of coleopterans, with a total of 503 exemplars (table 1).

During the entire observations period, we collected 503 coleopters belonging to 26 species.

At the first collecting on 4.07 we found 45 coleopters from 10 species, were: *Carabus coriaceus* L., *Carabus cancellatus* Illig., *Pseudophonus rufipes* Mull., *Cicindela germanica* L., *Brachynus crepitans* L., *Formicomus pedestris* Rossi., *Phyllotreta atra* F., *Phyllotreta nemorum* L., *Harpalus distinguendus* Duft. and *Amara aenea* Dejean .

At the second collecting on 18.07 we discovered 105 samples belonging to 9 species, were: *Pseudophonus rufipes* Mull., *Platynus assimilis* Payk., *Ophonus puncticollis* Payk., *Dermestes laniarius* Illig., *Amara aenea* Dejean., *Opatrum sabulosum* L., *Phyllotreta atra* F.,*Phyllotreta nemorum* L. and *Podagrica fuscicornis* L.

At the third collecting on 19.08 we found 353 coleopters from 20 species, were: *Pseudophonus rufipes* Mull., *Carabus coriaceus* L., *Cicindela germanica* L., *Agriotes lineatus* L., *Dermestes laniarius* Illig., *Opatrum sabulosum* L., *Harpalus tardus* Panz., *Otiorrhynchus raucus* F., *Leistus rufescens, Bembidion lampros* Hrbst., *Bembidion properans* Steph., *Phyllotreta atra* F., *Pleurophorus caesus* Panz., *Phyllotreta nemorum* L., *Podagrica fuscicornis* L., *Formicomus pedestris* Rossi., *Anthicus humilis* Germ., *Apion apricans* Hrbst., *Hypocoelus procesulus* Mnnh., *Brachynus crepitans* L.

The most frequent collected species, 8 species, were (table 2): *Phyllotreta atra* F. (242 samples), *Phyllotreta nemorum* L. (61 samples), *Pseudophonus rufipes* Mull. (38 samples), *Podagrica fuscicornis* L. (38 samples), *Formicomus pedestris* Rossi. (16 samples), *Anthicus humilis* Germ. (15 samples), *Carabus coriaceus* L. (13 samples), *Dermestes laniarius* Illig (11 samples).

Table 1

Structure and the abundance species of coleopterans collecting from the vegetables crops

Crt no	Name of the species	Nr. samples
Collecting I from 4.07		
1	Carabus coriaceus L.	8
2	Carabus cancellatus Illig.	2
3	Pseudophonus rufipes Mull.	8
4	Cicindela germanica L.	3
5	Brachynus crepitans L.	2
6	Formicomus pedestris Rossi.	3
7	Phyllotreta atra F.	7
8	Phyllotreta nemorum L.	6
9	Harpalus distinguendus Duft.	5
10	Amara aenea Dejean	3
Total		**45**

The collecting II from 18.07		
1.	Pseudophonus rufipes Mull.	15
2	Platynus assimilis Payk.	2
3	Ophonus puncticollis Payk.	2
4	Dermestes laniarius Illig.	3
5	Amara aenea Dejean.	2
6	Opatrum sabulosum L.	2
7	Phyllotreta atra F.	49
8	Phyllotreta nemorum L.	20
9	Podagrica fuscicornis L.	10
Total		**105**
The collecting III from 19.08		
1	Pseudophonus rufipes Mull.	15
2	Carabus coriaceus L.	5
3	Cicindela germanica L.	2
4	Agriotes lineatus L.	2
5	Dermestes laniarius Illig.	8
6	Opatrum sabulosum L.	2
7	Harpalus tardus Panz.	2
8	Otiorrhynchus raucus F.	3
9	Leistus rufescens	1
10	Bembidion lampros Hrbst.	5
11	Bembidion properans Steph.	6
12	Phyllotreta atra F.	185
13	Pleurophorus caesus Panz.	6
14	Phyllotreta nemorum L.	35
15	Podagrica fuscicornis L.	28
16	Formicomus pedestris Rossi.	13
17	Anthicus humilis Germ.	15
18	Apion apricans Hrbst.	9
19	Hypocoelus procesulus Mnnh.	5
20	Brachynus crepitans L.	6
Total		**353**

Table 2

The species of coleopterans collected and the number of samples from the vegetables crops

Crt no	Name of the species	Collected			Total samples
		I	II	III	
1	Carabus coriaceus L.	8	-	5	13
2	Carabus cancellatus Illig.	2	-	-	2
3	Pseudophonus rufipes Mull.	8	15	15	38
4	Cicindela germanica L.	3	-	2	5
5	Brachynus crepitans L.	2	-	6	8
6	Formicomus pedestris Rossi.	3	-	13	16
7	Phyllotreta atra F.	7	49	185	241
8	Phyllotreta nemorum L.	6	20	35	61
9	Harpalus distinguendus Duft.	5	-	-	5
10	Amara aenea Dejean	3	2	-	5
11	Platynus assimilis Payk.	-	2	-	2

12	Ophonus puncticollis Payk.	-	2	-	2
13	Dermestes laniarius Illig.	-	3	8	11
14	Opatrum sabulosum L.	-	2	2	4
15	Podagrica fuscicornis L.	-	10	28	38
16	Agriotes lineatus L.	-	2	-	2
17	Harpalus tardus Panz.	-	-	2	2
18	Otiorrhynchus raucus F.	-	-	3	3
19	Leistus rufescens	-	-	1	1
20	Bembidion lampros Hrbst.	-	-	5	5
21	Bembidion properans Steph.	-	-	6	6
22	Pleurophorus caesus Panz.	-	-	6	6
23	Anthicus humilis Germ.	-	-	15	15
24	Apion apricans Hrbst.	-	-	9	9
25	Hypocoelus procesulus Mnnh.	-	-	5	5
TOTAL		**45**	**105**	**353**	**503**

CONCLUSIONS

1. One in years 2007, of observation collected, in totally, 503 samples of coleopterans what belong to 25of species.

2. The dominant species what in concerns the number of samples collected were: *Phyllotreta atra* F. (242 samples), *Phyllotreta nemorum* L. (61 samples), *Pseudophonus rufipes* Mull. (38 samples), *Podagrica fuscicornis* L. (38 samples), *Formicomus pedestris* Rossi. (16 samples).

3. The species *Phyllotreta atra* F., *Phyllotreta nemorum* L. and *Pseudophonus rufipes* Mull., were collected in all period of observation.

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RESEARCHES REGARDING THE COLEOPTERS FAUNA FROM A NATURAL PASTURE LOCATED IN THE EASTERN ROMANIA

CERCETĂRI CU PRIVIRE LA FAUNA DE COLEOPTERE DINTR-O PĂŞUNE NATURALĂ DIN ZONA DE EST A ROMÂNIEI

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Abstract. *The fifth material collectings have been made in May-August 2007. We used the soil traps Barber and the interval between the collectings was 10 to 20 days. The first collecting took place on 31.05, the second has been made on 13.06, the third was on 10.07, the fourth on 20.07 and the fifth on 21.08. At each collecting we took the biological material from the traps and we replaced or we filled in the formalin solution of 3-4% concentration. From the biological material we selected the coleopters and identified them. The most frequently species were: Pseudophonus rufipes Mull., Dermestes laniarius Illig., Harpalus distinguendus Duft., Ophonus azureus F., Opatrum sabulosum L., Harpalus aeneus F.,Baris chlorizans Germ., Bothynoderes punctiventris Germ., etc.*

Rezumat. *Recoltarea materialului s-a făcut dintr-o păşune naturală în perioada mai-august, 2007, la intervale cuprinse între 10 şi 20 zile, efectuându-se un număr de 5 recoltări ale capcanelor de sol tip Barber. Recoltările au fost făcute la următoarele date:recoltarea I-a , la data de 31.05; recoltarea aII-a, la data de 13.06; recoltarea a III-a, la data de 10.07; recoltarea a IV-a, la data de 20.07 şi recoltarea a V-a, la data de 21.08. La fiecare recoltare, materialul biologic a fost luat din capcane şi tot atunci, soluţia de formol, 3-4 % concentraţie a fost completată sau înlocuită. Din materialul biologic colectat, au fost selecţionate speciile de coleoptere, care au fost apoi determinate. Speciile de coleoptere cel mai frecvent colectate au fost: Pseudophonus rufipes Mull., Dermestes laniarius Illig., Harpalus distinguendus Duft., Ophonus azureus F., Opatrum sabulosum L., Harpalus aeneus F.,Baris chlorizans Germ., Bothynoderes punctiventris Germ., etc.*

Among the most important families from the *Coleoptera* (*Insecta*) order are the carabidaes (*Carabidae),* distributed throughout the globe. The species of this family have a trophic regime largely carnivorous but some species are vegetarian-carnivorous and fewer are vegetarian species.

The studies were conducted in 2007 in the pastures invaded bt *Lepidium draba* L. – the result of irrational grazing of livestock respectively cows and sheep.

MATERIAL AND METHOD

The fifth material collectings have been made in May-August 2007. We used the soil traps Barber and the interval between the collectings was 10 to 20 days. The first collecting took place on 31.05, the second has been made on 13.06, the third was on 10.07, the fourth on 20.07 and the fifth on 21.08. At each collecting we took the biological material from the traps and we replaced or we filled in the formalin solution of 3-4% concentration.

From the biological material we selected the coleopters and identified them.

RESULTS AND DISCUSSIONS

In 2007 in the pastures, were effectuates a number of 5 collected thus:

- at the 1st harvest, ou the 31th of May, there were collected 97 exemplary belonging to the following 19 species. The most frequently species were: *Dermestes laniarius* Illig. (25 samples), *Cleonus piger* Scop. (10 saples), *Pseudophonus rufipes* Mull. (9 samples) (table 1);

- at the seconds harvest, ou the 13nd of June, there were collected 29 exemplary of coleopters, belonging to the following 13 species. The most frequently species were: *Harpalus aeneus* F. (7 samples), *Bothynoderes punctiventris* Germ. (4 samples), *Harpalus distinguendus* Duft. (2 samples) (table 2);

- at the third harvest, ou the 10nd of July, there were collected 112 exemplary, belonging to the following 23 species. The most frequently species were: *Baris chlorizans* Germ. (25 samples), *Metabletus truncatellus* L. and *Crypticus quisquilius* L. (12 samples), (table 3);

- at the fourth harvest, ou the 20th of July, there were collected 36 exemplary, belonging to the following 6 species. The most frequently species were: *Baris chlorizans* Germ. (18 samples), *Dermestes laniarius* Illig. (6 samples), *Pseudophonus rufipes* Mull. (5 samples), (table 4);

- at the fifth harvest, ou the 21th of September, there were collected 31 exemplary, belonging to 7 species. The most frequently species were: *Harpalus aeneus* F. (13 samples), *Ophonus azureus* F. (8 samples), *Pseudophonus rufipes* Mull. (5 samples) (table 5).

Table 1

Structure and the abundance species of coleopterans collecting from the pasture in month May

The collecting I from 31.05		
Crt no	**Name of the species**	**Nr. samples**
1	Dorcadion fulvum Scop.	1
2	Anisodactylus poeciloides Steph.	1
3	Pseudophonus rufipes Mull.	9
4	Cleonus piger Scop.	10
5	Ceuthorrhynchus troglodytes F.	4
6	Dermestes laniarius Illig.	25

7	Crypticus quisquilius L.	5
8	Harpalus aeneus F.	3
9	Ophonus puncticollis Payk.	5
10	Harpalus distinguendus Duft.	3
11	Staphylinus caesareus	2
12	Harpalus tardus Panz.	3
13	Ophonus azureus F.	5
14	Amara aenea Dejean	2
15	Opatrum sabulosum L.	1
16	Baris chlorizans Germ.	9
17	Agriotes ustulatus L.	5
18	Onthofagus vacca L	2
19	Ceuthorrhynchus rapae Gyll.	3
Total		**97**

Table 2

Structure and the abundance species of coleopterans collecting from the pasture in month the June

The collecting II from 13.06		
Crt no	**Name of the species**	**Nr. samples**
1	Harpalus aeneus F.	7
2	Bothynoderes punctiventris Germ.	4
3	Harpalus distinguendus Duft.	2
4	Aphodius varium Duft.	3
5	Bembidion lampros Hrbst.	3
6	Dermestes laniarius Illig.	3
7	Anthicus floralis	2
8	Metabletus foveatus Geoffr.	3
9	Strangalia bifasciata Mull.	1
10	Cassida nobilis L.	1
Total		**29**

Table 3

Structure and the abundance species of coleopterans collecting from the pasture in month the July

The collecting III from 10.07.		
Crt no	**Name of the species**	**Nr. samples**
1	Ophonus sabulicola Panz.	2
2	Cryptocephalus sericeus Lin.	1
3	Bothynoderes punctiventris Germ.	3
4	Poecilus cupreus L.	1
5	Pterostichus koyi ssp. Marginalis Dejean.	2
6	Calathus fuscipes Goeze.	3
7	Ophonus azureus F.	8
8	Harpalus distinguendus Duft.	6
9	Dermestes laniarius Illig.	5

10	Formicomus pedestris Rossi	5
11	Meligethes brevis Strm.	1
12	Tanymecus palliatus F.	2
13	Baris chlorizans Germ.	25
14	Agriotes lineatus L.	5
15	Sitona puncticollis Steph.	5
16	Aphodius varium Duft.	2
17	Spermophagus sericeus Geoffr.	2
18	Clytus figuratus Scop.	1
19	Metabletus truncatellus L.	12
20	Anthicus antherinus L.	2
21	Crypticus quisquilius L.	12
22	Mordella aculeatu L.	2
23	Phyllotreta atra F.	5
Total		**112**

Table 4

Structure and the abundance species of coleopterans collecting from the pasture in month the July

The collecting IV from 20.07		
Crt no	**Name of the species**	**Nr. samples**
1	Pentodon idiota Hrbst.	1
2	Harpalus aeneus F.	5
3	Pseudophonus rufipes Mull.	5
4	Baris chlorizans Germ.	18
5	Dermestes laniarius Illig.	6
6	Ophonus puncticollis Payk.	3
Total		**38**

Table 5

Structure and the abundance species of coleopterans collecting from the pasture in month the August

The collecting V from 21.08		
Crt no	**Name of the species**	**Nr. samples**
1	Pseudophonus rufipes Mull.	5
2	Harpalus aeneus F.	13
3	Ophonus azureus F.	8
4	Pterostichus unctulatus L.	1
5	Coccinella 7 punctata L.	1
6	Dermestes laniarius Illig.	1
7	Notiophilus rufipes Curt.	2
Total		**31**

Were collected in season 2007 at number of 307 sample of coleopterans belonging to the following 46 species (table 6).

Largest number of were collecting in the month July (112 samples) and least number of sample (29 samples) collecting in the month June.

Table 6

Structure and abundant species of coleopterans collected in the pasture ecosystem in 2007

Crt no	Name of the species	I	II	III	IV	V	Total samples
1	Dorcadion fulvum Scop.	1	-	-	-	-	1
2	Anisodactylus poeciloides Steph.	1	-	-	-	-	1
3	Pseudophonus rufipes Mull.	9	-	5	-	5	19
4	Cleonus piger Scop.	10	-	-	-	-	10
5	Ceuthorrhynchus troglodytes F.	4	-	-	-	-	4
6	Dermestes laniarius Illig.	25	3	5	6	1	40
7	Crypticus quisquilius L.	5	-	12	-	-	17
8	Harpalus aeneus F.	3	7	5	-	13	28
9	Ophonus puncticollis Payk.	5	-	-	3	-	8
10	Harpalus distinguendus Duft.	3	2	6	-	-	11
11	Staphylinus caesareus	2	-	-	-	-	2
12	Harpalus tardus Panz.	3	-	-	-	-	3
13	Ophonus azureus F.	5	-	8	-	8	21
14	Amara aenea Dejean	2	-	-	-	-	2
15	Opatrum sabulosum L.	1	-	-	-	-	1
16	Baris chlorizans Germ.	9	-	25	18	-	52
17	Agriotes ustulatus L.	5	-	-	-	-	5
18	Onthofagus vacca L	2	-	-	-	-	2
19	Ceuthirrhynchus rapae Gyll.	3	-	-	-	-	3
20	Bothynoderes punctiventris Germ.	-	4	3	-	-	7
21	Aphodius varium Duft.	-	3	2	-	-	5
22	Bembidion lampros Hrbst.	-	3	-	-	-	3
23	Anthicus floralis	-	2	-	-	-	2
24	Metabletus foveatus Geoffr.	-	3	-	-	-	3
25	Strangalia bifasciata Mull.	-	1	-	-	-	1
26	Cassida nobilis L.	-	1	-	-	-	1
27	Ophonus sabulicola Panz.	-	-	2	-	-	2
28	Cryptocephalus sericeus Lin.	-	-	1	-	-	1
29	Poecilus cupreus L.	-	-	1	-	-	1
30	Pterostichus koyi ssp. Marginalis Dejean.	-	-	2	-	-	2
31	Calathus fuscipes Goeze.	-	-	3	-	-	3
32	Formicomus pedestris Rossi	-	-	5	-	-	5
33	Meligethes brevis Strm.	-	-	1	-	-	1
34	Tanymecus palliatus F.	-	-	2	-	-	2
35	Agriotes lineatus L.	-	-	5	-	-	5
36	Sitona puncticollis Steph.	-	-	5	-	-	5
37	Spermophagus sericeus Geoffr.	-	-	2	-	-	2
38	Clytus figuratus Scop.	-	-	1	-	-	1
39	Metabletus truncatellus L.	-	-	12	-	-	12
40	Anthicus antherinus L.	-	-	2	-	-	2
41	Mordella aculeatu L.	-	-	2	-	-	2
42	Phyllotreta atra F.	-	-	5	-	-	5
43	Pentodon idiota Hrbst.	-	-	-	1	-	1
44	Pterostichus unctulatus L.	-	-	-	-	1	1
45	Coccinella 7 punctata L.	-	-	-	-	1	1
46	Notiophilus rufipes Curt.	-	-	-	-	2	2
Total		**97**	**29**	**112**	**38**	**31**	**307**

CONCLUSIONS

1. One in years 2007, of observation collected, in totally, 307 samples of coleopterans what belong to 46 of species.

2. The dominant species what in concerns the number of samples collected were *Baris chlorizans* Germ. (52 samples); *Dermestes laniarius* Illig. (40 samples); *Harpalus aeneus* F. (28 samples); *Ophonus azureus* F. (21 samples); *Pseudophonus rufipes* Mull. (19 samples).

3. The species *Dermestes laniarius* Illig. were collected in all period of observation.

3. A number of 5 species: *Pseudophonus rufipes* Mull., *Harpalus aeneus* F., *Harpalus distinguendus* Duft., *Ophonus azureus* F. and *Baris chlorizans* Germ., were collected in the three harvest from period of observation.

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THE VENATORIAL FUND IN ROMANIA – ACTIONS OF COLONIZATION AND DEVELOPMENT STRATEGIES

FONDUL CINEGETIC DIN ROMÂNIA – ACȚIUNI DE COLONIZARE ŞI STRATEGII DE DEZVOLTARE

MUNTEANU M.
D.F.F.B. Suceava

Abstract: *For centuries, hunting has represented an important activity for a part of Romanian population. Having a double purpose, finding food source on the one hand and spending free time on the other hand, this branch of economy unfolds its activity according to the law of venatorial fund and game protection no. 103/1996. The venatorial fund from Romania represents an area of 23.3 million hectares, of which about a third is occupied by forests. Starting with the 15th century, on the Romania's territory the have been done many actions of colonization, having as aim the rejuvenation of the indigenous game populations where they disappeared long ago, blood refreshment, increase of the game productivity on certain areas. The species that have been colonized in different stages were pheasant (starting with 1475), common crows (16th century), fallow deer (17th century), roebuck (20th century), chamois (1970), blackcock (1975), alpine marmot (1946), hares (periodically, in depopulated areas), enot dog (1950). The paper presents the actions and effects of these colonisations. At a national level, there have been elaborated the strategy of development in the venatorial resources and biodiversity, rendering efficient the role of the state in administering the national venatorial fund, promotion of the research activity and increase awareness in this domain, ensuring a durable venatorial management, diminution of illegal exploitations of the venatorial resources. In the paper there are presented SWOT analyses for each of the strategic objectives.*

Rezumat: *Vânătoarea a reprezentat de-a lungul secolelor o activitate importantă pentru o parte din populația teritoriului românesc. Având un dublu scop, completarea resurselor de hrană, pe de o parte, şi de petrecere a timpului liber, pe de altă parte, această ramură a economiei îşi desfăşoară activitatea pe baza Legii fondului cinegetic şi a protecției vânatului nr. 103/1996. Fondul cinegetic din România ocupă o suprafață de 23,3 milioane hectare, din care circa o treime este ocupat de păduri. Începând cu secolul XV, pe teritoriul României s-au realizat numeroase acțiuni de colonizare, având drept scop întinerirea unor populații de vânat autohton acolo unde acesta a dispărut cu mulți ani în urmă, împrospătări de sânge, sporirea productivității în vânat a unor terenuri. Speciile care au fost colonizate în diferite etape au fost fazanii (începând cu 1475), corbii comuni (sec. XVI), cerbii lopătari (sec. XVII), căpriorul (sec. XX), capra neagră (1970), cocoşul de munte (1975), marmota alpină (1946), iepurele de câmp (periodic în zone depopulate), câinele enot (1950). În lucrare sunt prezentate acțiunile şi efectele acestor colonizări. La nivel național s-a elaborat strategia de dezvoltare în domeniul cinegeticii pentru perioada 2006-2025 care are ca obiectiv strategic: utilizarea durabilă a resurselor cinegetice şi conservarea biodiversității; eficientizarea rolului*

statului în administrarea fondului cinegetic naţional; promovarea activităţii de cercetare şi ridicarea nivelului cunoştinţelor; asigurarea unui management cinegetic durabil; diminuarea exploataţiilor ilegale a resurselor cinegetice. În lucrare sunt efectuate analize SWOT pentru fiecare dintre obiectivele strategice.

MATERIAL AND METHOD

In order to accomplish the paper there have been used the data gathered in the specialty literature, as well as information obtained through direct investigation. There have been used the following methods: monographs and for the second part, the projection method.

RESULTS AND DISCUSSIONS

On the Romania's territory hunting has represented along the centuries an important activity having a double aim: an additional food supply on the one hand, and leisure, on the other hand.

Till the end of the 18th century, hunting in the Romanian provinces was considered "res nullius"; each hunter having the right to hunt anywhere, according to the necessities and possibilities. After a while, a part of the owners of large agricultural and forest lands extended their pretensions over the game, too. Nevertheless, according the juridical regulations that existed till 1948, the game belonged to the owner of the land where they were temporarily found. But he could not hunt if he was not a member of U.G.V.R.

After 1948, hunting entered with no exception in the state property, the whole venatorial heritage being shared by the units of venatorial management, called hunting funds. Two thirds of them have been assigned to the hunting associations, and a third is part of the special hunting forestries.

In 1996, there was abrogated the Law of venatorial fund and game protection where, among others, it is stipulated that the game is a public good, whose existence can be on public or private land, being divided into "hunting funds" with areas of 5000 ha in plains, 7500 ha in hills and 10000 ha in the mountains. The number of hunters is limited, according to the surface of the venatorial fund. For Romania, this number is of 60.000.

At present, Romania has one of the richest venatorial funds of Europe. Three were the causes that contributed to this situation: highly heterogeneous and presenting a moderate temperate climate; lower density of population and less intensive exploitation of the soil.

With no exaggeration we can state that Romania has remained, together with other few East- European states, the reservation of the large predators in Europe and even in the world. Romania has the first place in the world form the point of view of the density of *Ursus arctos* L., *Canis lupus* L., *Felix silvestris* L., and even *Lutra lutra* L. There is a moderate density of *Linx linx* L., *Lutreola lutreola* L. and *Cricetus cricetus* L.

Also, there are numerous species of fowls, rare in other parts, which in Romania have significant densities: *Biranta ruficollis* P., *Aythya nyroca* G., *Tadorna tadorna* L. etc.

A. Actions of repopulation with game

In Romania there have been practiced populations with certain game species, starting with the 15th century. The aims had in view: establishing native game populations, in the areas where they had disappeared; blood refreshments, increase of the productivity of such fields in order to exploit them in a hunting system.

The first colonizations of which there are written documents refer to pheasants and they go back to 1475, being localized in the west of the country. In the south of the country there have been used after 1900. In the inter-war period and especially after 1950, the practice developed a lot, as it has proved to be extremely attractive. At the same time, there has developed the warren houses destined for the breeding of the species and also the export of pheasants has increased as abroad they are looked for their good qualities.

The populations of common deer were done in Transylvania beginning with the 16th century, after the example of some countries from central Europe. They were done with specimens brought especially from Hungary and Austria, the species adapting very well, and thus through reproduction, it occupied all the mountainous and sub-mountainous areas of the country.

After 1970, there was organized another action of colonization in the south plain of the country. The set up populations, although they are not very stable as regards the place, and neither very representative as effectives, but they are of high quality, including the captures. At this situation there seems to have contributed both the genetic fund of the specimens captured selectively and the "blood mixture" done between deer that came from different zones of the country, but also from Bulgaria, and also due to the fact that plenty of food can be found here.

The populations of fallow deer began in the 17th century, but the success was partial because of the superposition of the habitat with that of the wolf and also with the existence of the poaching. Nevertheless at present there are some viable nuclei in the West Plain and in the Romanian Plain, but their existence is reduced.

The populations of mouflons were done in two stages in the 19th century and the beginning of the 20th century, but were not successful because of the wolves, dogs and poaching.

The populations with roebucks have begun after 1960, as a consequence of the disappearance of most of the species in the South Plain and other zones. The populated specimens and their descendants quickly occupied the forests in the low altitude zones and in the Danube meadow and delta, uniting the nuclei with the populations in the wild, including the trophies. The national record of over 211 CIC points comes from this region.

Two of the populations done after 1970 had a spectacular success. It is about the populations with chamois and blackcock. The lack of natural predators, the better conditions of feeding and the blood mixture had a great impact on these populations.

The populations with alpine marmot, bustard and aurochs are projects under development, but the actions are reduced as activity from the lack of funds and special protection conditions.

B. The strategy in the venatorial domain

The elaboration of the strategy in the venatorial domain at the national level in the 2006-2025 period, done on short and long term starts from the premise of alignment to the European demands, respecting at the same time the national traditions and specific in the venatorial domain. The elaboration of the strategy involved all the institutions and organizations that are related directly or indirectly with the forest and hunting and fishing fund. There have been identified five strategic objectives, for each doing also a SWOT analysis.

Objective 1. Durable use of venatorial resources and the preservation of biodiversity

In order to accomplish this objective there have been taken into account the following measures:

- accomplishment of some studies of venatorial scaping of the hunting funds, which should include the requests of biodiversity preservation;
- setting up management plans for the species of national, European and world interest.
- regulation of the number control of the fauna in the protected areas;
- respecting the refuge zones at the level of the hunting funds;
- creation of an organized frame for periodical consultancy of hunters, administrations and conservators of the protected zones, for information and insurance of transparency;
- regulation of the unfolding of tourist and agro-tourist activities within the hunting areas.

Strategic objective 2. Rendering efficient the role of the state in the administration of the national venatorial fund

Measures within this objective have in view the following:

- signing management contracts of the hunting funds for at least 10 years;
- establishing minimum contract clauses regarding the management of the hunting zones;
- setting up county structures of regulation, guiding and control of the venatorial activity;
- guiding, informing and training the specialized personnel;
- giving the ok of the specialized studies for each hunting fund.

Strategic objective 3. Harmonization of the relationship between landowner and fauna of venatorial interest

Within this objective we have in view the following:

- taking part of landowners at auctions organized for each hunting fund;
- creation of an organizational frame according to which the administrator and key landowners can sign direct agreements regarding the hunting activity with the stipulation of the obligations of the Prts;
- elaboration of a “code of good practice” by a inter-sector team regarding the behaviour towards nature.

Strategic objective 4. Ensuring a durable venatorial management in the context of the diversification of land property

These measures have in view the following:

- preservation of the minimum limits of the area of the hunting zones;
- identification, mapping and including the migration track in the landscaping plans and the infrastructure development;
- inclusion of measures of venatorial management in the norms of forestscaping and forestry landscaping;
- establishment of harest level according to the real present situation of the species;
- establishement of the norms of complementary feeding according to the natural potential of the venatorial fund;
- correlation of the studies of venatorial management of the hunting zones with the pexisting biodiversity and with the management of the protected areas;
- accomplishment of studies regarding migration amd season movements of the mage.

Strategic objective 5. Decession of the illegal exploitations of the venatorial resources

Within this last objective we have in view:

- buy the necessary equipment for guard, observations, communications and transport for each hunting fund;
- establishment of a “lottery” type system for authorizations available where the demand is higher than the offer;
- increase of the venatorial offer and implicitelly the fall of the authorization price; control of game products (trophy, skins, furs, game meat etc) and their compulsory standar registration.
- Intensification of the control of equipment, arms and ammunitions used for hunting.

The strategy as regards the venatorial domain is part of the agricultural strategy.

Thus, the objectives of the strategy in the venatorial domain is subordinated to the environmental policy of durable use of venatorial resources and the preservation of biodiversity under the conditions of maintaining the agro-forestry-venatorial equilibrium.

CONCLUSIONS

1. Along the years, on the territory of Romania, hunting has represented an important occupation having a double aim: leisure and economic character.

2. Within Europe, Romania occupies the first place as regards the density of many species such as the bear, wolf, lynx etc.

3. Along the centuries there have been made numerous populations with species that have diminished their effective. It is about species of pheasans, deer, roebuck, chamois. At some species such as the alpine marmot, bustard and aurochs the populations have partly succeded.

4. The strategic plan in the venatorial domain comprises a series of objectives that are going to be put to practice. These objectives have in view the durable use of venatorial resources and biodiversity preservation; rendering efficient the role of the state and the administration of the national venatorial fund; harmonization of the relationship between landowner and fauna of venatorial interest; Ensuring a durable venatorial management in the context of the diversification of land property, Decession of the illegal exploitations of the venatorial resources.

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STUDIES REGARDING THE NATURAL ECONOMIC AND SOCIAL FRAME OF THE VENATORIAL AREA OF SUCEAVA COUNTY

STUDII PRIVIND CADRUL NATURAL ECONOMIC ŞI SOCIAL AL AREALULUI CINEGETIC DIN JUDEȚUL SUCEAVA

MUNTEANU M.
D.F.F.B. Suceava

Abstract: *The studied venatorial fund is situated in the North-Eastern part of Romania and can be found within the Siret river and the peaks of Călimani, Bârgău, Suhard, Rodna and Maramureş mountains. The relief is mountainous (67%) and hilly and plateau (33%). The density of the hydrographical network is of 0,5 km/km^2, being crossed by many rivers such as Siret, Suceava, Moldova, Bistrița, Samuzu Mare and Mic. The climate is continental with moderate elements in the Western part. The annual average temperatures vary between 8 °C in the Suceava Plateau and 2°C in Rodna and Călimani mountains. The precipitations vary according to the position: 600 mm in the East 1200 mm in the West. As regards vegetation, the territory is occupied by forests – 52% (coniferous 78% and broad-leaved 22%). As regars the age of the forests, those which are up to 20 years represent 20.9%, while those over 60 years – 44.0%. The hunting fund has an area of 884395 hectares, of which 50.7% is represented by forests and 32% by arable land. The Suceava county is organized in 26 forest districts (6.5% of the total country) and 71 hunting funds (3.2%). Within the North-eastern region, the Suceava County is on the first place with 26 forest districts, representing 34% of the total forest districts.*

Rezumat: *Fondul cinegetic studiat este amplasat în partea de N-E a României şi este cuprins între râul Siret şi culmile munților Călimani, Bârgău, Suhard, Rodnei şi Maramureşului. Relieful este de natură muntoasă (67%) şi de deal şi podiş (33%). Densitatea rețelei hidrografice este de 0,5 km/km2, fiind străbătură de o serie de râuri Siret, Suceava, Moldova, Bistrița, Samuzu Mare şi Mic. Clima este de tip continental cu elemente de moderație în partea de vest. Temperaturile medii anuale variază înttre 8 °C în Podişul Sucevei şi 2°C în munții Rodnei şi Călimani. Precipitațiile variază în funcție de amplasare 600 mm în est şi 1200 mm în vest. În ce priveşte vegetația, teritoriul este ocupat în procent de 52% de păduri (răsinoase 78% şi foioase 22%). În ce priveşte vârsta pădurilor, cele care au până la 20 ani dețin 20,9%, iar cele peste 60 ani – 44,0%. Fondul de vânătoare deține o suprafață de 884395 hectare, din care 50,7 este ocupat de păduri şi 32% teren arabil. Județul Suceava este organizat în 26 ocoale silvice (6,5% din total țară) şi 71 fonduri de vânătoare (3,2%). În cadrul Regiunii Nord-Est, județul Suceava deține primul loc cu 26 ocoale, numărul acesta reprezentând 34% din totalul ocoalelor silvice.*

MATERIAL AND METHOD

In order to accomplish the paper there have been used the data gathered in the specialty literature, as well as information obtained through direct investigation. There have been used the following methods: monographs, comparison as well as the method of specific indicators.

RESULTS AND DISCUSSIONS

The venatorial fund of Suceava has an area of 884395 ha and it is located in the North-Eastern part of Romania, having as limits in the East, Siret river, in the South the peaks of Bistrița and Stânișoarei mountains, in the West, Călimani and Bârgău mountains and in the North, Rodna and Maramureş mountains and the border with the Ukraine Republic. It is a territory with mountainous peaks and plateaus, including most part of the basins of Suceava and Moldova rivers, as well as a part of the hydrographical basin of Bistrița.

The investigated area belongs to two large units of relief: mountains (67% of the area) and sub-mountainous hills (33% of the area). The collector of the whole hydrographical networks is Siret River, which receives as main affluents on Suceava County, the rivers Suceava, Moldova, Bistrița and Somuz. The average density of the hydrographical network is of 0, 5 km^2 and maximum 0, 7 km^2 in the south-west and a minimum of 0, 3 km^2 in the northeastern part of the county.

From the climatic point of view, the studied geographic area equally belongs to the continental climate (the eastern part) and to the continental moderate climate (in the western part). The annual average temperature has values from 8ºC in the Suceava Plateau and below 2, 0 ºC on the peaks of the Rodna, Suhard and Călimani Mountains, which have the isotherm 0 ºC. The plateaus, the sub-mountainous zones and the areas occupied by the valleys of the large rivers have average temperatures that range from 6 ºC and 8 ºC. The warmest month is July with temperatures that range from 10 ºC and 18 ºC, and the average temperature of January, the coldest month of the year, varies from -4 ºC and -5 ºC. In the high mountainous areas, the monthly average temperatures reach in winter temperatures of down to -10 ºC. The early frosts in autumn and the late ones in spring are frequent and last a while. The temperatures registered in the months December, January and February are negative on the whole studied territory. From the climatic point of view the registered situation shows the fact that within this zone; the temperature is a limitative factor in the development of wild species. In the years with excessively low temperatures supplementary food is needed, especially for deer species, at which the metabolism intensifies along with the dropping of temperatures and the food necessities are proportionally higher. The temperature, as limitative factor, is, to a certain level, an element of selection within the game. The sick, injured, weak and generally the old specimens are the first victims. The vigorous game specimens that have survived have the opportunity of transmitting to the descendants the superior genetic qualities. In the latest years there has been registered a radicalization of the climate, i.e. the increase of the annual climatic amplitude, there have been rough winters followed by dry summers, thing that negatively influences the game in the area. The average quantity of precipitations that annually fall in the area varies, descending in the southwestern northeastern direction.

In the mountainous zone, the annual precipitations gather 1200-1400 mm, dropping to 800 mm in the hilly area and to 600 mm in the meadows of Suceava

and Siret rivers. The monthly average precipitations, especially those in the winter months affect the thickness of the snow layer, an important element for game handling that does not hibernate. In addition, the alternance of positive temperatures during the day with the negative ones during the nights make more difficult the circulation of the game, favourizing the capturing phenomenon. Also connected to the climatic conditions and the thickness of the snow layer it is represented the phenomenon of excortication of young trees used as food in lack of other resources. The late frosts influence the mortality of wild female boars, which, for example, took place in spring 1996.

The forests of the venatorial area of Suceava County are generally structured on the altitudinal criterion. Certain climatic phenomena of local influence produce in many cases some inversions as regards the altitude display. The most frequent is the presence of pine in the depression area at lower altitudes that those where it is their limit. The phenomenon takes place generally due to the lower temperatures in the depression zones. Objectively, the resinous woods and the mixtures of resinous trees with decinous trees are the largest part, gathering 98% of the total area of the venatorial fund. Of this area, 78% is represented by the resinous trees and 22% to the decinous trees. Within the resinous wood, the large percentage is represented by the pine with 84%, followed by the fir tree with 15% and the rest of 1% is occupied by pinaster, larch. Within the decinous species, most of the area is represented by beech, with a percentage of 71%, followed by oak with 5% and other species of hard and soft essence, with a percentage of 24%. A specific characteristic of these trees is the obvious destructuralization as regards the age classes, i.e. the predominance of trees of small and middle ages and a scarcity of trees with high seed productivity (table 1).

From the data in the table there results that, as regards management, structure on age of the forests is not appropriate, showing a lack of the old trees that can ensure the necessary food during the winter.

The hunting fund of Suceava county has an area of 884395 ha. It represents 3,79% of the total hunting fund of Romania (table 2). its structure, on types of use, shows that the forest occupies 50,7%, almost double that the average on the whole country (27,8%). Being generally a mountainous area, the weight of the arable land of the total hunting fund is small (31,59%) in comparison with the country average (51,43%). The following place is occupied by the grassland with 10,94%. The other categories have insignificant areas. Suceava county is organized in 26 forest districts (6,5) of the total and 71 hunting funds (3,2%). On the level of the northeastern region, it occupies about a third (34,2) of the total forest districts and 21,2% of the hunting areas.

Table 1

The structure of forests of ISJ Suceava on age classes

Age class	Total area of woods on age classes		Surplus or deficit from the normal %		Weight of age classes of the total area %	
0	1	2	3	4	5	6
-	Normal	Real	+	-	Normal	Real
I. (1-20 years)	100,0	125,4	25,4	-	16,6	20,9
II (21-40 years)	100,0	109,7	9,7	-	16,7	18,3
III (41-60 years)	100,0	100,7	0,7	-	16,7	16,8

IV (61-80 years)	100,0	126,4	26,4	-	16,7	21,0
V (81-100 years)	100,0	85,1	-	14,9	16,7	14,2
VI (over 100 years)	100,0	52,7	-	47,3	16,6	8,8
TOTAL ISJ	-	-	62,2	62,2	100,0	100,0

Table 2

The structure of the hunting fund on types of use

Nr. crt.	Denomination	Total country		Suceava county		Weight
		ha	%	ha	%	%
1.	Water surface	285598	1,22	2413	0,27	0,84
2.	Forest	6478511	27,81	448362	50,7	6,92
3.	Arable land	11982116	51,43	279406	31,59	2,33
4.	Grass land	2896268	12,43	96722	10,94	3,34
5.	Empty mountain areas	273210	1,17	11520	1,30	4,22
6.	Total venatorial production	21915703	94,06	838423	94,80	3,83
7.	Venatorial non-productive	1381879	5,94	45972	5,20	3,33
	General total	23297582	100,0	884395	100,0	3,79

CONCLUSIONS

1. Suceava county has an important venatorial fund placed in a natural environment favourable for the development of wild animals. The areas occupied by forest have two thirds of the venatorial area of the county, the difference being represented by the hills and river valleys.

2. The climate of the area has temperate continental characteristics, with abundant precipitations (800-1200 mm) and moderate temperatures (6-8ºC) vaporizing the development of venatorial fund.

3. The structure of tree species shows the fact that the resinous forests and the mixture of resinous and decinous forests occupy 98% of their surface, determining a high economic potential to the area.

4. There is disequilibrium as regards the structure on categories of age of the trees in the disadvantage of old trees, having a negative impact on the game.

5. At the level of the northeastern region, the Suceava county has the largest part as regards the game fund, representing 21,2% of the total.

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AFFORESTATION OF THE DEGRADED AREA FROM THE CERNA OF OLTET BASIN

ÎMPĂDURIREA TERENURILOR DEGRADATE DIN BAZINUL CERNEI DE OLTEȚ

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Abstract. *The Cerna of Olteț Basin is situated in the South-West part of Romania, incorporated in the Getic Benchland (178 m), in the Oltenia sub-Carpathian depression and in the mountainous region (inferior, intermediary, and superior) (2100 m). The afforestation of degraded terrain in the territory that is being analyzed has been differentiated according to the type of terrain. From this category of degraded terrain within the territory, have been included the slippery and the antropically degraded ones (burrows and the banks of the main courses of water within the basin).*

Rezumat. *Bazinul Cernei de Olteț este situat în partea de sud-vest a României şi se încadrează la partea superioară a Piemontului Getic (178 m), depresiunii subcarpatice a Olteniei şi regiunii montane (inferioare, mijlocii şi superioare) (2100 m). Împădurirea terenurilor degradate din teritoriul cercetat s-a făcut diferențiat în funcție de tipul de teren. Din categoria terenurilor degradate, în teritoriul cercetat au fost incluse terenurile alunecoase şi cele degradate antropic (haldele miniere şi malurile principalelor cursuri de apă din bazin).*

***Key words*:** afforestation, Cerna of Oltet Basin.

INTRODUCTION

In order to increase forests' productivity and to avoid land slides in certain areas from the analyzed perimeter, forest vegetation is needed through works of afforestation, which make possible the expansion of rapid growth species, recovery of barely productive arboreta, and the use of special cultures of great performance.

In uncovered areas in the forest perimeter, woody vegetation can emerge and expand naturally, without any kind of human intervention.

In the old forest, exploited or destroyed from whatever the cause, the trees are generally replaced by a new generation.

Forests within the researched are that are exploited for wood are naturally or artificially regenerated. In the case of natural regeneration, the new generation is obtained from the seeds spread after the exploitation cuttings, and when natural regeneration is not possible or advantageous economically, afforestation is being done with the help of saplings from the same species or, seldom, with saplings from different species.

The afforestation of antropically degraded terrains is a necessity, because, this way, catastrophes with devastating consequences can be avoided. A series of factors must be considered for the afforestation of these terrains: the type of soil, soil humidity, area of vegetation where these surfaces are, exposure and degree of inclination of the terrain etc.

MATERIAL AND METHOD

Starting from bibliographical information we repeatedly studied the area conform to the method of itinerary as the surface was very large, but when necessary we used the method of stationary and detailed our analyses collecting and preserving the floristic material.

RESULTS AND DISSCUSIONS

Afforestation has been performed differently, according to the type of terrain and the area or layer of vegetation where the forest area is.

Afforestation of slippery terrains

Land slides are degrading phenomena present in some locations of the researched territory (Dejoi, Nisipi and Fârtățești) (Fig. 1). They consist of the detachment and displacement of masses of earth, the main cause being the combined action of gravity and infiltration waters.

Fig. 1. Terrain sliding in the locality Fârtățeşti

They usually take place on high inclination terrains, and appear as a consequence of fissures within the terrain around the area where the land slide phenomenon is produced. This type of slide has led to the destruction of the district road in the locality of Dejoi.

The most efficient measure of prevention regarding land slides is afforestation, because the forest, through its trees' crowns retains large quantities of water from rains, great part of which evaporates directly into the atmosphere, without falling onto the ground and, thus, not infiltrating in it. Secondly, the forest consumes great quantities of water from the ground, reducing the risk of it becoming dump, and thirdly the roots of the forest trees constitute the live reinforcement that fixes the sliding land strata.

In the Dejoi locality, where the land slides occurred, concrete dams have been made, but they later proved useless. This is why the use of forest vegetation in the consolidation of these terrains remains one of the most efficient and less costly methods.

Also, through the afforestation of sliding lands important direct revenues are obtained. First, there is a supplementary wood mass production, as a result of the entry of these terrains in the production circuit.

When choosing the species, the climate and edafic conditions are taken into consideration, so that the selected species give the best output regarding the desired aim.

By using certain species in the afforestation of certain degraded terrains there results a special melliferous basis for the local apiculture. Also on the degraded terrains cultures of fruit-bearing trees can be started, as basis of raw material in the food industry.

Other species used for the consolidation of these terrains are: *Robínia pseudoacácia, Quércus róbur*, *Sálix álba, Salix frágilis*, *Fráxinus órnus*, *Cérasus ávium*, *Elaeágnus angustifólia*, *Júglans régia* as well as bushes of *Córnus mas*, *Cornus sanguínea* and *Ligústrum vulgáre*.

The observations made on the slippery terrains of the Cerna de Olteț Basin show the positive evolution of the majority of these terrains as a result of the afforestation works, the global efficiency of these works generally being high.

It has been noticed that the process of stabilization of slippery masses starts only 5-6 years after the initiation of the culture, in the case of species with a rapid growth (locust tree, oleaster, alder), and after 8-10 years in the case of those with a slower rhythm of growth during the first period after the planting (black pine, ash tree, etc).

We can thus say that slippery terrains are the expression of gravitational disequilibrium, and their emergence is conditioned mainly by the nature of the lithological substrata. The maximum expansion of land slides has been registered for the alternation of sands with clay and marl where the index of affectation for active slides is a lot lower for forests in comparison with the degraded pastures.

The forest ensures to the greatest extent possible the prevention and damming of slide processes. Together with adjacent works meant to prepare the terrain, consolidation and support for the slopes, has got great efficiency in the gradual stabilization of slippery terrains and in their capitalization.

Slippery terrains present a pronounced homogeneity from the ecological characteristics point of view, and of the productive potential for the forest vegetation.

Afforestation of antropically degraded terrains

In many cases the terrain degradation processes caused by natural factors such as water coming down the slopes, or the wind where erosion processes are involved, water excess in the soil, gravity together with infiltration water – the case of land slides. To these, man, through his activity, has favored or diminished the erosion action of water, without directly intervening in the terrain degradation process.

There are nonetheless situations when, through the activities they perform, men directly lead to terrain degradation, respectively destroying or diminishing the production capacity of the soil. Through human activities that lead to terrain degradation, are those related to mining exploitations, construction of road transport installations (Copăceni), setting and functioning of different industrial installations (Lăpuşata) etc. In all of these cases, the fertile soil is being destroyed or removed, manually or with machines (bulldozers, excavators, etc), or is being covered with different kinds of debris, without, or with very low, fertility.

Mining burrows afforestation. This type of burrows is found within the Cerna de Olteț Basin in the area of the Copăceni locality. They are a result of surface exploitation for coal.

The majority of these terrains present on their surface fine materials that are easily blown away by the wind and deposited on fertile terrains, gardens and orchards. The necessity for afforestation is the more acute, as their presence is in the vicinity of human settlements. Apart from their unaesthetic aspect, they are continuous sources of dust inside homes, especially during windy or stormy days.

For these reason the problem of fixing and planting within the mining burrows is a social necessity. Covering them with useful vegetation solves not only the problem of deposit consolidation and redoing the landscape, but also finding good use for sterile soils.

These burrows, located in Copăceni, offer very difficult stationery conditions for vegetation. This is why, in many cases, authorities in charge have first realized amelioration works that allowed for forest vegetation and ensure its proper development.

The burrows, with slopes of $10\text{-}15^0$ inclinations, and which had a reduced degree of stability, have been consolidated by construction works. In many cases the deposits have been very set. This is why the soil loosening has been the main condition for forest vegetation plantation.

The planting of woody species has been made in holes where humiferos soil has been added. During the first years these plantations have been watered,

because of the draughty periods that followed, the water necessities of the trees not being met.

In the afforestation of the burrows good results have been obtained for the *Pínus nígra* (Fig. 2), *Robínia pseudoacácia* and *Bétula péndula*.

Fig. 2. Afforestation of the mining dump from the locality Copăceni

Afforestation of the banks of the main water courses within the basin

The banks of the main water courses of the researched territory are also part of the antropically degraded terrains category. They are constantly subject to degradations. The main factors that contribute to their degradation are: rains, water currents, rodents, worms, etc.

The consolidation of water course banks was realized with the help of construction works (protection dams made with rock closed with wire), around the localities of Stroeşti, Slătioara, Dejoi and Copăceni, and with the help of herbaceous and woody vegetation in the localities of Oteteliş, Stăneşti, Stroeşti and Slătioara). There are cases when the woody vegetation appeared naturally on the water banks, efficiently contributing to their stability. (Oteteliş, Valea Mare, Dejoi, Nisipi, Lădeşti and Stroeşti).

Among the species widely used for this type of works, we mention: *Sálix álba*, *Salix frágilis*, *Pópulus x canéscens*, *P. nígra*, *Álnus glutinósa*, *Fráxinus pallísiae* etc.

To conclude with, we can say that forest vegetation together with construction works represent much more efficient and durable consolidations, than the construction works alone (especially where the water courses have a curvy downfall).

CONCLUSIONS

As a result of the research done on the site, we can say that on slippery soils *Robínia pseudoacácia, Fráxinus órnus, Cérasus ávium, Córnus sanguínea* and *Ligústrum vulgáre* are successfully used; on antropically degraded soils *Pínus nígra, Robínia pseudoacácia* and *Bétula péndula*; and in the river deltas within the basin, poplars, willows and alders, because they are resistant to floods, are easily assimilated, and grow rapidly when offered the optimum conditions.

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ECOLOGIC AGRICULTURE IN TELEORMAN DISTRICT

AGRICULTURA ECOLOGICĂ ÎN JUDEȚUL TELEORMAN

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Abstract*. The ecologic agriculture guarantees the protection of the natural resources and the health of the people, a proper development for humans and environment. Lately both the demand of ecologic products and the number of the agricultural producers in the field has grown. Teleorman district is situated among the most important districts in the country, if we are gather the areas where the ecologic agriculture is practiced, both the certified one and the areas in conversion. From year to year the area planned for ecologic agriculture has grown a lot to 2922 hectares. In order to encourage the agricultural producers to practice an ecologic agriculture, the Consultation Office dealt with informing regarding to new techniques in ecologic agriculture, organized symposiums on this theme, prepared ecologic technologies to all the vegetable cultures which were also distributed to the agricultural producers, demonstrative areas were created together with practical demonstrations regarding the preparation of the seed tree material, herbicide applying methods, disease control in the case of nursery transplant, pest control and so on. The results obtained by the agriculture producers showed the economic efficiency of the ecologic cultures, much superior to the conventional ones.*

Rezumat*. Agricultura ecologică asigură protejarea resurselor naturale şi sănătatea oamenilor, o dezvoltare armonioasă între om şi mediu. În ultima perioadă de timp a crescut atât cererea de produse ecologice cât şi numărul de producători agricoli care activează în acest domeniu. Județul Teleorman se situează între județele fruntaşe din țară, dacă însumăm suprafețele pe care se practică agricultura ecologică, atât certificată cât şi pe suprafețele aflate în conversie. De la an la an suprafața planificată pentru agricultura ecologică s-a mărit foarte mult ajungându-se la 2922 hectare. Pentru încurajarea producătorilor agricoli de a practica o agricultură ecologică, Oficiul de consultanță s-a ocupat de difuzarea informațiilor cu privire la noutăți în agricultura ecologică, a organizat simpozioane cu această temă, a întocmit tehnologii ecologice la toate culturile legumicole pe care le-a şi difuzat producătorilor agricoli, au fost realizate loturi demonstrative şi s-au efectuat demonstrații practice privind pregătirea materialului semincer, metode de erbicidare aplicate, combaterea bolilor la răsad, combaterea bolilor şi dăunătorilor în vegetație etc. Rezultatele obținute de producătorii agricoli au arătat eficiența economică a culturilor ecologice, mult superioară celor convenționale.*

Ecological agriculture is practiced in about 100 countries worldwide and the surface of land under ecological agricultural practices is ever increasing.

According to I.F.O.A.M. statistics the global agricultural surface assigned to ecological cropping systems mounts to 15.8 million ha, the largest tracts of

land being in Australia (7.6 million ha), Argentina (3 million ha), Italy (1 million ha). The distribution of tracts of land on continents is as follows:

The evolution of ecological agriculture in Romania can be pointed out as follows:

1992–Establishment of the first Poligon of Ecological Agriculture at the Station of Research in Growing Vegetables - Bacau;

1997–Establishment of ,,BIOTERRA" Association;

2000–Release of O.U.G. nr 34/2000 – regarding ecological foodstuff, , approved by Law nr.38/2001;

2001–Establishment of Ecological Agriculture Bureau;

2002–Establishment of National Federation of Ecological Agriculture (F.N.A.E.);

2003–Legislation regarding Ecological Agriculture: Order nr 527/2003, for approving the rules regarding the system of checking and certification; Order 721/2003, for approving the rules regarding the export and import of ecological products.

2004–Accreditation of Romanian Checking Bodies, through Order nr.88/2004

2006–The appearance of ,,ae" label

2006–Law 513 – approves Emergency Ordonnance nr.62 and modifies O.U.G. 34/2000;

2007–Order 688 – regarding the system of checking and certification;

2007–Order 219 – regarding the registration of operators in ecological agriculture

MATERIAL AND METHODS

The special importance of ecological agriculture sector which provides high quality products for human consumption determined us to carry out an adequate study regarding regulations and legislation, ecological techniques and technologies, market/prices, ways towards sustainable development and environment protection, financial support.

The case study was Teleorman county and the data were gathered and processed with the help of OJCA.

RESULTS AND DISCUSSIONS

Teleorman county is among the top counties countrywide, with respect to the tracts of land on which ecological agriculture is practiced, both certified and under conversion.

Every year the surface planned for ecological agriculture has increased very much, reaching 2922 hectares as follows:

-the first company – S.C.PROD BIO AGRO Limited and the largest tract of land certified for ecological agriculture is sited in Ciolăneşti commune, Teleorman county, with a surface of 1712 ha under ecological practices - field crops;

-KAS AGRICOM Limited - 230 ha, field crops – first year conversion;

-Dida Adrian – 23,5 hectares – fruit shrubs – first year conversion;

-S.C.AGRO – ILY Limited – 122,34 hectares – field crops – first year conversion;
-S.C.AGROVERA Limited – 783,21 hectares – field crops – first year conversion;
-S.C.BENJE COMPANI – 47,88 ha – out of which: 4,00 hectares - vegetables – certified; 2,00 hectares - vegetables – second year conversion; 41,88 hectares field crops – first year conversion;
-BOZEANU GHEORGHE – 120 - bee hives - certified;
-Association of Vegetable growers Cernetu - 1,08 hectares vegetables.
-Perspective 2008 – 20,00 hectares vegetables; 100,00 hectares field crops.

Fig. 1. Achievements in the "bio" field, in Teleorman county

The effects of ecological agricultural imply the elimination of pesticides, the improvement of water and foodstuff quality, plant nutrition, soil protection and improvement, biodiversity and nature protection, animal welfare, quality promotion, production decrease by 20 %, price increase by 25 % – 30 %, expenses for obtaining ecological yields 19,2% higher, income accomplished up to 100%, resulting from the calculation of economic efficiency in tomato crop.

The promising findings aim to encourage the increase in ecologically cultivated tracts of land and to attain two objectives, a qualitative one by positioning ecological agriculture in the core of national agriculture, as a pivot for sustainable rural development; the concern for a healthy nutrition has led to the increase of local production of ecological foodstuff (involving business worth millions of euros, accounting for significant input in farms, supermarkets, special restaurants and factories in Romania); and a quantitative one by extending the area cultivated by ecological means, to 150.000 hectares in 2007, and developing an internal distribution market for ecological products.

Table 1

Comparison between economic effects of two kinds of agricultural practices

Crt. no.	INDICATORS	CROPPING SYSTEM	
		Conventional agriculture	Ecological agriculture
1.	Expenses to 1000 lei income (lei)	904,4	791,2
2.	Income at 1000 lei material expenses (lei)	1524,5	1863,2
3.	Income at 1000 lei, labour-related expenses	5809,7	6794,6
4.	Profit at 1000 lei income (lei)	95,5	209
5.	Profit margin	9,5	20,9

CONCLUSIONS

The following general conclusions can be drawn from the information in this paper:

- economic efficiency in ecological crops is 2-3 times higher;
- income is safe and high;
- consumers' preference for ecological products, in an Agral survey on 220 people, shown the following for different age groups:
  - 47% of the age group 20 to 36 years, wish to consume ecological vegetables;
  - 32% of the age group 36 to 50 years, wish to consume ecological vegetables;
  - 21% of the age group over 50 years, wish to consume ecological vegetables.

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VARIATION OF TRACTORS' TRACTION POWER FORCE FUNCTION OF WORKING SPEED, SOIL AND PLOUGH TYPE AT SUPERFICIAL TILLAGE

VARIAȚIA PUTERII DE TRACȚIUNE A TRACTORULUI FUNCȚIE DE VITEZA DE LUCRU, TIPUL DE SOL ŞI TIPUL DE PLUG LA EFECTUAREA ARĂTURILOR SUPERFICIALE

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Abstract. *The present paper have as goal to establish the tractors' traction power force used by two different ploughings units at superficial tillage. U-650 tractor and PP-3-30 normal plough and the other one by U-650 tractor and PRP-3 reversible plough form the two units. The working conditions are as follows: three different types of soil (light soil, medium soil and heavy soil), four different working speeds (4.48 km/h, 4.61 km/h, 4.88 km/h and 4.98 km/h), working depth is 20 cm and working width is 90 cm. Researches were hosted by Agricultural Research and Development Station Podu-Iloaie, Iaşi County. From the presented dates it is obviously that the unit U-650+PRP-3 use a higher traction power force of the tractor at all working speeds and all types of soil face to the U-650+PP-3-30 ploughing unit due to the fact that PRP-3 plough is heavier that PP-3-30 one.*

Rezumat. *Prezenta lucrare are drept principal scop stabilirea puterii de tracțiune a tractorului utilizată de două agregate diferite de arat la efectuarea arăturilor superficiale. Cele două agregate sunt compuse din tractorul U-650 şi plugul normal PP-3-30 iar cel de al doilea din tractorul U-650 şi plugul reversibil PRP-3. Condițiile de lucru au fost următoarele: trei tipuri de sol cu rezistența diferită la arat (sol uşor, sol mediu şi sol greu), patru viteze diferite de lucru (4,48 km/h, 4,61 km/h, 4,88 km/h, 4,98 km/h), adâncimea de lucru a fost stabilită la 20 cm iar lățimea de lucru a fost reglată la valoarea de 90 cm. Cercetările s-au desfăşurat pe câmpurile experimentale ale Stațiunii de Cercetare-Dezvoltare Podu-Iloaie, județul Iaşi. Din datele prezentate este evident faptul că agregatul agricol de arat U-650+PRP-3 foloseşte mai mult din puterea dezvoltată de motor decât agregatul U-650+PP-3-30 pentru toate tipurile de sol şi la toate vitezele de lucru acest fapt datorându-se şi diferenței de greutate dintre cele două pluguri, în favoarea plugului PRP-3.*

In order to establish the most adequate types of ploughs, which will work in aggregate with the 65 HP tractors, research and experiments have been performed. The main research criteria consist, on one hand, of reaching the imposed agro-technical demands, and on the other hand, of presenting a rational usage of the energetic base.

Making the soil basic work, as tillage is known, is in a direct connection with the soil type, which from the point of view of agriculture mechanization has various characteristics, both due to different mechanic features and variations of humidity and soil compaction.

The present paper, aims at establishing the optimal type of plough, in order to be able to perform some superficial tillage, which will work in aggregate with the 65 HP tractor, within the current framework provided by the conditions of tending and use.

The research took into consideration the study of the types of ploughs used for superficial tillage (at a depth of 15-20 cm) in aggregate with 65 HP tractors.

MATERIAL AND METHOD

To establish the optimal type of plough used for superficial tillage were studied the following two ploughing units:

aggregate formed by U-650M tractor and PP-3-30 plough;

aggregate formed by U-650M tractor and PRP-3 reversible plough.

The experiences took place on three types of soil with different specific resistance at ploughing:

- a light soil with K_0 (specific resistance at ploughing) smaller than 0.35 daN/cm^2 (typical chernozem) (**variant 1**);
- a medium soil with K_0 (specific resistance at ploughing) between 0.35-0.55 daN/cm^2 (chernozem cambic mezocalcaric) (**variant 2**);
- a heavy soil with K_0 (specific resistance at ploughing) between 0.56-0.75 daN/cm^2 (luvosoil) (**variant 3**).

Working speeds, which were used during experiments, were from the IIH gear and had the following values: 4.48 km/h; 4.61 km/h; 4.88 km/h and 4.98 km/h.

The working depth was 20 cm and working width was 90 cm. Researches were hosted by Agricultural Research and Development Station Podu-Iloaie, Iaşi County.

RESULTS AND DISCUSSIONS

Are presented the obtained results of the tractors' traction power force for the four distinct working speeds, in the conditions of making tillage on those three types of soil, with the two above mentioned tillage aggregates (U-650M+PP-3-30 and U650-M+PRP-3) (tables 1, 2, 3 and 4).

Table 1

Tractors' traction power force function of soil type (V_1 = 4.48 km/h)

Working conditions	U-650M+PP-3-30			U-650M+PRP-3		
	Variant 1	Variant 2	Variant 3	Variant 1	Variant 2	Variant 3
Working speed (km/h)	4.48	4.48	4.48	4.48	4.48	4.48
Traction power force (HP)	21.90	23.39	24.40	24.72	25.13	25.88

From the dates presented in table and figure 1 should be remark the fact that tractors' traction power force increase together with the increasing of K_0 (specific resistance of ploughing). So the lowest values were recorded when

tillage work was done on a light soil, resulting 21.90 HP at usage of PP-3-30 plough, respectively 24.72 HP for PRP-3 reversible plough.

The maximum values were recorded at tillage on heavy soils recorded 24.40 HP when PP-3-30 plough was used, respectively 25.88 HP at using PRP-3 reversible plough.

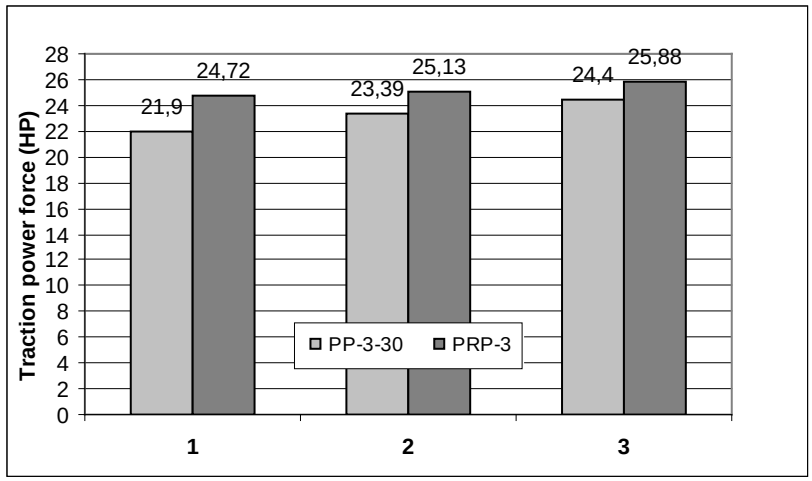

Fig. 1. Variation of tractors' traction power force function of soil type (V_1 = 4.48 km/h)

From the dates presented in table and figure 2 could be observed the fact that tractors' traction power force increase with the increasing of the specific resistance at ploughing (K_0) also in the case at making tillage with the working speed of 4.61 km/h.

Table 2

Tractors' traction power force function of soil type (V_2 = 4.61 km/h)

Working conditions	U-650M+PP-3-30			U-650M+PRP-3		
	Variant 1	Variant 2	Variant 3	Variant 1	Variant 2	Variant 3
Working speed (km/h)	4.61	4.61	4.61	4.61	4.61	4.61
Traction power force (HP)	22.11	23.52	24.26	24.80	25.42	26.07

The minimum values were obtained when tillage was processed on a light soil, recording 22.11 HP at using PP-3-30 plough, respectively 24.80 HP for using PRP-3 plough.

The maximal values were obtained at tillage on heavy soils recording values of 24.26 HP at using the aggregate formed by U-650+PP-3-30 respectively

26.07 HP when the tillage was carried out with the aggregate formed by U-650+PRP-3.

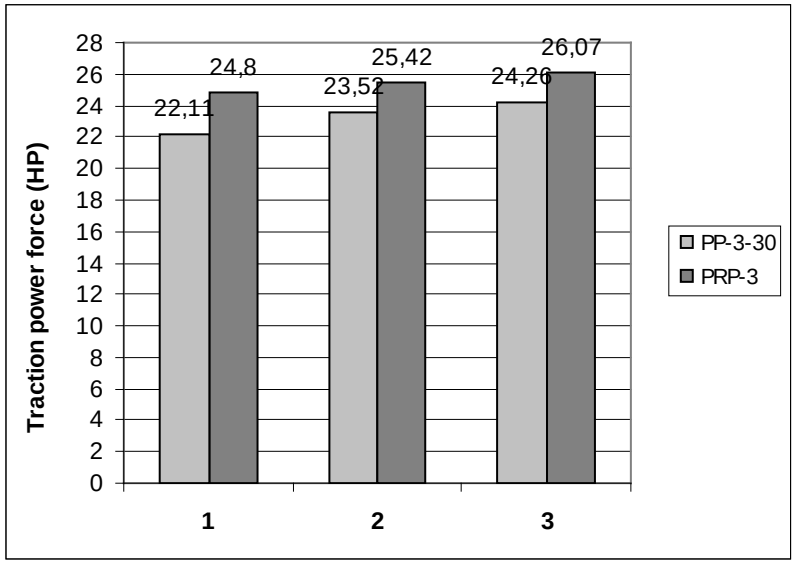

Fig. 2. Variation of tractors' traction power force function of soil type (V_2 = 4.61 km/h)

Tracking the dates presented in table and figure 3 could be remarked the fact that the tractors' traction power force increase at the same time with the increasing of specific resistance at ploughing (K_0) also in the case of tillage with 4.88 km/h as working speed.

So in this experiment the minimal values were recorded when tillage was done on a light soil, obtaining in this case 22.70 HP at using the PP-3-30 plough respectively 25.52 HP when PRP-3 reversible plough was used.

Table 3

Tractors' traction power force function of soil type (V_3 = 4.88 km/h)

Working conditions	U-650M+PP-3-30			U-650M+PRP-3		
	Variant A	Variant B	Variant C	Variant A	Variant B	Variant C
Working speed (km/h)	4.88	4.88	4.88	4.88	4.88	4.88
Traction power force (HP)	22.70	24.27	25.32	25.52	26.44	27.02

At tillage on heavy soils were recorded the following maximum values, 25.32 HP at usage of PP-3-30 plough respectively 27.02 when was used the reversible plough PRP-3.

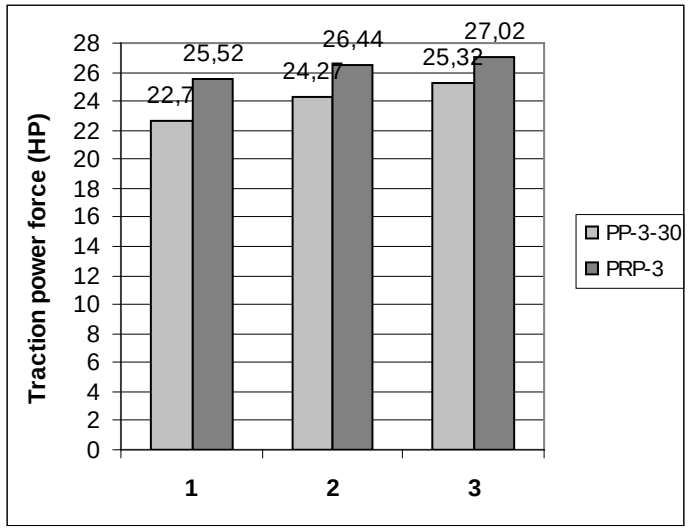

Fig. 3. Variation of tractors' traction power force function of soil type (V_3 = 4.88 km/h)

From the dates presented in table and figure 4 could be observed that tractors' traction power force increase together with the increasing of specific resistance at ploughing (K_0) also in the case of tillage with V_4=4.98 km/h as working speed.

The lowest values were realized, also, when tillage was processed on a light soil obtaining 22.68 HP at using the normal plough PP-3-30, respectively 25.82, for the reversible plough PRP-3.

Table 4

Tractors' traction power force function of soil type (V_4 = 4.98 km/h)

Working conditions	U-650M+PP-3-30			U-650M+PRP-3		
	Variant A	Variant B	Variant C	Variant A	Variant B	Variant C
Working speed (km/h)	4.98	4.98	4.98	4.98	4.98	4.98
Traction power force (HP)	22.68	24.43	25.67	25.82	26.61	27.31

The highest values were recorded at tillage on heavy soils, being recorded values of 25.67 HP at the usage of PP-3-30 plough and respectively 27.31 HP at using the reversible plough PRP-3.

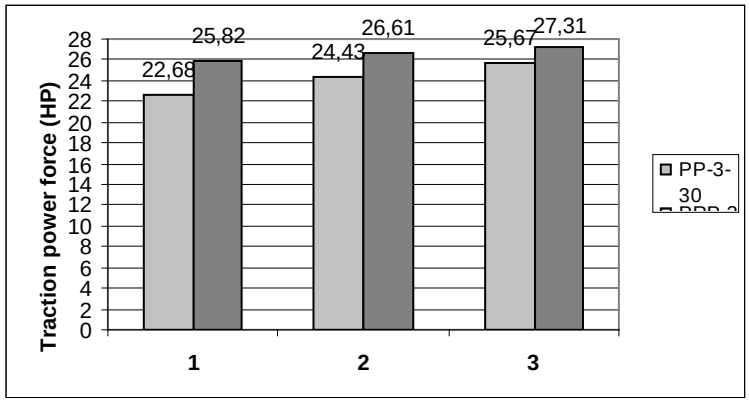

Fig. 4. Variation of tractors' traction power force function of soil type (V_4 = 4.98 km/h)

CONCLUSIONS

On the basis of the above presented results could be observed the fact that tractors' traction power force is influenced by the soil type where tillage is processed. So the minimal values of tractors' traction power force were recorded at tillage on light soils and the maximal ones were obtained in the conditions in which tillage was done on heavy soils. At the same time in which the ploughs' traction resistance increase , the real working speed decrease, fact which affect the fuel consumption and working capacity of the aggregate. Increasing the ploughs' traction resistance increase, at the same time, tractors' traction power force and could be observed the fact that working speed had a low influence on that power. Traction power force keeps between very close values for tillage on the same type of soil, with the same ploughing aggregate and with different working speeds.

So at superficial tillage with PP-3-30 plough, with the four working speeds (V_1=4.48 km/h; V_2=4.61 km/h; V_3=4.88km/h and V_4=4.98 km/h), tractors' traction power force had, for light soil, values between 21.90-22.68 HP; for medium soil, the values were between 23.39-24.43 HP and for heavy soil the values were between 24.26-25.67 HP.

At superficial tillage with reversible plough PRP-3, with the same four working speeds, tractors' traction power force had the following values: for light soil between 24.72-25.82 HP; for medium soil between 25.13-26.61 and for heavy soil the values were from 25.88 to 27.31 HP.

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ESTABLISHMENT OF PRESERVATION TECHNOLOGIES FOR MECHANIZATION OF SOIL WORKS AT SOY-BEAN CROP, IN THE N-E AREA OF ROMANIA

STABILIREA TEHNOLOGIILOR CONSERVATIVE DE MECANIZARE A LUCRĂRILOR SOLULUI LA CULTURA DE SOIA, PENTRU ZONA DE N-E A ROMÂNIEI

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Abstract. *For establishing the best preservation technologies for mechanization of soil works and sowing, at soy-bean crop, in the spring of 2007, three technological variants were carried out. At each technological variant, the quality working indexes were determined, for each working unit, but also, energetic and exploitation indexes, for each agricultural unit. At a certain period of time from sowing soy-bean crop, it was determined, at each variant the following: soil penetration resistance, balanced average diameter of the soil structural elements and hydric stability of those elements. The fuel consumption per hectare, for tillage and sowing has also been determined at each variant. Taking in consideration the results obtained during experiments, the best preservation technologies for mechanization of soil works, for soy-bean crop was established.*

Rezumat. *În vederea stabilirii celor mai bune tehnologii conservative de mecanizare a lucrărilor solului şi semănatului la cultura de soia, în primăvara anului 2007 s-au experimentat trei variante de tehnologii. La fiecare variantă s-au determinat indicii calitativi de lucru, pentru fiecare utilaj de lucru, şi indicii energetici şi de exploatare pentru fiecare agregat agricol. După o anumită perioadă de timp de la însămânțarea culturii de soia s-a determinat, pentru fiecare variantă, rezistența solului la penetrare, diametrul mediu ponderat al elementelor de structură ale solului şi stabilitatea hidrică a acestor elemente. S-a mai determinat, de asemenea, la fiecare variantă de tehnologii, consumul de combustibil la hectar, pentru efectuarea lucrărilor solului şi semănatului. Ținând seama de rezultatele obținute în cadrul experimentărilor efectuate s-a stabilit care sunt cele mai bune tehnologii conservative de mecanizare a lucrărilor solului, pentru cultura de soia.*

GENERALITIES

In years 2006 and 2007, research staff carried out experimental researches to establish which are the preservation, unconventional, technologies for mechanization of soil works and which could be applied at soy-bean crop in the N-E area of Romania.

More technological variants were tested, in order to establish which of them are suitable in the highest grade to the concept of sustainable agriculture and they

will assure, first of all, protection, preservation and improvement of agricultural fields.

Each variant of mechanized technologies which includes unconventional, preservative soil works, made by adequate units will be compared with control (sample) variant, at which it is applied the classical, conventional technology for soil work, but comparison it will also be made with the other conservative technologies.

At each technological variant, we presented basic soil work, superficial maintenance works of the field, seedbed tillage, weeding works on intervals between plant rows.

Some experimental technologies used combine and complex working units, in which are included also sowing equipments. This is the reason why at all technologies, sowing work will also be present, so to be possible a comparison between them.

MATERIAL AND METHOD

Experiments regarding mechanization technologies of soil works and sowing at soy-bean started in autumn of 2006 and continued in summer of 2007. Trials were settled up on a chernozem cambic soil, with a 36% clay content and average values of bulk density and humidity. The longitudinal slope of the field was 1 – 2 degrees.

To create the most suitable conditions for tillage and sowing, at all variants of technologies, before performing these works, a SR 250 machine chopped vegetal mass

To establish the conservative technologies for mechanization of soil works and sowing, at soy-bean crop, which will be applied, we tested three technological variants. These three variants are presented in table 1.

Table 1

Variants of mechanization technologies for soil works and sowing at soy-bean

Used units	Technological variants
• tractor Valtra T-190+Opal 140 reversible mouldboard plough (used in autumn) • tractor U-650+GD-3,2 light harrow disk+2CGR-1,7 spring-tooth harrow (2 passes, in spring) • tractor U-650+SPC-8 precise sowing machine for weeding plants (in spring) • tractor U-650+CPU-8 cultivator for weeding (2 times weeding)	V_1 (control)
• tractor U-650+PC-7 chisel (used in autumn) • tractor Valtra T-190+BS 400 A kompaktor (in spring) • tractor U-650+SPC-8 precise sowing machine (in spring) • tractor U-650+CPU-8 cultivator for weeding (2 times weeding)	V_2
• tractor U-650+PC-7 chisel (used in autumn) • tractor U-650+complex unit (FPL-4 rotary hoe for weeding legumes+SPC-4 precise sowing machine), in spring • tractor U-650+CPU-8 cultivator for weeding (2 times weeding)	V_3

Variant V_1 was considered control variant, because it represents the mechanization technology for soil works and sowing which is usually applied in

production; so variant V_1 is the conventional technology, the classical one for soil processing.

The qualitative working indexes were determined during experiments, at each technological variant and for each working unit; after that, the energetic and exploitation indexes were established at each variant for each agricultural aggregate.

Later, at a certain period of time from soy-bean sowing, for each variant we determined soil penetration resistance, balanced average diameter of the soil structural elements and hydric stability of these elements. After weeding of crop, fuel consumption per hectare for a mechanized processing of soil works and sowing was determined at each variant based on the values of exploitation indexes of the units,

RESULTS AND DISCUSSIONS

By making the experimental researches, interesting results were obtained regarding the previous mentioned indexes. In table 2 are presented the values of quality indexes for seedbed preparation, indexes related to soil feature preservation and fuel consumption per hectare for tillage and sowing.

Table 2

Obtained results regarding works quality, soil preservation and fuel consumption

Technological variants	Quality indexes of seedbed preparation		Indexes regarding soils' features preservation			Fuel consumption for tillage and sowing, *l/ha*
	Breakage grade of soil , *%*	Loosening grade of soil, *%*	Soil penetration resistance *daN/cm²*	Balanced average diameter of soil structural elements *mm*	Hydric stability of soil structural elements *%*	
V_1 (control)	96	21	5.7	3.09	58.25	34.768
V_2	98	12	4.9	3.22	60.12	23.227
V_3	100	15	4.2	3.31	67.92	20.632

Breakage grade of soil at seedbed preparation. The values of this index varied very few, depending on the applied technology, from 96 % to 100 %.

As it is well know, the agro-technical demands impose that breakage grade of soil at seedbed preparation to have a minimal value of 90 %. If we compare the obtained results with the imposed demand it can observ the fact that breakage grade of soil is satisfied at all three variants. The best breakage grade of soil was recorded at variant V_3, in this case, breakage grade of soil of 100%.

Loosening grade of soil had suitable values at all three technological variants for mechanization of soil works, which placed it into the limits established by agro-technical demands. In the case of variant V_3, at which breakage grade of soil is the higher, loosening grade of soil decreases in comparison with the value obtained at variant V_1. The lowest value of loosening grade of soil was achieved at variant V_2 due to the fact that BS 400 A kompaktor has three rollers, which made a certain compaction of the soil.

From all the quality indexes of the units by which the seedbed is prepared the most important one is breakage grade of soil .From this reason, the other

indexes were not presented. If problems will appear at seedbed tillage, these ones are especially caused by the fact that it is not assured a suitable soil loosening. It must be mention the fact that reducing the breakage grade of soil at values situated under the minimum limit established by agro-technical demands appears especially at seedbed preparation for crops which are sowed in autumn.

Soil penetration resistance, in the case of soy-bean crop, was determined at six days after sowing. This thing must be known, because during vegetation period, this index is increasing.

Concomitantly, we mention that soil penetration resistance was determined from 5 to 5 cm, till 30 cm depth; in table is presented only the average value of this index on 0 – 10 cm depth, because in this area all units worked influencing soil penetration resistance.

The agro-technical demands established many value classes for soil penetration resistance: very small = under 11 daN/cm^2, small = 11 – 25 daN/cm^2, medium = 25 – 50 daN/cm^2 etc. Comparing the obtained results with these demands, it observes that soil penetration resistance is very good at all variants.

The average soil penetration resistance, on 0 – 10 cm depth, varied from 4.2 and 5.7 daN/cm^2. The lowest value of this index was obtained at variant V_3, and the highest one, at variant V_1.

The imposed agro-technical demands show the fact that at a soil penetration resistance up to 25 daN/cm^2 the roots of the plants have a normal grow. Taking in consideration these demands, it could appreciate that at all technological variants for mechanization of soil works, at soy-bean crop, there are normal conditions for plant roots grow.

Balanced average diameter of soil structural elements was determined at three months after sowing, on three deeps: 0 -10 cm, 10 – 20 cm, 20 – 30 cm; in table are presented the values of this index on 0 – 10 cm deep, area in which all the units worked.

The agro-technical demands show, that from agronomic point of view, it presents a major interest in structural elements with a 2 – 5 mm diameter (even over 5 mm). If it will compare the obtained results with these demands, it observes that the balanced average diameter of soil structural elements is suitable at all variants.

The balanced average diameter of soil structural elements varies from 3.09 mm till 3.31 mm. The lowest value of this index is recorded at variant V_1, and the higher one, at variant V_3.

Regarding this index, we must mention an important observation: at the same time with the increasing of number of passes of the units for seedbed tillage and sowing, the diameter of soil structural elements decreases because the increasing of the passing number leads to an accelerated fragmentation process of structural elements (at variant V_1, for seedbed tillage and sowing, are made three passes of the units, while at variant V_3 is only made one pass).

Hydric stability of soil structural elements was also determined, as previous index, at three months after sowing, on three deeps: 0 – 10 cm, 10 – 20

cm. 20 - 30 cm; in table are presented the values of this index only for 0 – 10 cm deep.

The agro-technical demands establish that if hydric stability of soil structural elements is between 40 - 60 %, this index is placed in the “very high” class; and when this index is over 60 % could be placed in “extreme high” class. Comparing these demands with obtained results, it could say that hydric stability of soil structural elements is very good at all variants.

From the data presented in table, it observes that the lowest value of hydric stability of soil structural elements was obtained at variant V_1, and the higher one, at variant V_3.

Also, in the case of this index of soil structure, we made the same observation: at the same time with the increasing of number of passes of the units for seedbed tillage and sowing, the hydric stability of soil structural elements decreases.

Fuel consumption per hectare. This one was obtained by adding the fuel quantities used at mechanized soil works and sowing, so at all works provided in the technological variants that are the goal of our study.

We consider that, the total fuel consumption per hectare at soil works and sowing is suitable, at the three technological variants which were tested. The higher one was recorded at variant V_1 (34.768 l/ha), and the lowest one, at variant V_3 (20.632 l/ha).

Establishment of the mechanization technologies for soil works which will be applied. Analysing the indexes determined at each technological variant, we established the variants which are recommended to be applied and their order.

When there are conditions for using preservation, unconventional, soil works systems, we appreciate that the variants which could be used, starting with the best one, are: V_3, V_2. Usually, it will be applied variant V_3; but if from different reasons it could not be used variant V_3, it will be applied variant V_2.

If it is necessary to till with mouldboard plough, it will be applied variant V_3 modified: basic soil work, in autumn will be made by Opal-140 reversible mouldboard plough (will not be used PC-7 chisel).

CONCLUSIONS

1. Based on the obtained results after experiments, we established the variants for mechanization technologies of soil works and sowing, at soy-bean, which are recommended to be applied in the N-E area of Romania.

2. When there are conditions for using preservation, unconventional, soil works systems, the variants which could be used, starting with the best one, are: V_3, V_2 .

3. In the case in which mouldboard plough is imposed to use, it is strongly recommended to be applied variant V_3 modified: will be used, in autumn, for basic soil work, Opal-140 reversible mouldboard plough (instead of PC-7 chisel).

4. Even if it is necessary to use mouldboard plough, it will be avoided to apply variant V_1, due to the higher fuel consumption and lower results obtained at all other indexes.

5. The low performances obtained at variant V_1 is mainly due to the great number of passes of the agricultural units (at variant V_1, for preparing germination bed and sowing are made three passes of the units, while at variant V_3 is made only one single pass).

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ESTABLISHMENT OF PRESERVATION TECHNOLOGIES FOR MECHANIZATION OF SOIL WORKS AT CORN CROP, IN THE N-E AREA OF ROMANIA

STABILIREA TEHNOLOGIILOR CONSERVATIVE DE MECANIZARE A LUCRĂRILOR SOLULUI LA CULTURA PORUMB, PENTRU ZONA DE N-E A ROMÂNIEI

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Abstract. *To establish the best preservation technologies for mechanization of the soil works at corn crop, in the spring of 2007, six technological variants were carried out. During experiments, at each technological variant were determinated the quality working indexes, for each working unit, but also, energetic and exploitation indexes, at each agricultural unit. At a certain period of time after sowing were determined, at each variant, soil resistance to penetration, balanced average diameter of the soil structural elements and hydric stability of structural elements. Concomitantly, were determined at each variant the fuel consumption per hectare, for tillages and sowing. After analysing the obtained results were established the best preservation technologies for mechanization of soil works, for corn crop.*

Rezumat. *Pentru stabilirea celor mai bune tehnologii conservative de mecanizare a lucrărilor solului pentru zona de N-E a României la cultura de porumb pentru boabe, în primăvara anului 2007 s-au experimentat 6 variante de tehnologii. În cadrul încercărilor efectuate, la fiecare variantă de tehnologii s-au determinat indicii calitativi de lucru, pentru fiecare utilaj de lucru, dar şi, rezistența solului la penetrare, diametrul mediu ponderat al elementelor de structură ale solului şi stabilitatea hidrică a acestor elemente. Totodată, s-a determinat la fiecare variantă consumul de combustibil la hectar, pentru efectuarea lucrărilor solului şi semănatului. În urma analizei rezultatelor obținute la încercările efectuate s-au stabilit cele mai bune tehnologii conservative de mecanizare a lucrărilor solului, pentru cultura de porumb.*

GENERALITIES

To establish the preservation technologies for mechanization of soil works in the N-E area of Romania, at corn crop, in 2007 more technological variants were carried out.

The trial of those technologies was made in order to establish which of them are suitable in the highest grade to the concept of sustainable agriculture and will assure, first of all, protection, preservation and improvement of agricultural fields. The staff experimented five variants of unconventional technologies-

conservation of soil tillage and a sample variant, that represents the classical technology, the conventional one for soil works, used in production.

Some experimented technologies have included combine and complex working units, that have in their constitution also sowing equipments, it will be presented at all technologies also the sowing work, and in this way it will be possible acomparison between them.

MATERIAL AND METHOD

Experiments regarding mechanization technologies of soil works and sowing at corn were done in the spring and summer of 2007, on a chernozem cambic soil, with a clay content of 36% and average values of bulk density, and humidity. The longitudinal slope of the field is around 3 degrees.

At all six variant of technologies, before soil works, the vegetal mass was chopped with a SR 250 machine.

The six variants are presented in table 1.

Table 1

Variants of mechanization technologies for soil works and sowing at corn

Used units	Technological variants
• tractor Valtra T-190+Opal 140 reversible mouldboard plough (used in autumn) • tractor U-650+GD-3,2 light harrow disk+2CGR-1,7 spring-tooth harrow (2 passes, in spring) • tractor U-650+SPC-8 precise sowing machine for weeding plants (in spring) • tractor U-650+CPU-8 cultivator for weeding (2 times weeding)	V_1 (control)
• tractor U-650+PC-7 chisel (used in autumn) • tractor U-650+GD-3,2 harrow disk+2CGR-1,7 spring-tooth harrow (in spring) • tractor U-650+Vibromixt VM-251 (in spring) • tractor U-650+SPC-8 precise sowing machine (in spring) • tractor U-650+CPU-8 cultivator for weeding (2 times weeding)	V_2
• tractor U-650+PC-7 chisel (used in autumn) • tractor U-650+GD-3,2 harrow disk+2CGR-1,7 spring-tooth harrow (in spring) • tractor Valtra T-190+BS 400 complex unit(kompaktor)(in spring) • tractor U-650+SPC-8 precise sowing machine (in spring) • tractor U-650+CPU-8 cultivator for weeding (2 times weeding)	V_3
• tractor U-650+PC-7 chisel (used in autumn) • tractor U-650+complex unit (FPL-4 rotary hoe for weeding vegetables+SPC-4 precise sowing machine), in spring • tractor U-650+CPU-8 cultivator for weeding (2 times weeding)	V_4
• tractor Valtra T-190+GDG-4,2 heavy disk harrow (used in autumn) • tractor U-650+GD-3,2 harrow disk+2CGR-1,7 spring-tooth harrow (in spring) • tractor U-650+Vibromixt VM-251 (in spring)	V_5

• tractor U-650+SPC-8 precise sowing machine (in spring) • tractor U-650+CPU-8 cultivator for weeding (2 times weeding)	
• tractor Valtra T-190+GDG-4,2 heavy disk harrow (used in autumn) • tractor U-650+complex unit (FPL-4 rotary hoe for weeding legumes+SPC-4 precise sowing machine), in spring • tractor U-650+CPU-8 cultivator for weeding (2 times weeding)	V_6

Qualitative working indexes were determined, at each technological variant and for each working unit. Energetic and exploitation indexes were established, for each agricultural aggregate.

After corn sowing (at a certain period of time), at each variant, it was determined soils' penetration resistance, balanced average diameter of the soil structural elements and hydric stability of these elements. Also, at each variant, it was determined the fuel consumption per hectare for a mechanized processing of soil works and sowing.

RESULTS AND DISCUSSIONS

Important results were obtaining during experiments, regarding the above mentioned indexes. In table 2 are presented the main results that were obtained by our researches.

Table 2

Obtained results regarding works quality, soil preservation and fuel consumption

Technological variants	Quality indices for preparation of seedbed		Indices concerning conservation of soil properties.			Fuel consumption for soil works and sowing, *l/ha*
	Breakage grade of soil *%*	Loosening grade of soil , *%*	Soil penetration resistance *daN/cm²*	Balanced average diameter of soil structural elements *mm*	Hydric stability of soil structural elements *%*	
V_1 (control)	96	22	1.2	3.23	59.02	34.568
V_2	98	20	0.8	2.96	63.18	27.061
V_3	99	13	1.4	2.56	57.62	28.245
V_4	100	16	0.6	3.17	69.30	21.046
V_5	98	19	0.9	2.69	62.00	24.677
V_6	100	15	0.7	3.15	67.12	18.662

Breakage grade of soil for the seedbed preparation varied depending on the applied technology, between 96 % and 100 %. The agro-technical demands impose that at seedbed preparation, the soil breakage grade to have a minimal value of 90 %. Comparing the obtained results with the imposed demand, it finds

that the soil breakage grade is appropriate at all variants. The biggest soil breakage grade (100 %) was recorded at variants V_4 and V_6.

Soil loosening grade was suitable at all variants.

Due to the fact that we consider that the most important quality working index is breakage grade of soil, the other indexes were not presented.

Soil penetration resistance was determined at four days after corn sowing.

It must be mention the fact that, soil penetration resistance was determined from 5 to 5 cm, untill 30 cm depth. In the table, it is only presented the average value of this index on 0 – 10 cm depth, because in this area all units worked, influencing soil penetration resistance.

The agro-technical demands established many value classes for soil penetration resistance: very small = under 11 daN/cm^2, small = 11 – 25 daN/cm^2, medium = 25 – 50 daN/cm^2 etc. Comparing the obtained results with these demands, it finds that soil penetration resistance is "very small" at all variants, so it is very good.

The lowest soil penetration resistance was obtained at variants V_4 and V_6, and the highest one, at variants V_1 and V_3. The higher penetration resistance in V_3 case is due to the fact that the three rollers of BS 400 A kompaktor achieved a certain compaction of soil.

Also, the imposed agro-technical demands show the fact that at a soil penetration resistance up to 25 daN/cm^2 the roots of the plants have a normal growing. If we take in consideration these demands, we can consider that at all six variants, there are conditions for a normal growing of the corn plant roots.

Balanced average diameter of soil structural elements was determined at four months after sowing, on three deeps: 0 - 10 cm, 10 – 20 cm, 20 – 30 cm. In table are presented the values of this index on 0 – 10 cm, area in which all the units worked.

The agro-technical norms show that, from agronomic point of view, it presents a major interest in the structural elements with a 2 – 5 mm diameter. Comparing these demands with obtained results , it found that pondered average diameter of soil structural elements is proper for all variants.

At variant V_1 structural elements are the biggest, because mouldboard plough turns the processed layer of soil bringing at surface soil with a better structure (aggregates with bigger structure). In the case of variants where it was not used mouldboard plough, the higher value of balanced average diameter of soil structural elements was obtained at variants V_4 and V_6, and the lowest one at variant V_3.

Hydric stability of soil structural elements was determined, also as previous index, at four months after sowing, on three deeps: 0 – 10 cm, 10 – 20 cm, 20 - 30 cm. In table are presented the values of this index on deep 0 – 10 cm.

The agro-technical demands shows that when hydric stability of soil structural elements is higher than 60 %, this index is placed in the "extreme high" class. Comparing agro-technical demands with obtained results, it finds that hydric stability of soil structural elements is very good at variants V_4, V_6, V_2 and

V_5. The agro-technical norms established, also, that if hydric stability of soil structural elements is 40 – 60 %, the index is placed in "very high" class, it can say that hydric stability of soil structural elements is very good, in the case of variants V_1 and V_3.

The higher value of this index was recorded at variants V_4 and V_6, and the lowest one, at variants V_3 and V_1.

Fuel consumption per hectare. It was obtained by adding the fuel quantities used at mechanized tillage of soil (before sowing), at sowing and at weeding, so at all works provided at each technological variant.

If we analyse the recorded fuel consumption, we can say that this one is appropriate. The biggest fuel consumption was registered at variant V_1 and the smallest one at variants V_6 and V_4.

Establishment of the mechanization technologies for soil works which will be applied. Based on the analyse of the indexes determined at each technological variant, the variants which will be applied were established and their order.

We must specify that all six variants of mechanized technologies of soil works, experimented at corn had suitable values for quality indexes of seedbed preparation and for indexes regarding soils' features preservation. The decision in the favour of one or another variant is taken by the value of fuel consumption per hectare, but also based on the value of two kind indexes.

When there are the conditions for using preservation, unconventional, soil works systems, it can appreciate that variants which could be used, starting with the best one, are: V_6, V_4, V_5. If it isn't possible to use variant V_6 (from different reasons), it will be apply variant V_4; when even variant V_4 could not be used, will be applied variant V_5.

Could be situations in which, it is imposed to till the land with mouldboard plough. In this case, variant V_6 will applied, (or V_4) modified: basic soil work, in autumn, will be made with Opal-140 reversible mouldboard plough (it will not be used GDG-4,2 heavy disk harrow or PC-7 chisel).

CONCLUSIONS

1. After experiments and interpretation of the obtained results, the variants for mechanization technologies of soil works, at corn that are recommended to be applied in the N-E area of Romania were established.

2. In the cases in which there are conditions for using the unconventional and preserving systems of soil works, the variants of mechanized technologies for soil works which will be used, starting with the best one, are: V_6, V_4, V_5.

3. If it is imposed to till the land with mouldboard plough, it will be applied variant V_6 (or V_4) modified: in autumn, it will be used for basic soil work, Opal-140 reversible mouldboard plough (instead of heavy disk harrow or chisel).

4. It will be avoided application of variant V_1, due to the higher fuel consumption and lower values of the obtained indexes.

5. All six technological variants for mechanization of soil works and sowing, tested at corn, have suitable values of quality indexes for seedbed preparation and of indexes regarding soils' feature preservation.

6. We appreciate that variants V_4 and V_6 are much more advantageous face to the other ones, because in spring, with only one pass of the complex aggregate, formed by FPL-4 rotary hoe for weeding vegetables and SPC-4 precise sowing machine, is settled up corn crop; at the other four variants, in spring are made three passes for settling up the crop.

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AESTHETICAL FEATURES OF DESCRIPTIVE IMAGINARY IN GARDEN ART

VALENȚE ESTETICE ALE IMAGINARULUI DESCRIPTIV ÎN ARTA GRĂDINII

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Abstract. *The paper focuses on applying the concept of descriptive imaginary in garden aesthetics. Similarly to any other work of art, the gardens could be seen as selective and cultural descriptions of nature from a human point of view. They also reflect the relation between human consciousness and nature, having a complex nature as artistic enterprises that combine the representation with the reconstruction of the artistic object. Some features of the nature are more aesthetically valorized than others, depending of style and period. The artist not only creates significant images using plants, but also discovers some aesthetical qualities of nature. Therefore, the garden becomes the expression of the relation between human consciousness and nature, a relation that helps human beings to define themselves.*

Rezumat. *Lucrarea este centrată pe valorificarea conceptului de imaginar descriptiv în estetica gradinii. La fel ca orice altă operă de artă, grădina poate fi privită ca descripție selectivă, culturală a naturii din perspectiva conştiinței umane. Dar ea reflectă totodată şi relația dintre om şi natură, situându-se ca act artistic între re-prezentare şi re-construcție. Anumite trăsături ale naturii sunt valorizate estetic în detrimentul altora, în funcție de stil şi de epocă. Artistul nu doar creează imagini semnificative folosind plante, ci descoperă în natură anumite calități estetice, grădina fiind martora relației între conştiința umană şi natură, relație ce ajută omul să se redefinească pe el însuşi.*

In every day language, we are used to oppose quite often the words "imaginary" and "real". It is very convenient to suppose that it is possible to make a very sharp distinction between "real things" and "imaginary things", even thaw human knowledge raises from a combination of these two categories at the conjunction of human imagination and human cognition with that part of the physical real detectable by our senses.

Western culture is quite suspicious regarding any imaginative excess, especially in the moments when imaginary interposes between human consciousness and the physical world. Those situations are usually associated with psychopathology. This circumspection could be explained by the long time in which Western civilization struggled to eliminate mythical imaginary from the dialogue of human consciousness with nature. In a way, this process was similar with the dissolution of the charm of mythical explanation regarding the world.

Some of the greatest cultures in the world missed the opportunity of inventing modern science just because they hesitated to make a sharp distinction among real world and imaginary worlds. Indian culture is a good example in this

respect (6). One can easily conclude that, in order to give constructive powers to human imagination in the knowledge making process, a great culture has to admit the fictional nature of the conceptual products of human imagination. The distinction between imaginary (as a noun) and real (as a noun, also) represents the first step towards the recognition of the constructive and epistemological function of imaginary. This is equivalent with admitting that descriptive fictions have a provisory and explanatory nature with regard to their part in the scientific discourse, but also in other types of discourses including the artistic one.

In spite of some very important and remarkably early achievements in mathematics and empirical medicine, far-eastern cultures were not able to get rid of mythological imaginary in explaining the world. Consequently, they did not develop a methodology for the optimization of the world descriptions according to some pragmatic criteria. Unable to distinguish descriptive fictions from mythological fictions, they also missed the opportunity to develop a proper descriptive imaginary as part of the scientific discourse about the physical real. Nevertheless, the situation of descriptive fictions in oriental art is quite different, because they play a major role in establishing a very refined aesthetical code suitable for describing and creating an artistic image of physical reality. One can just remember the major influence of Japanese stamps on Vincent van Gogh, for example.

As to the European culture, it has been characterized by a great competition between mythological descriptions of the physical world and logical-structural descriptions of the same physical world. At the end of the XVII-th century, the logical-structural descriptions, based on logical-structural fictions, prevailed upon mythological descriptions. They proved to be more efficient, so – finally – descriptive imaginary prevailed in this culture upon mythological imaginary. A good example for understanding the specific difference between mythological imaginative scenarios and descriptive imaginative scenarios is a comparison of the mythological description of a dragon with a scientific description of a *pterodactyl* in a museum. Many representations of the dragon pay no attention to the proportions of the animal. Especially the head is sometimes far bigger than the wings. So big is the difference that suddenly becomes obvious that such a creature could never fly. However, this aspect has no importance in mythological discourse and simply does not undermine the power of the mythological descriptions. On the contrary, in the scientific description of a *pterodactyl*, the lift of the wings plays a major role and the proportions of the animal are taken very carefully into consideration in order to produce a plausible description of a flying animal. Among other pragmatic criteria, the *one of the concatenation of descriptive representations* is the most important. It demands that each concept with descriptive function within the framework of a scientific theory must *fit* in the conceptual *puzzle* of that theory in such a way that leaves no dark places in the description of the real phenomenon. The concept must be logically linked to other central concepts of the theory in order to assure a minimum efficiency for the scientific description, therefore the concept is shaped

in accordance with the whole theory. This feature distinguishes the scientific discourse in comparison with other types of discourse. But for the moment, we will try to emphasize some of the aesthetical features of *descriptive imaginary* and to understand its constructive role not only in the scientific discourse, but also in garden art.

Recent experiments in cognitive psychology emphasized the primary physiological sensations as being the departure point in the construction of any human concept, no matter how abstract (5). This discovery should not represent a surprise, since human consciousness evolved in a constant dialogue with nature and primary sensations have been used in this dialogue as an interface. Starting from here, Cornelius Castoriadis suggests that human perception is imaginatively structured (3) – a very important aspect in our investigation of descriptive imaginary and confirmed by recent research on human brain (4). Human brain associates abstract concepts with primary sensations in his effort of distinguishing them one to the others. This helps the brain to manipulate easily abstract concepts.

Taking into account all these aspects, we can easily understand that descriptive imaginary plays an important role especially in those cultural activities that combine sensations with abstract thinking. Garden art is such a case. Like any other work of art, the gardens could be seen as selective and cultural descriptions of nature from a human point of view. They also reflect the relation between human consciousness and nature, having a complex nature as artistic enterprises that combine the representation with the reconstruction of the artistic object. But in the garden art case the physical support the aesthetical message is constituted by a fragment of nature itself: the plant. Of course, starting from Antiquity and coming to contemporary gardens, some features of the nature are more aesthetically valorized than others, depending on style and period. The artist not only creates significant images using plants, but also discovers some aesthetical qualities of nature. The artist creates for the viewer not only a suggestion of a parallel universe – the aesthetical one - , but also a complex experience (1,8). The garden "speaks" not only through colors, surfaces, or sounds, but also through smells and textures. Actually, what is remarkable for a garden as artistic description of an aesthetical ideal is the simultaneity of all these channels of communication. The artistic message creates a complex state of mind associated to a specific perception of nature (7), a *guided* one. Therefore, the garden becomes the expression of the relation between human consciousness and nature, a relation that helps human beings to define themselves.

Giving the fact that gardens have good chances to become "spaces" of artistic conscience in which the viewer is invited to begin a self-analysis effort, starting from the posture of an "intruder" and moving towards the posture of a "participant", is quite ironic that nowadays the crisis of garden art is a metaphysical one (2). It is a crisis of spiritual message in a period of intense pragmatism and tremendous technical achievements. The suggestion we make in order to surmount the present cultural difficulties and to transform the gardens in much more than physical spaces filled with plants refers to the opportunity of

using contemporary scientific representations in the artistic dialogue with the public. One cannot ignore the development of modern science that determined an evolution of scientific representations. At the beginning of human rational inquiries upon nature these representations were mainly qualitative-sensitive. In contemporary science they became predominantly conventional-structural. Their *visuality (their capacity of helping the scientist to visualize physical processes)* changed and became, little by little, a conventional-structural one.

This giving up of sensory intuition simultaneous with a translation towards mathematical abstraction in the historical development of scientific discourse revealed another important aspect concerning scientific representations. Theirs ontological status in the discourse depends on the distinction drawn between the objective physical process and its reflection in the scientist mind.

We are therefore inclined to propose new stylistic synthesis like a fractal garden or a non-Euclidean one. Maybe in contemporary post-modernism there is enough space for a new symbolism that pays enough attention to the fact that behind the visual aspect of scientific representations lays an equation or other sort of analytical reality that allows human minds to "visualize" descriptive structures situated far beyond the limits of our senses. After all, science represents today a major cultural activity of human being in his effort of imagining descriptions of the universe from a human conscious point of view.

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THE COMMUNITY ORCHARD, A CONCEPT OF PRESENT INTEREST

LIVADA COMUNITARĂ, UN CONCEPT DE MARE ACTUALITATE

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Abstract. *Beginning in the early 90's, there's a rapid decline in the Romanian fruit growing industry, the decrease in planted areas and fruit production being recorded by national statistics. This situation has been severely influenced by poor agricultural policies, the increasing pressure from the real-estate sector and large imports of cheap fruit from abroad. The community orchard caters to the increasing need for relaxation spaces in close proximity of urban areas. It also allows for a better use of old orchards, that have lost their productivity and it supports the development of new planted areas, thus becoming the right place for outdoor activities, for individuals and groups alike. By utilizing local fruit tree varieties, it also increases the interest for fruit growing among the general population.*

Rezumat. *Incepand cu anii 90' asistam la un declin rapid al pomiculturii in Romania, reducerea suprafetelor de livezi si a productiei de fructe fiind evidentiate in datele statistice publicate. Politicile agricole neinspirate, presiunea din partea investitiilor imobiliare si edilitare, si nu in ultimul rand importurile masive de fructe ieftine au contribuit din plin la aceasta situatie. Livada comunitara ofera ocazia satisfacerii nevoii din ce in ce mai accentuate de spatii destinate relaxarii in aproprierea asezarilor umane. In acelasi timp, ofera posibilitatea valorificarii unor livezi imbatrinite, cu productivitate redusa, infiintarii de noi plantatii pomicole, devenind locul potrivit petrecerii timpului liber, individual sau colectiv, cadrul natural al unor manifestari populare, asigurand un areal al varietatilor locale de fructe, renascand interesul populatiei pentru pomicultura.*

Starting with the '90s, we are the witnesses of a fast decline of the fruit growing in Romania, as we refer to the area allocated to orchards, to the fruit productivity or to the access to the high technology.

A series of social political factors, that is the breaking up of the state farms, the division of properties on the agrarian land, the lack of functional programs for the producers' association, the incoherence in supporting the research and experimentation activity within the context of an extremely tight competition from the part of the importers of fruit at a relatively low price have led to a decrease of interest toward fruit growing plantations.

The unmerciful rushing on the orchards, especially on those located in the suburbs of towns have made up the rest estates' investing activity. The multiplication in a fast rhythm of the one family dwelling places, the

areas designed to commerce, to storing or to industrial activities are current phenomena that occur around large cities and not only and even there, where there used to be large fruit growing farms. These objectives have brought with them works afferent to public unities, such as water feeding railways, sewerage and electricity systems, access railways that have disaffected at their turn large land areas designed to agriculture and to orchards respectively.

On the other hand, the existence of small "household" orchards, with mixed up trees cultivated in a wide variety of technologies, from the bending ones with tall trunks and free round crowns to the small size ones cut in decorative systems, assure the fruit consumption of an important segment of population for their own use.

Iaşi, a well known fruit growing basin, wasn't avoided by such phenomena and it's enough to consider the orchards from Galata, Bucium or Copou to find out the bitter truth.

The concept of communitarian orchard emerged in Great Britain in the '80s – '90s and has quickly spread out, having favorable effects on the old plantations rehabilitation but mostly at the communitarian level.

These orchards, either they are rigorously managed or they remain in their "wild" state, when the species, they are made of, are in a wide diversity, in agreement with the land configuration, may develop peculiar types that define themselves in a special way to create the scenery. (1)

In the conditions of a post industrial society life, there is an imperious need for areas designed to self relaxation and leisure or spending the free time in the company of some friends or even in that of strangers with various ages and preoccupations, the need for socialization being stronger and stronger.

As we refer to productivity, the communitarian orchard is trying to get together the plantation created according to specific technological rules and the less performing traditional orchard which is closer to compositions with scenario us function.

The alternation of areas planted with trees and bushes with decorative role with areas covered by grass and flowers taken from the spontaneous flora define areas of quietness where you meet again items of homogeneity and harmony with the "natural" landscape. (2)

Everybody should have anytime access to these arrangements.

The administration of these arranged areas should be voluntary performed by the local administration or by groups of initiation that belong to the respective community.

Economic components, the revaluation of certain opportunities from the services category inclusively or even the direct and intermediate opening up of the fruit productivity might occur.

These ones should be solved within a local juridical background.

We have to underline the fact that this concept doesn't have as main purpose the fruit productivity, and it is this fact that allow the development of a wide variety of guidelines, many of them being addressed to the vanguard experiment and the others suggesting romantic, past-ridden approaches.

The preservation and even the way to reinvent certain "wild life" areas is another important component that worth to be mentioned. The use of certain native fruit growing species, having a large ecological plasticity or modest pretensions and being resistant at illnesses, together with bushes from the same category, mixed up with natural meadows might get valences of a gorgeous scenery. (1)

This component which performs the transaction toward the natural landscape is just the one which can and should interfere in case of the revaluation of certain traditional orchards that are on the "edge" and in danger to disappearance.

The maintenance works are very important but the approach should differ from the technology that is applied to well known orchards that have a high productivity. The cleaning up of the dry branches, the cuttings performed for the purpose of the fruit-bearing, the replacement of the ill or dead trees will be made up, having in view the scenario us perspective of the composition. Thus, criteria that belong to spaces, volume, perspective, texture, form, and color may become decisive as we refer to interference.

From functional point of view, this concept might answer at the same time to the most diversified and complex challenges of the life within community, training higher or smaller segments of the local population or relying on the guests from outside in an optimum way.

The communitarian orchard might become the most adequate background for a wide range of events. It is certain that some arrangements to the buildings that have been raised, some urbanite endowments or accessories performed in such a way not to damage the natural environment and to submit to it discretely, are necessary to be performed.

The celebration of certain religious events such as The Flowers Sunday, Saint George or the Baptist's day may gather the whole community.

With a higher participation, even over passing the local interest area, folk or poetry festivals, sporting competitions may be organized.

The school festivals, the classes hold in the open air might stir the interest of groups that include people of different ages on one hand and might be an opportunity for their socialization on the other hand.

Depending on the orchards structuring on species and on the particular period of fruit ripening, feasts related to fruit cropping or degusting the products that revaluate those fruit might be organized.

Overpassing the statute of hobby, having an important educative formative role for the younger generation and not only, such an environment is the proper place for agriculture.

Camping and picnics have become usual ways of domestic leisure for those who have found in orchards the proper locations.

In association with small seed beds, the orchards might be the proper location for amateur horticulturists and under specialists' guidance, training courses might take place.

Least but not the last, such locations might form the nucleus around which protected areas designed for the bio diversity preservation may be arranged. (3)

Such a complex and challenging concept may be the starting point for the rehabilitation of certain destructive orchards in searching their own identity.

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ASPECTS OF INDUSTRIAL LANDSCAPE REHABILITATION

ASPECTE ALE REABILITĂRII PEISAJULUI INDUSTRIAL

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Abstract. *Inside the cities the industrial zones are the most polluted areas. Therefore this situation can be a challenge for the researchers for experiments and proposals of sustainable urban transformations and rehabilitation, in order to enhance the quality of urban life and environment. The industrial heritage constitutes also a large field for the process of urban rehabilitation. Many kinds of proposals appeared, trying to create a new life for the old build areas of the Industrial Revolution. Through judicious landscape architectural projects, sustaining the rehabilitation of industrial sites, through multifunctional arrangements and equipments, we can transform these polluted and pollutant areas into magnetic sane and safe places, destroying pollution on a large urban scale. At international level there are some successful experiments which constitute a reference point to begin a very usefull landscape transformation process.*

Rezumat. *În interiorul oraşelor cele mai poluate zone sunt cele cele industriale. Această situație poate constitui o provocare pentru cercetători, pentru a propune şi experimenta modalități de reabilitare şi transformare urbană durabilă, cu scopul de a îmbunătăți calitatea vieții şi a mediului urban. Un larg câmp de activitate în domeniul reabilitării urbane îl oferă şi zonele declarate monumente de patrimoniu industrial. Există o mare diversitate de propuneri care au apărut în încercarea de a da o nouă viață vechilor zone pe care s-au dezvoltat construcțiile Revoluției Industriale. Prin proiecte peisagistice judicioase, susținând reabilitarea zonelor industriale prin propuneri de amenajare şi echipare multifuncțională, aceste zone poluate şi poluante pot fi transformate în locuri magnetice sănătoase, capabile să distrugă poluarea la o largă scară urbană. La nivel internațional există câteva experimente de succes care constituie un punct de referință pentru începerea unor astfel de procese de benefică transformare peisagistică.*

The industrial heritage rehabilitation tries to create a future for the old build areas of the Industrial Revolution. The presence of the old industrial giants, or of many other kinds of industrial buildings, can arouse the melancholy of the past in our souls. But, there is also other kind of reaction versus the industrial relics. We must underline a very important aspect, almost subtle, existent in the collective consciousness: the industrial vestiges wear a "stigma", very difficult to raze, waking sometimes painful memories and associations (image 1).

The polluting industrial evolution, with destructive consequences, gave to the word "industry" negative connotation: saying "industrial", even "industrial heritage", from the collective memory spring out spontaneous association with the

"pollution". It is still difficult for many inhabitants, of our polluted cities, to accept the industrial revolution relics as precious treasure, which should be saved and respected. As consequence, industrial heritage should be also rehabilitated at the collective memory level, making possible to awake a positive echo in all collective consciousness for the work for protection and salvation of this kind of heritage.

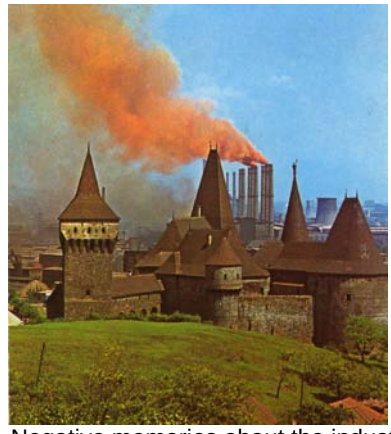

Image 1 - Negative memories about the industrial relics:
pollution near the historical castle in Hunedoara.

Through judicious landscape architectural projects, sustaining the rehabilitation of industrial patrimonial sites, through multifunctional arrangements and equipments, we can transform the old polluted and pollutant areas into magnetic places, destroying pollution on a large urban scale. Curing gradually the collective memories through its interventions, the landscape architecture science can be very useful assuring a benefic change of attitude versus industrial heritage.

The interest in landscape architecture grew through time, nowadays having an important role in the policy of the environment protection. From the identification and preservation measures of the natural patrimony, which started at the beginning of XX century, it became these days a real "policy" of planning, settlement, salvation and protection of all kinds of heritage, one being the industrial heritage.

IMPROVING THE DRY AND TECHNICAL IMAGES OF THE OLD INDUSTRIAL ENVIRONMENT

The idea of using natural elements in order to improve the industrial environment was promoted at the end of the XIX century. Having the vision of a polluted industrial future, many utopian researches appeared, proposing models of "safe and sane industrial cities": with "a green belt" around the cities for absorption of noxes and for landscape arrangements; in the residential areas every house had the opportunity of individual gardens. We can mention "the garden

cities" of Ebenezer Howard, which ideas were materialized in Letchworth and in Welwyn. However, the success of the construction and of the integration of these new towns in the territory was very slow.

Nowadays we are facing a noticeable need of human settlements rehabilitation. But, in this domain, we should not confine ourselves only to spaces and materials, but our field of researches must comprise also the human feelings, outlooks and subtle necessities. Even after their rehabilitation, the aspect of the historical industrial spaces, their architectural and urbanistic layouts remain generally dry, possibly giving visual, physical and psychological shocks. It is important to rehabilitate these areas without turning them into arid museums and avoiding their mortification. These things remain ones of the big cultural problems of modern architecture: "less aesthetics, more ethics". It is a common error restoring areas without reintegrating them into a real urban life. This reintegration could be realised either by providing them with suitable urban functions, not artificially functional and by rehabilitating from the environmental point of view, using the landscape architectural proposals. The aim is to turn to the best account the space of the industrial heritage: to re-think and redesigned these spaces as living places, as safety areas for larger users groups. The landscape architecture can offer judicious ways to give back the historical charm of the industrial heritage, to educate the inhabitants and to offer a useful, joyful, healthful and cultural manner of spending their free time in the rehabilitated industrial places. That means also find such a manner to give it back the lively, personal and picturesque touch that it once have, but also to ensure the safety to move, to stay and to enjoy. Using the virtues of landscape architecture elements – earth, water, vegetation, furnitures - for the rehabilitation of the historical industrial spaces, we can create multifunctional spaces that will attract all kind of people. The potential of these reanimated places will educate people and will restore all citizen identity, whatever can be their degree of dependence, will restore their feeling of self-respect and also their responsibility towards this heritage and its aspects. The mixing of the population, with and without special needs, the mixing of the ages, will create an atmosphere to bring back the tolerance, the inner–peace, the unmediated inter-communication, bringing the end of these sites isolation.

In order to enjoy, stay and socialize, stimulating different groups to use the facilities of these rehabilitated industrial spaces, the proposals of the landscape architecture will endow the areas with adequate urban equipments and will create multifunctional, sustainable landscape arrangements, restoring the deteriorated urban life of the sites. Using earth, water and vegetation, using the power of the blue sky contemplation, we can obtain important effects of relaxation, restfulness, or dynamism, we can concretize the respect for "the essential joy" trough a real contact with Mother Nature. We can transform some of the spaces into garden plots, providing close contact between some leisure spaces and the circulation in the rehabilitated spaces. Works of creative and applied art can be distributed

through the green spaces for contemplation and as a visual therapy. Such availability of space tries to stimulate all the users to move about and enjoy.

PROPOSALS OF THE LANDSCAPE ARCHITECTURE

The proposals of landscape architecture are various, using the virtues of all morphological landscape elements, creating a harmonious integration in the urban landscape of the old industrial degraded sites. The factories can be transformed using green spaces. Plants will grow, embracing the structure skeleton, which served as a basis for the design of new interior functions in the old factories. But in the new ones can also change the dry and polluted industrial environment, giving a new life through the landscape arrangements. The build space will form an organic whole, coming closer to nature then the dry industrial world (image 2).

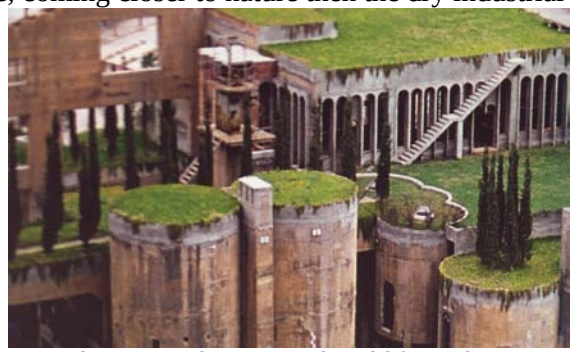

Image 2 - **The vegetation cover the old factories structures giving a new life and a new image.**

Not only the factories, but also any other kinds of industrial sites can be transformed. As an example, the area of Arsenale, heart of the old ships industry of Venetia was degraded in time and nowadays there are many “dead” spaces beyond or between ruined walls (image 3).

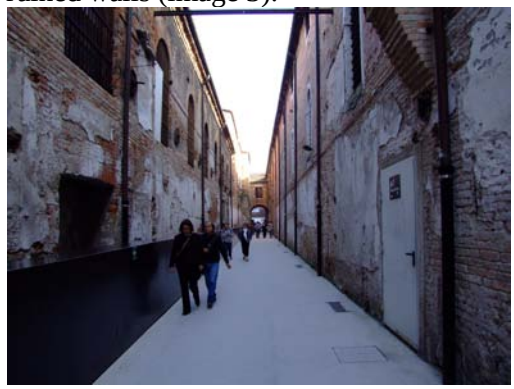

Image 3 – **Arsenale zone Venetia: dry spaces and degraded walls**

All these places need a new life, a new image, a new function. Step by step, these needs created beyond some walls a new world, trough the virtues of the natural elements. Only using a few build elements, water and vegetation, we can change the image of the old degraded spaces, creating a real visual therapy. As a result, a new kind of exterior space will appear, acquiring magnetism and generating unmediated social contacts (image 4).

Image 4 - **Behind the degraded walls:**
the therapeutic effect of water arrangements and vegetation

Another good example, proving the potential of the natural elements which can transform any kind of degraded old structure, is the Bastille- Gare de Reuilly old railway viaduct rehabilitation in Paris/France. Being in the middle of a big city, the rehabilitation aim was to give a new life to 1.4 kilometers of old elevated railway line and its supporting arched structure.

The ideal solution was to transform the upper area into a promenade linear garden. The down spaces of the arches were used for small shops and business.

Image 5 **– Landscape rehabilitation of Bastille/Gare de Reuilly viaduct: a parisian promenade linear garden**

The magnetism of green garden transformed the linear promenade into a very popular public space. The trees have been planted on the axes of existing columns and the promenade offers surprising urban views for the visitors. An industrial historic structure became a new, exciting element in the modern city grace to the virtues of landscape architecture (image 5).

CONCLUSIONS

In order to replace negative memories about polluted industrial areas with new joyful memories, the landscape architecture offer in the industrial heritage rehabilitation is to create for larger users groups, adults and children, an escape from the pollution of city life.

Transforming the industrial relics into new healthy and good-looking places, into favourable places for human communication, for different human activities, an escape of anonymity and isolation will be possible, the zone magnetism will grow also, attracting new visitors.

The new images will persuade and educate the inhabitants into enjoy the rehabilitated spaces, into stimulating their creativity and inspiration, into feeling self-respect and also responsibility towards these old industrial aspects of the city.

A strength penetration into the conscience of the inhabitants will be created trough the contact with the elements of Mother Nature. These proposals will contribute to the quality of life in many ways and will bring benefits on multiple levels: urban, economic-utilitarian, sanogen, social, cultural, forming-instructive, scientific, recreational, decorative-aesthetic.

As a result, it will be possible to awake a positive echo in the collective consciousness for the work for protection and salvation of industrial heritage.

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INTERFERENCES IN ECO-CONCEPTION

INTERFERENȚE ÎN ECO-CONCEPȚIE

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Abstract. *The increasing importance of ecologic criteria within the products and services designing (projection), in the conditions of a diversified and particularly dynamic offer, induces a preoccupation towards improving the environment performances. In this view, many organizations allocate important amounts, out of their investments (volume), in the favour of eco-conception (the research and development of processes and products compatible to the environment, environmental-friendly). The design contributes (tends) to a reinvention of a society that can live in harmony with the environment, activity that has to promptly and very courageously respond to the ecologic concepts' challenges: the quality and environment philosophy, the restriction of the natural resources, the cultural identity, biotechnology promotion, demographic lack of balance etc. The products and processes designers must assure that these excels in all aspects that lead to clients demands' satisfaction by assuring the functional performances, the economical profitability, reliability and, in equal measure, the impact on the environment (Sarbacker, 1998). Taking into account the designer's involvement along the life cycle of a product, a service ,etc, this research presents experiments concerning the wood treatment in order to obtain some aesthetic finishing (in a large wide of colours), with the aid of plants. These tests create multiple possibilities of wood treatment, from aesthetic point of view, with the support of some natural substances, having a zero negative impact over the environment.*

Rezumat. *Creşterea importanței criteriilor ecologice în proiectarea produselor şi serviciilor în condițiile unei oferte diversificate şi deosebit de dinamice, determină o preocupare în sensul îmbunătățirii performanțelor de mediu. În acest scop, multe organizații alocă sume importante, din volumul lor de investiții, în favoarea eco-concepției (cercetarea-dezvoltarea de procese şi produse compatibile cu mediul, environmental-friendly). Designul contribuie la reinventarea unei societăți care să trăiască în armonie cu mediul, activitate care trebuie să răspundă prompt şi cu mult curaj provocărilor conceptelor ecologice: filozofia calității şi a mediului, limitarea resurselor naturale, identitatea culturală, promovarea biotehnologiei, dezechilibrele demografice, etc. Proiectanții de produse şi procese trebuie să se asigure că acestea excelează în toate aspectele care conduc la satisfacerea cererilor clienților prin asigurarea performanțelor funcționale, profitabilității economice, fiabilității şi în egală măsură, a impactului asupra mediului (Sarbacker, 1998). Având în vedere implicarea designerului pe toată durata ciclului de viață a unui produs, serviciu, lucrarea prezintă experimente privind tratarea lemnului, pentru obținerea unor finisaje estetice (într-o gamă variată de culori), cu ajutorul plantelor. Aceste teste creează posibilități multiple de tratare a lemnului, din punct de vedere estetic, cu ajutorul unor substanțe naturale, având impact negativ zero asupra mediului.*

GENERALITYS

Eco-conscious design is a preventive method of work, which offers concrete applications for improving the life cycle of products, and sustains innovative solutions in the environment strategy of the company, improving the commercial profile with eco-products designs, and reducing the costs regarding the pollution of the environment. Experimental and theoretical research attests that ecological materials are used in an increasing variety of fields: Real estates, the garment and accessories industry, furniture and auto industry, etc. *(1, 2, 3, 4)* This natural materials of provenance: vegetal (wood, reed, cotton, silk, beet, etc), animals (shorn wool, bones, skin, etc.), either minerals (argil, soil, stone, etc.) have been used from ancient times. The manufacture of those products (traditional houses, fabrics, pots, accessories, etc.) has been possible through simple hand-made technologies. By reinventing environment friendly materials and technologies (environment friendly), we define (open) new ways to new products.

The concept of ecological car, (fig.1) developed by Dr. Kerry Kirwan and Ben Wood, from the Warwick University is worth to be mentioned here. This concept wants to demonstrate that ecological cars don't represent just a small vehicle with poor performance. High Performance vehicles can be made using biodegradable materials and in the future, these technologies could be used in the process of auto manufacturing. This car, Eco One, is a race car made (in proportion of) 95% out of ecological materials. With the exception of the steel chassis and the steering wheel, the rest of the components are biomass: tyres from potatoes, body from hemp and colza oil. The fuel is a mixture of sour corn and sugar beet. The vehicle is capable to reach a speed of 240 km/h through the driving mechanism recovered from a Triumph Daytona motorcycle, which accelerates from 0 to 100 km/h in 4 seconds. This engine is economical, with an average consumption of 6 litters per 100 km. *(2)* This concept manages to cover from conception to recycling the specific phases in the activity of eco-design.

MATERIAL AND METHODS

Experimental researches have been made on samples of different wood type: lime, oak, beech, fir. In order to obtain the samples they used the method of mechanical debiting. Several types of debiting were used, for every essence of wood, to show the wood structure, regarding the angle of debiting and the direction of wood fibber. This test shows the aesthetic aspect of the wood, without other aesthetic coverings.

The next experimental test uses samples of wood, of a certain type. These samples have been treated using immersion, mechanical friction, blowing, brushing, with vegetal substances (naturals), having the purpose of colouring the samples.

Fig. 1 – Ecologic vehicle concept manufactured in proportion of 95% from Biodegradable materials *(2)*

RESULTS AND DISCUSSIONS

Aesthetic effects as a result of using wood, depending on the debiting angle and the direction of wood fibber.

The wood (ecological material), has lots of aesthetic features, that the designer can take advantage of in his work. The experiments demonstrate the capacity of the wood to respond to the most exigent aesthetic requirements. The effects of light and shadow, the lines of wood fibber, the quality of surfaces, the tones, revealing or hiding the defects, all this according to different qualities of different species of wood (lime, beech, oak) more or less hard, with lighter or darker tones, contribute to creating friendly, warm, ecological products. These finishes, which a designer can speculate, allow excluding some finishing processes, regarding the achievement of surfaces with aesthetic effects. These choices help us obtain an ecoproduct with a low-cost manufacturing process, little energy and fewer materials, and in the benefit of the manufacturer, user and environment.

Fig. 2 – Debiting the wooden material perpendicular on fibber, the faces of the cube revealing the fibber in different ways on every face.

Different types of aesthetical finishes (obtained after experiments), made on wood samples, show the result between the cutting angle of the tool and the wood Fibber, behaving differently according to the essence of wood being used. The results are displayed in fig. 2, fig.3, fig.4 and fig.5.

Fig. 3 – Debiting the wooden material perpendicular on the fibber, the fibber having an aesthetical role due to the game of tones and direction.

Fig. 4 - Debiting the wooden material longitudinal with respect to the wood fibber. The fibber presents an aesthetical role, through the game of colour tones, direction or some existent defects in the wooden structure (nods).

Fig. 5 – Different finishing types in wood (different tones, revealing the wooden structure in a different way, the quality of the surface, more or less shiny) are the result of cutting the different wood essences (lime, oak, etc.)

Aesthetical effects, obtained with wood, depending on the way the surface was treated and on the vegetal paint that was applied.

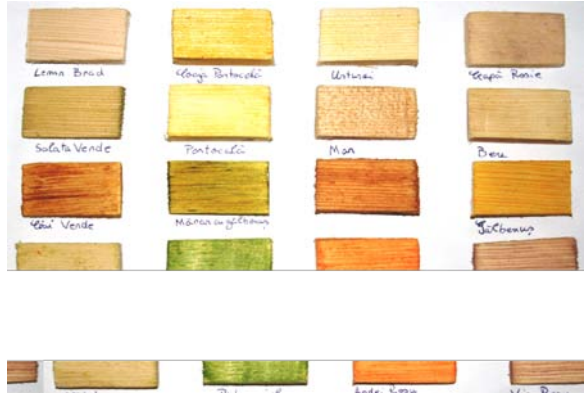

Fig. 6 – Samples of different colours, revealed according to the way the wood surface was treated.

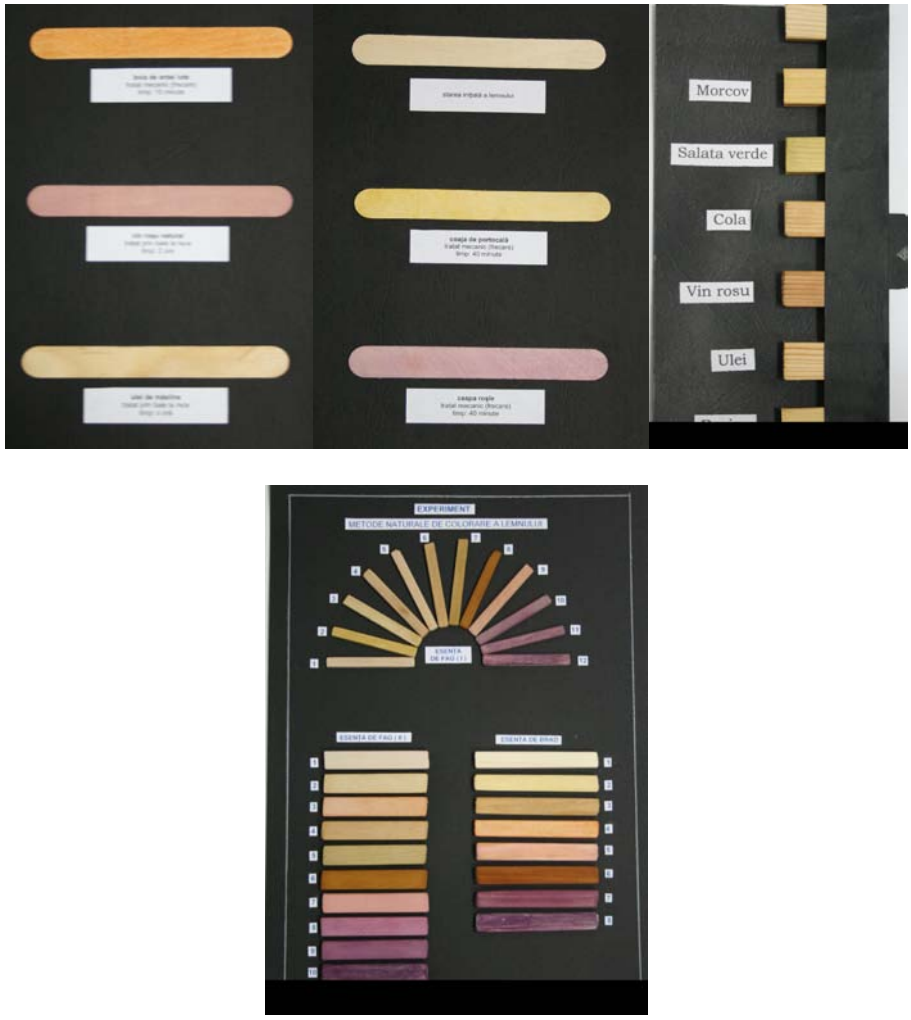

Fig. 7 – Different ways of treating the wood surface

The samples in fig. 6 and fig. 7, are made from pin wood transacted longitudinal (fig.6) on the fibber of the wood, or cylindrical samples from pin wood, the wood fibre being longitudinal reported to the debiting section, and the wood treatment is done using vegetal substances, by the process of immersion. These aesthetical effects depend on the following parameters: the vegetal substance used, the time and the temperature of exposure, the way of applying the colouring substance (immersion, mechanical friction, brushing), the essence of the wood, the section of the samples (receded, the sectioning of wood regarding the wood fibber).

CONCLUSIONS

Having as a purpose the manufacturing of „friendly" products, this work proposes studies and concepts regarding the shape, finishes, materials, technologies, which can be used in eco-product design. Interfering with different fields, this prior objective of the eco-design activity can be accomplished.

Vegetal materials can constitute real resources of materials in the design of the most exigent products (ex: ecological car Eco One, construction materials, textiles, accessories, etc.)

The wood, a favourite material in furniture industry, constructions, accessories, etc. can be aesthetically exploited in different ways. This material confers multiple finishing possibilities, which can be exploited in the advantage of eco-conception: through its structure, through the way of debiting and finishing, through the essence of wood, the way of finishing the surfaces (the colouring substances used, time of treating these surfaces, temperature used, the method of application, the essence of wood).

Our study opens new possibilities of research in developing the eco-products field.

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PROJECT PROPOSAL FOR LANDSCAPE DEVELOPMENT AT THE PUBLIC GARDEN IN BISTRIȚA COUNTY

PROPUNERE DE REAMENAJARE A GRĂDINII PUBLICE DIN BISTRIȚA

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Abstract. *Once with the urban development, increase of industrial activity, extended auto traffic, the creation and design of the green spaces has become an imperative solution for the modern urbanism. The green spaces are creating healthy and beautiful conditions for work and life development, with direct impact upon the modulation of microclimate, acting as a green filter for dust and toxic substances. Also they provide oxygene needed for maintaining life support, with a special particularity related to the beauty of these spaces, providing physical and psychological recreation for the human kind. The landscape development of the Public Garden in Bistrita County has it's beginnings in 1900, projected to fit in the urban development of the city, with a soft combination between architectural aspects and natural ones. Through the General Urbanity Plan, the public garden has been declared "Green space with severe regime for protection and controlled interventions". It's imperative to promote a new conception upon landscape development, with rules for maintaining the biodiversity, the natural potential of the specific zone, the landscape fond and not at least maintaining the environmental conditions. In the Public Garden of Bistrita County its imperative the rehabilitation of all the structural components, through controlled interventions, in successive stages.*

Rezumat. *Odată cu dezvoltarea oraşelor, intensificarea industrializării şi sporirea traficului rutier, crearea zonelor verzi a devenit un imperativ al urbanismului modern. Ele înfrumuseţează locul de viaţă şi de muncă, îmbracă într-o haină vegetală plăcută cadrul arhitectural al oraşelor, contribuind la ameliorarea microclimatului, purificând atmosfera de praf şi substanţe nocive, furnizează oxigenul necesar vieţii, constituind în acelaşi timp medii stenice şi estetice pentru recrearea fizică şi psihică a oamenilor.*

Amenajarea Grădinii Publice din Bistrița începe în jurul anului 1900, ea fiind gândită astfel încât să se integreze în peisajul urban, îmbinându-se armonios atât elementele arhitecturale cât şi cele naturale. Prin Planul Urbanistic General, grădina publică a fost declarată "Zonă verde cu regim sever de protecție și intervenții controlate". Este evidentă necesitatea promovării unei concepții despre modul de reamenajare a zonelor verzi şi de recreare, ținându-se cont de conservarea biodiversității, menținerea potențialului natural al zonei, a fondului peisagistic şi de rolul de asigurare a calității factorului de mediu. În grădina publică bistrițeană se impune o reabilitare a tuturor elementelor sale componente prin intervenții controlate realizate în etape succesive.

EXISTENT SITUATION

Before it was conceived as a public garden, the terrain made part of the medieval area, with his nordic area related to the fortification system from the XV century plus a dig of water.

The landscape development of this public garden was conceived to be fully integrated in the urban landscape, with a good balance between architectural elements (Dogarilor Tower, the fortress fence of defence, the existing villas) and also with the environmental elements (Bistrița river, Codrişor forest).

After the year 1953 the public garden has suffered major modifications through constructions of new paths and insertion of the urban furniture. In the present time, the public garden reaches a surface of 58,831 m^2, 18,509 m^2 occupied by pedestrian walkings, 3.622 m^2 occupied by semi-paths and 36.700 m^2 occupied by green spaces.

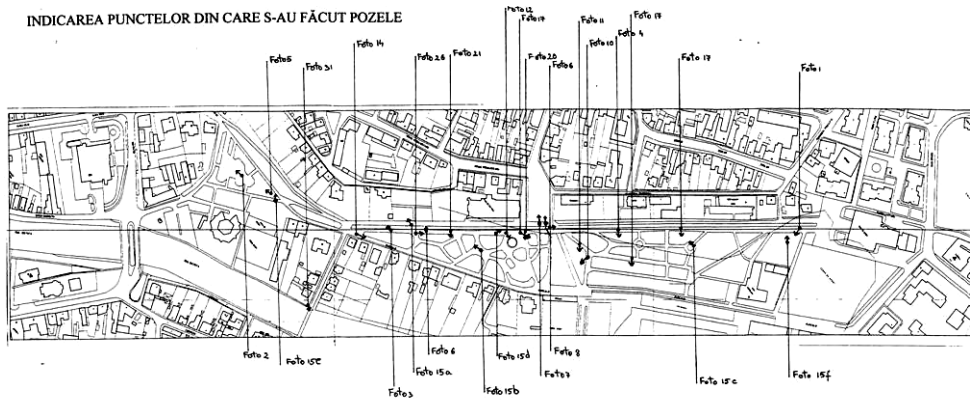

Fig.1. Points of perspective upon the existing situation

The existing situation of the vegetation. The public garden is divided in 76 parcels, with different sizes and shapes. In this parcels we can distinguish 3 main zones (I. : parcels between 43-76 with a play field in parcel no. 65; II : parcels between 42-18, pavilion and main entrance in the park; III. : parcels between 17-1, with the second play field). The whole landscape architecture in the parc is relatively conservatory, with organization on the transversal axis, all around the main entry in the park, pavilion area and the statue of George Coşbuc. Also another organization is made on the longitudinal axis of the park on the principal pedestrian path with an alignment made from horse chestnut-tree (*Aesculus hippocastanum*). The woody vegetation witch outcomes the optimum density is made from 1487 trees and 352 shrubs, representative beeing secular trees (with diameters on trunk over 1 m), the maple tree (in front of the sport building) plane trees and other species near the patio. The attraction of the public garden stays between two species of trees that are considered monument of nature): *Ginko biloba* (original from China) and *Lyriodendron tulipifera* (tulip tree - original from North America).

On the public garden surface are created two play fields, situated on the nord-east extremity of the park (with a surface of 913 m^2) (fig. 2) and on south-vest extremity (with a surface of 844 m^2) (fig. 2)

Fig.2. Playing fields

The lightning system. The existing lightning system in insufficient and old, we propose a lightning system for public lightning and ambient lightning.

At the present time in the public garden exists a single source of potable water and nether one public WC.

Pedestrian paths. The pedestrian paths are made of asphalt, mostly deteriorated and in some areas the borders between the paths and green area are missing.

External furniture made for the rest area. We can observe external furniture made for the rest area along the pedestrian paths and also in large area of the public garden. In the patio area and parcel no. 54 area. Parcel no. 54 is considered the best illuminated parcel.

Fig.3. Lightning system

The decorative and functional constructions meet in the public garden of Bistrita are damaged with need for reconstruction and maintenance.
Some of the decorative and functional construction in the public garden will be conserved others will be replaced. The existing ones will suffer restoration and maintenance works.

Stairs. Their need is to compensate the difference between different levels.

Fig. 4. Drinking fountain

They are made with concrete prefabricated boards. The form of the stairs is simple. In the present time the stairs are in a state of decay, in some area the construction material is missing and also the borders between the green spaces and stairs

Pergolas and columns don't exist in the public garden.

Jardinières. The existing jardinières will be kept, but with works for maintenance and rehabilitation.

Protected spaces in the public garden. In the public garden exists a traditional patio, witch is a point of interest for some band concerts, different static

games, creative activities. This patio will be kept because it's a traditional point of interest of the public garden in Bistrița. **Benches**. The existing benches in the public garden are sufficient but are unaesthetic (damaged and with a brute design), proposing the replacement of all benches.

Art exponats. The art exponents in the public garden of Bistrița consist in different statues and architectural objects.

Equipment for sorts and games. The equipments for sports and games will be kept, and some of theme that doesn't correspond from the functional point of view will be repaired and maintained.

Accesory. ***Indication panels*** In the public garden exists a single panel with a map of the garden and a brief history description of the garden. ***Garbage cans*** are enough and with adequate design.

LANDSCAPE PROPOSAL

Disposal of vegetative species. After the maintenance works or elimination upon the vegetative species, it's recommended to improve the landscape design by introduction of new vegetative species in the public garden of Bistrița county:

- Development of an alignment in the Nordic part of the public garden, in order to hide the estates from Ecaterina Teodoroiu Street. The alignment will be made from *Malus floribunda* specie.
- The buildings that will be functional as public W.C. will be covered with perennial twining plants.
- For accomplishment of color games, it's recommended the application of jardinières with annual flowers, biennale flowers, perennial flowers, shrubs (*Buxus, Cotoneaster, Ligustrum)* or conifers. The decorative effect is assured through port, leaf colors, flower colors and fruit colors.
- The jardinières will be placed near George Coşbuc statue with a plant mixture (*Hedera helix*, *Fuchsia*, *Coleus* ş.a.); in the existing jardinières will be planted flowers that will be decorative from early spring till autumn fall.
- In parcel no. 59 will be made a rondo with flowers, witch will assure the decorative design from early spring till autumn fall, (with biannual flower specias: *Bellis*, *Myosotis*, *Viola*) till autumn fall (with flower species decorative through leafs : *Alternanthera*, *Cineraria*, *Coleus*, *Echeveria*, *Iresine*, *Santolina*);
- The talus that maxes the difference between the two walk areas will be planted with different shrub species (*Cotoneaster*, *Ilex*, *Juniperus*, *Lonicera* etc.), perennial flower species (*Hosta*, *Primula*, *Rosa* etc.) and different ferns (*Adiantum*, *Athyrium*, *Dryopteris*). The most favorable places (wit natural light) will be chosen for planting the mentioned above species
- At the junction of pedestrian paths will be planted shrub species (*Cytissus*, *Cotoneaster*, *Hibiscus*, *Ilex*, *Juniperus*, *Lonicera*, *Rododendron*, *Thuja* ş.a.) in order to block the access for the green areas.
- Suspended pot flowers will be with (*Alternanthera*, *Begonia*, *Bellis*, *Coleus*, *Hedera*, *Impatiens, Lobelia, Myosotis, Pelargonium, Petunia, Salvia, Tropaeolum, Viola*) for the patio design, lightning system, children playgrounds ;
- will be planted replacement species for the turf (*Vinca*) in the shaded places of the public garden, in order to obtain a green carpet;
- In parcel no. 54 the existing turf will be replaced with a new one. Will be adopted carpet turf or rustic turf.

- Near the bole trees will pe planted perennial flower species rustic (*Colchicum, Convallaria, Crocus, Hyacinthus, Muscari, Narcissus, Tulipa*), witch will assure the spring design;

- The concrete post witch are placed in parcel no 55 will take the place of columns and will be dressed with annual plants and lianas.

- The stone wall in parcel no. 22 will be dressed with lianas (*Parthenocissus, Hedera*) in order to mask the unaesthetic wall.

At the planting and association of the flower species will be accorded attention to the vegetation period, height of plants, decoration period, leaf color, fruit color, flower color. The main criteria are to use a large palette of flower species, in order to ensure a large period of decoration.

The evergreen species and shrub ones will be dispose solitary and in groups, alone and in association with other species. Identical to the flower species the attention will be keen on association of plants with decorative elements existing in the public garden, decorative elements of the plants, height of plants. Species with a distinct decorative aspect will be planted solitary in order to expose their qualities. Group plants will be made from single specie. The mixtures made from conifer plants and dedicious ones will be made wit dedicious plants in the first plan of view, and conifer one on the second plan of view.

At the borders of shrub groups will pe planted different species of ferns, miniature roses, and *Hosta* species. In order to obtain the desired design effect will be placed decorative stones like marble, with an excellent esthetic property and soil fixation property for the existing slopes.

The lightning system. We propose the alignment of the lightning system along the main pedestrian path and the secondary ones.

We propose the building of 11 drinking fountains and two sanitary groups for women, man and disability persons. The drinking fountains will be spread all over the surface of the public garden, and the sanitary groups will be placed near the playgrounds.

Pedestrian paths. We propose the removal of the asphalt on the pedestrian paths with ornamental bricks made by granite. The pedestrian paths will be delimited by the green space with small border stones. The secondary pedestrian paths will be made with the same material as the main pedestrian paths.

Stairs. After the several studies we came to the conclusion that the stairs will be kept in their original form, with maintenance works. Delimitation between green spaces and stairs will be made with balustrades.

Pergolas and columns. We propose the emplacement in the public garden, in areas who are free of vegetation, more precisely parcel no. 54, and near George Coşbuc statue. The concrete post in parcel no. 55 will be used as columns, dressed with lianas.

Jardinières. The existing jardinières will be kept, and for some jardinières that are decayed, restoration work will continue. Jardinières will be placed an all pedestrian paths (principal and secondary ones), in the same time this jardiniers will be used to block the access of the vehicles in the park.

Protected spaces in the public garden. The patio will be kept because is a traditional point of interest in the public garden. Maintenance works will be made on the wood constructions, with special care for maintaining their original shape.

Benches. We propose their replacement with benches made by wrought iron in combination with wood.

Art exponats. George Coşbuc statue will remain because it's in good shape. The busts will be replaced because their poorly condition, and replaced with other art objects.

Equipment for sorts and games. The sport and game equipments will be kept, and those that aren't corresponding from functional point of view will be repaired.

Accessory. ***Indications panels*** The main indicator panel will be kept and other seven indicators will be mounted in the public garden, providing a map of the public garden

with all the utilities and the place where the visitor stays. ***Garbage cans*** will be kept, and the destroyed ones will be replaced.

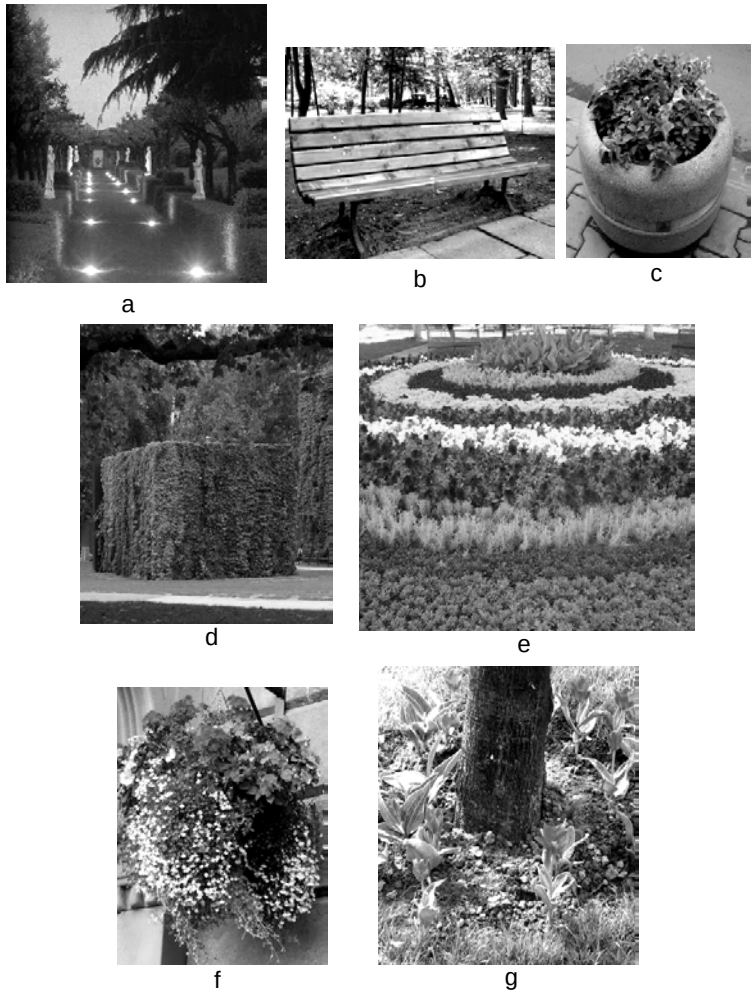

Fig. 5 Landscape proposal: a) lightning system, b) bench, c) jardinière, d) sanitary group covered with perennial plants, e) flower round, f) suspended pot, g) spring landscape arrangement

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IMPLEMENTATION OF THE BRODERBUND HOME DESIGN 5.1 PROGRAM IN LANDSCAPE DESIGN ARCHITECTURE – PLANT USING AND MANAGEMENT OF PLANT ENCYCLOPEDIA

IMPLEMENTAREA PROGRAMULUI BRODERBUND HOME DESIGN 5.1 ÎN AMENAJAREA SPAȚIILOR VERZI – UTILIZAREA PLANTELOR ŞI A ENCICLOPEDIEI BOTANICE

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Abstract. *The program comes to support architects and landscape designers through its two distinct components home architect and landscape design with powerful tools for vectorial drawing, on x and y coordinates length, height, landscape curves etc. Management of plants it's gradual with four specific steps: insertion of the plants, searching additional informations on the plant encyclopedia upon the inserted plants, managing the age of the inserted plants for a better revelation of the design with the actual conditions in the field, and not at least season change of the created design, with a dynamic view of the plants development through all the seasons of an year. The plant encyclopedia as integrated part of the program has detailed information for 7500 plant varieties. Each plant is presented through its scientificall name, common name, usage of the plant, vegetation period, blossom period, fruit or seed obtaining period. Each plant from the plant encyclopedia has its specific calendar witch shows all the maintenance works specific for the plant. The plant encyclopedia becomes complete with the section related to pest and diseases determination, powerful illustrated.*

Rezumat. *Programul se doreşte a venii in sprijinul arhitecților cât şi a peisagiştilor cuprinzând, doua părți distincte home arhitect (arhitectura caselor) landscape design (amenajare peisageră) cu unelte puternice de desen vectorial pe bază de coordonate x şi y, lungime, lățime, înălțime, curbe de nivel, etc. Abordarea utilizării plantelor in acest program se face gradual cuprinzând patru etape distincte: inserarea plantelor, abordarea plantelor din perspectiva unei enciclopedii botanice, oferind surplus de informații aferent speciei introduse in proiect, modificarea vârstei plantelor introduse, pentru o cat mai buna mulare a creației programului cu realitatea, observarea întregului proiect în dinamică, de-a lungul anotimpurilor specifice unui an calendaristic. Enciclopedia botanică, parte integranta a programului, vine cu un surplus de informații aferent celor 7500 de specii cuprinse în ea. Fiecare specie este prezentată prin denumirea ei ştiințifică, cât şi cea populară, modul de folosință al plantei, perioada de vegetație, perioada de decor, perioada de obținere a fructelor sau a semințelor. Fiecare plantă inclusă în enciclopedie are alocat un calendar specific lucrărilor de întreținere cu animații flash sub o formă grafică avansată, arătând modul de desfăşurarea al fiecărei lucrări de întreținere în parte. Enciclopedia este întregită şi prin secțiunea adresată combaterii bolilor şi dăunătorilor, bogat ilustrată.*

PLANT INSERTION AND MANAGEMENT

The Plant Tool gives many options for working with plants, trees, shrubs, and more in the selected project. The program can insert plants, select and learn about plants through an extensive encyclopedia of more than 7,500 items, view your landscape at different stages of growth and different seasons of the year. The Plants Tool icon has a different state for each of these four functions. A single click on the Plants Tool performs the function indicated by the icon.

	Insert plants
	Open the Plant Encyclopedia
	Change the maturity (years of growth) of the plants in your landscape
	Change the season to view your landscape at different times of the year

Fig.1. The functional characteristics for the plant insertion tool

To insert a plant:

1. Make sure the Plants Tool is set to the Insert Plants function.
2. Select a plant from the Catalog list.
3. Click in your 2D Plan view where you want to insert the plant(s).
4. When you are finished inserting plants of the type you have chosen, select another plant from the catalog or right-click and select Finish.

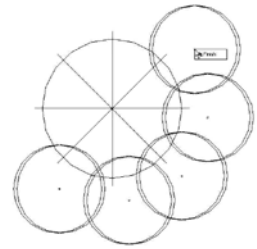
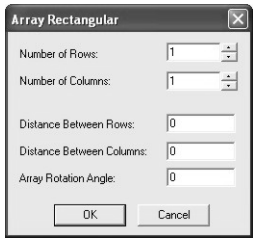
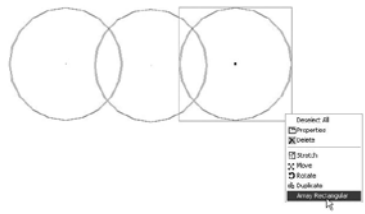


Fig.2. Plant insertion in a 2D Plan view

To insert a group of plants:



1. Insert the type of plant you want at the left end of the first row that you want to create.
2. Right-click on the plant in your 2D Plan view and select Array Rectangular. The Array Rectangular dialog will open.
3. Type in the number of horizontal rows of plants you want.
4. Type in the number or vertical columns of plants you want (if you only have a single row of plants, this will be the number of plants in that row.)
5. Type in the number of inches for the distance from the center of one plant to the center of the next plant in the row.
6. Type in the number of inches for the distance from the center of one plant to the center of the next plant in the column.



7. Click OK.

Fig.3. Insertion of a plant group

To manually change the size of a plant:

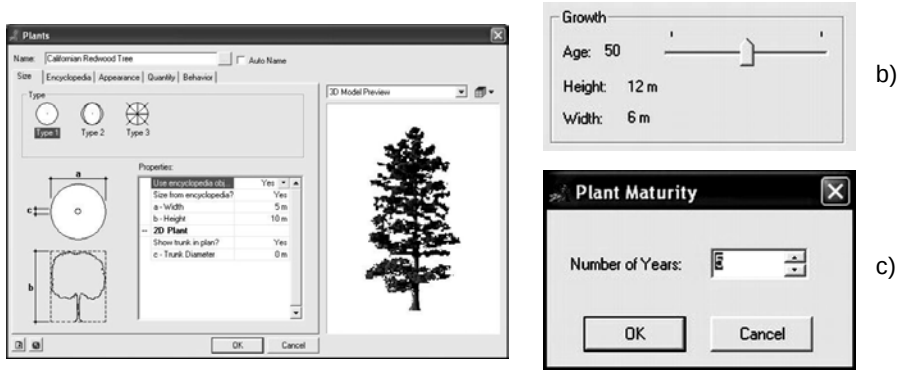
1. Select the plant(s) you want to change. You can change the age for each plant individually, or for all plants that are the same species - all the Oak trees in your project, for example.

2. Right-click and select Properties.

3. Click on the Size tab.

4. In the field that reads, "Size from Encyclopedia?" click on the "Yes" and select "No" instead.

5. Enter desired values for Width and Height. (fig.4)



a)

Fig.4. Different ways to control the plant age and size

USING THE PLANT ENCYCLOPEDIA

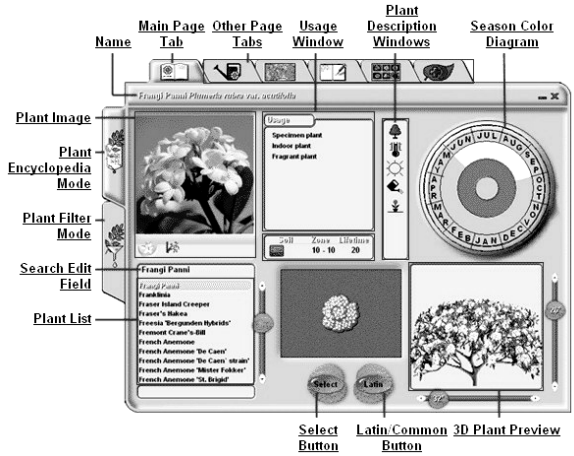


Fig.5. Plant encyclopedia (general description)

The Plant Encyclopedia contains comprehensive information on 7500 different varieties of plants. You can retrieve information about any plant, choose plants based on certain criteria, research potential diseases that each plant might

suffer from, or learn how to care for a given plant. You can use the Plant Filter to select a smaller group of plants based upon chosen criteria.

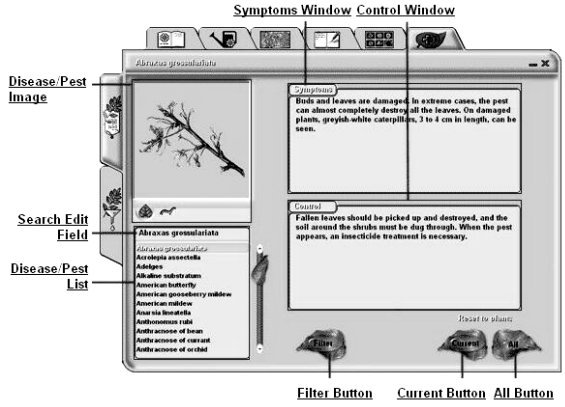
Main Page Tab - Clicking this tab brings up the Main page that you see above if you are in Encyclopedia mode. This page is where the majority of information on any plant can be found.

Plant Encyclopedia Mode - Clicking on this tab puts you in Encyclopedia Mode, where you can find information on the 7,500 plants in the program, as well as diseases that might affect them.

Name - The banner across the top of the page shows the Latin and Common name of the currently selected plant in the plant list. You can switch which name is listed first by clicking on the Latin/Common Button.

Search Edit Field - The box at the top of the plant list allows you to jump to the plant you want by typing in the first few letters of the name. The list of plants will move to the closest match as you type.

Season Color Diagram -The circle on the upper right corner of the Encyclopedia Main Page gives an idea of what you can expect from the chosen plant throughout the year. The outer circle shows the months in which the plant blooms and the color of its flowers. Fruits are also indicated in this circle, showing the period when they ripen and the color of their fruit. The inner circle indicates when the plant has foliage (including autumn leaves) and the color of its leaves.



Plant Diseases Page - This page shows a list of the possible diseases, pests, or other problems that may affect a plant (current plant, selected plants, or all plants from the Encyclopedia). (fig.6)

Disease/Pest Image - This is a real-world image or artists rendering. The box below the image indicates what you are seeing - i.e. the part of the plant (flower, bulb, leaf, etc.) or type of pest (vermin, insect, etc.). If the window below the picture shows more than one icon, the selected disease has additional pictures or video. Click on the icons to change the image in the picture frame.

Symptoms Window – This window provides a description of the indications that a plant is a victim of the currently selected disease or pest.

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DIFFICULTIES IN INSTALLING A JAPANESE GARDEN

DIFICULTĂȚI ÎN REALIZAREA UNEI GRĂDINI JAPONEZE

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***Abstract**: Close to other specific Japanese arts (origami, cha-no-yu), the art of setting up gardens represents a quintessence where philosophy pays for the main role. The installation of a Japanese garden acts like a provocation for the European man. Choosing and using the vegetal material, ligneous material especially, which does not often resist in our climatic conditions, represent one of the first difficulties. Another difficulty regards the building and the usage of the decorative elements, especially the most perishable ones (lanterns and lampions). Impregnating the "air" specific to the oriental extreme represents a difficulty, which constitutes the most important provocation for the one who builds the garden, but the one that offers important satisfactions, too.*

***Rezumat**: Alături de celelalte arte specific japoneze (origami, cha-no-yu) şi arta amenajării grădinilor este o chintesență în care locul principal îl are filosofia. Realizarea unei grădini japoneze reprezintă o provocare pentru un european.*
O primă dificultate o reprezintă alegerea şi utilizarea materialului vegetal, în special lemnos, care deseori nu rezistă în condițiile climatice de la noi. Altă dificultate este legată de realizarea şi valorificarea elementelor de decor, în special cele uşor perisabile (lanterne şi lampioane). Impregnarea aerului specific extremului orient este o dificultate ce constituie cea mai mare provocare pentru cel care realizează grădina, dar şi cea care oferă satisfacții deosebite.

The Far East has always charmed the Europeans with its fascinanting arts: the art of flower arrangement (*ikebana*), the ancient Japanese art of paper folding (*origami*) and the ancient art of aesthetic miniaturization of trees (*bonsai*). Creating a garden that follows the rules of the Japanese masters is both an art and a strong challenge.

Powerful symbols in the Far East, the Japanese gardens often loose their purpose when being recreated. Perhaps, that's the reason we should consider what a Japanese designer said: we speak about Japanese gardens in Japan, and about gardens in Japanese style in the rest of the world.

Japanese gardens contain vegetation, rocks, water, but what shows the craftmanship of the craftsman is the way these elements are put together.

RESULTS AND DISCUSSIONS

The plants that are traditionally used are native to Asia. It's quite difficult to use plants under the climate conditions of Iasi. The late April – May frosts can cause severe demage to the young plants. Another problem, in recent years, is the prolonged drought. The frost demages the deciduous trees and the drought demages the coniferous trees.

Among the coniferous trees (and gymnosperms , in general), the species of *Thuja* and *Chamaecyparis*, *Ginkgo biloba* resist quite well. But the species of *Cryptomeria japonica* and *Sciadopytis verticillata*, live for a few years, so it's not advisable to use them.

For the species of deciduous trees affected by the harsh winter conditions, it is necessary to be used a sheltered place, either a building, or a long – leafed plant of small woods, preferably of coniferous trees. Besides, they function as a background for either the beauty of the flowers, or the coloured foliage.

The star magnolia can be found in each Japanese gardens, and the reason is the beauty of the flowers. They are sensitive, in the first years of life. *Magnolia Kobus* tolerates the limestone soil, and *Magnolia stellata*, that has many flowers in its first years of life, likes to live in the sheltered, sunny places, because the strong wind, rain and frost can damage the flowers. It is best to grow this kind of magnolia in small gardens as it is 5 m high.

The Japanese maple are famous, but their sensitivity to unfavourable climate conditions is well – known, too. *Acer palmatum* [5] and the species with ornamental leaves are very sensitive as well. They best grow in places protected against the north and east winds, a light rain and rich in humus soil. The kinds of Red Maple and the kinds with lobed leaves are more sensitive than the species. *Acer triflorum*, a brightly red coloured species, from Asia, prefers high humid areas and balanced climate.

In the case of *Acer* species, we can replace the well – known ornamental subspecies with the variegated ones from *Acer negundo* or we can use a less known but more resistant species, *Acer ginnala*. The *semenovii* variety of *Acer tataricum* species, from Turkistan and Tian Shan, is very beautifully red coloured in autumn [1].

An everywhere symbol in Japan is the Japanese cherry tree. Of the species of *Prunus*, we grow *P. armeniaca, P. glandulosa, P. japonica, P. serrulata, P. triloba* [4], most in our country. The countless number of "Japanese cherry trees" worshiped in The Land of The Rising Sun are varieties of *P. serrulata* species. The varieties with double or semi-doubled flowers, and whose flowers last longer

are preferably used. Most of the time, these trees do not live for too many year, because they suffer from the late spring frosts or from the extremely severe winters. Besides these species, they sometimes grow *P. cerasifera var. pissardii* for the rust – coloured foliage, and because it's more rustic.

The willow species are quite easy to multiply and to maintain. The most valued kind is *Salix matsudana 'Tortuosa'* which, besides *Salix babylonica* and *S. purpurea* , is often grown in areas near water such as lakes, pools, etc.

Sophora japonica, best preferred as the cultivar '*Pendula*', requires attention in its first years of life, when the radicle system is fragile and it can be damaged by the late frosts. It likes a deep, fertile, rich in limestone soil, which allows to be planted near the falls made of limestone.

Albizia julibrissin is a species with a difference, admired, and planted for it delicate inflorescence. It is extremely sensitive and it recommended to be planted only in very sheltered interior gardens.

The rhododendron species is native to Far East. *Rhododendrom dauricum* resists very well to our climate conditions [6]. It requires a specific protection during winter time, then we can enjoy the beauty of its light violet petals in March – April. If the freezing temperatures can damage it in its first years, the severe dryness can damage it later in its life. That's why it is recommended it should be watered during prolonged droughts. Other species pretty resistant are *R. luteum* (from Caucaz), *R. mucronulatum* (from Eastern Asia), *R.schlippenbachii*, also known as 'royal azalea', native to Korea and Manciuria, resists well to the winter frost, but it is sensitive to the spring frost. Of the species with long – lasting foliage, *R. smirnovii* is more rustic, the species is native to Turkey and Caucaz. It is interesting for both the pink – purple flowers that bloom in spring and the young offshoot with dark hues.

Cornus kousa requires a slightly silicious soil. The hard soil must be avoided because the trunk doesn't grow nicely and it doesn't have nicely coloured leaves in autumn. To increase the colouring in autumn, potasium is added in September [1]. The young trees obtained from seeds and cuttings can blossom in 7 or 15 year's time. The young trees obtained by grafting blossom in 2-3 year's time.

A less used species, but it's worth the attention is *Enkianthus campanulatus*, an elegant shrub with its red flowers and leaves in autumn, but quite rustic.

Of the *Euonymus* species with falling leaves, *E alatus* stands out, with an exquisite carmine foliage in autumn, and *E fortunei* is an evergreen shrub whose cultivars with variegated and ornamental leaves and it resists without any protection during wintertime.

A valuable species is *Viburnum fragrans* because it blossoms in winter, but the flowers can be damaged by the strong frosts.

Buxus microphylla is a rustic species, which supports both half shadow conditions and strong sun, both wet and dry soil. It can be re – planted, even at a

late age. It is ideal for being cut in different shapes, a highly appreciated custom by the Japanese.

Of the *Hydrangea* species, *H. paniculata* is the most rustic one and it can reach up to 10 m height. The *H. aspera, H. heteromalla, H. macrophylla* [4] species require a sheltered place and protection during wintertime.

The big flowers of the peony can decorate successfully a corner in the garden, but the shrub peonies are rather used, such as *Paeonia delavayi, P.lutea* or *P. suffruticosa*. They best grow in the same place, up to 50 years, so it is recommended this place should not be changed. But when it is absolutely necessary to do the change, it is best to do it in October or March. It is best to be grown in a sunny place, sheltered from the wind and it prefers a soil rich in nourishing, fertile substances and well drained.

A few kinds of *Skimmia japonica*, with ornamental flowers and leaves, are recommended for a rocky place. It is a less rustic species, which grows better towards the south or west, protected by the shadow of big trees.

When choosing the bamboo trees, one should be very careful to the rhythm of invasion of the species. A great many of species are rustic enough to resist, even though they suffer damages during the harsh winters. They recover quite quickly as the spring comes. The species of the *Sasa, Pseudosasa* kinds and a few of the *Pleioblastus* kinds are invasive and it is better to avoid their planting in small gardens.

The *Phyllostachys* kind has less invasive species, but the height reached by its kinds make it difficult to protect against the cold winds. The *Arundinaria murielae*, *Phyllostachys aurea, Pleioblastus variegates* and *Sinarundinaria nitida* are species with a highly apprecieated foliage. But we ought to plant them in sheltered places.

In the gardens considered walking gardens, the moss is to be found everywhere. The severe drought during the summertime can make the maintenance of the moss quite difficult. It needs to be watered by spraying water, to compensate for the lack of rain. A compromise can be the use of *Soleirolia soleirolii*, a turf.

The climbing plants mostly used are and *Wisteria sinensis*. The later one needs to be trimmed carefully, both in summer and in winter, after they blossom, to get an abundant inflorescence.

The Japanese tradition preferssubtle green tones, but flowering trees and shrubs are used. Of the grassy plants, the anemones, the *Aster* species and chrysanthemums are preferred.

The distribution of vegetation must be done in such a way as to re – create nature. Another important symbolic aspect to be considered is the presence of the vegetation that has to mark the passing of the seasons, an essential cycle which is a symbol of life in itself. The vegetation in a Japanese garden must represent

spring (which corresponds to birth and youth), with shrubs that blossom in spring, summer (adult life), with falling species, autumn (old age) represented by the colours of the falling foliage, and, finally, winter, with long – lasting shrubs and trees, symbol of immortality and reincarnation.

The used species are well – known, being grown all over the world. The density, the diversity, the way they are combined create an exotic atmosphere and give a feeling of escape.

The water source must look like part of the natural surroundings, except for the traditional fountains. The meanders created by man must be winding and with irregularities as to look natural. The lanterns are often placed near a pool, as they represent the feminine and the masculine, water and fire.

There are two kinds of pools, the ornamental ones, *kazari – chozubachi*, placed next to the pavilion, and others, specific to the tea gardens, *tsukubai*.

The presence of the water evokes life. Thus, the source is a symbol of birth, a stream – a symbol of childhood, a pool or a fall – adolescence, and a swamp – old age. Ideally, the water runs from east towards south, then goes towards west, the curve thus created becomes the body of a dragon.

The third important element is the rock, which in the Japanese faith is invested with spirit. There are a great many ways to use rocks: for bridges, for pools, for falls, for alleys, for creating different symbols (a frog) or for their own beauty (in the case of dry gardens).

The specific paths, sometimes called “stepping stones” come originally from the tea ceremony. They have been created for not walking on the grass or moss and for redirecting the attention towards a specific visual experience. They often use granite other rocks, or even wooden pieces, to compensate for their lack. In the case of using pebbles, that have been fetched from somewhere else, the juxtaposition among the existing rocks must be made naturally. The natural rocks fetched from far away places must be carried carefully, as not to damage the marks made by time on them.

In the case of dry gardens, each pebble is places according to its unique shape and size; some are placed horizontally, while others are places vertically. Thus the symmetry in arranging pebbles is a common thing in the Japanese trees. In most cases, there is an odd number of pebbles and the most common shape of their arrangement is the triangle. The Japanese pay a great deal of attention to the harmony in arrangements which should give birth to **chi** energy [2].

The distinctive discretion of the Japanese architecture comes from respecting the three criteria of the so-called *zen*: *wabi*, the tranquility, the peacefulness, the bliss, *sabi*, the age patina, what has been lived, experimented, and *karumi*, the easiness, discretion, tact [3].

CONCLUSIONS

The most important elements in a Japanese gardens are vegetation, rocks, water; the art is the way these elements are put together.

The traditionals species used in a Japanese garden are damaged in our climate conditions.

The use of rocks are made by strictly rules.

The distinctive discretion of the Japanese architecture comes from respecting the three criteria: *wabi*, *sabi*, and *karumi*.

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NATURAL LANDSCAPE Vs. CULTURAL LANDSCAPE: AN ECOSEMIOTICAL APPROACH

PEISAJUL NATURAL VS. PEISAJUL CULTURAL: O ABORDARE ECOSEMIOTICA

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Abstract: *In the human transformations of the landscape lies a history of cultural activity far more pervasive than we usually realize. These alterations of the landscape assume patterns that have been guided by habits and local traditions, as well as by broader social and technological trends. When human activities have developed in a certain area, the landscape has become more and more organized. Landscape organization implies a concentration of its natural characteristics, an integration of natural elements with those created by man, the emergence of complex structures and forms, entirely produced by human beings. According to its broad conception, cultural landscape is that landscape or area bearing the imprint more or less of human activity, and it can be characterized as the outcome of an encounter between culture (understood in a general manner as human activity) and nature. We witness how cultural landscape has been replacing more and more significantly the natural landscape. Ecosemiotics or ecological semiotics is a new science, whose semiotic field is at the crossroads of nature and culture, being most closely related to the neighbouring academic fields of biosemiotics, cultural semiotics, environmental aesthetics, visual arts and hermeneutics .The special focus of this new interdisciplinary science is on the way signs and processes of semiosis determine the way humans interact with their environment.*

Rezumat: *Implicarea omului in transformarea peisajului inconjurator presupune o actiune culturala indelungata si complexa. Moificarile aduse peisajului sunt generate atat de obiceiurile si normele traditionale locale cat si de evolutia sociala si tehnologica a umanitatii. Pe masura ce activitatea omului se dezvolta intr-o anumita zona, peisajul devine din ce in ce mai organizat. Organizarea oricarei zone poate atrage dupa sine o concentrare a caracterului peisajului sau natural, o integrare a elementelor naturale cu cele construite de om, sau crearea unui complex de spatii si forme produse in intregime de om. Conceptul de peisaj cultural se refera la acel peisaj sau zona care poarta intr-o masura mai mare sau mai mica amprenta actiunii omului si in care elementele culturale se imbina in mod armonios cu cele naturale . Asistam la o inlocuire treptata, din ce in ce mai evidenta a peisajului natural cu cel cultural. Ecosemiotica sau semiotica ecologica este o stiinta noua, aflata la punctul de intersectie dintre cultura si natura, fiind inrudita cu biosemiotica, semiotica culturii, estetica mediului inconjurator, artele vizuale, si hermeneutica . Acasta noua stiinta interdisciplinara isi focalizeaza atentia asupra studiului semnelor si proceselor semice prezente in interactiunea omului cu mediul inconjurator.*

In this paper the author attempts to demarcate the specifics of ecosemiotics, or semiotic ecology, to describe and classify some of its main problems, and to introduce several concepts using its specific perspective. The aim of the research was to study man's relationship with the environment, proceeding from the practice of *signification*: how does man define and signify his surroundings. The semiotic aspects of human-nature relationships are of great importance everywhere, and these, particularly, are still not sufficiently taken into consideration or understood. Therefore, without understanding the semiotic mechanisms which determine the place of nature in different cultures, one has little hope of solving many serious environmental problems, and of finding the stable place of culture in nature.

MATERIAL AND METHOD

The notion *landscape*, if we treat it as a complex phenomenon, encompassing its mythological background, its ecological, geo-historical and cultural parameters as well as immaterial factors, the ways and levels of its mental perception, is one of the focal points of those traditions, shared values and views that constitute our links with the world around us, our personal, human and national identity.

The idea of cultural landscape often evokes the thought of some sort of investigation of the human and cultural with the natural, the land. The human contribution to the landscape is thought to be constructive and consistent with nature's own conditions and processes. The land and the things that are natural to it have in turn helped to determine the manner in which the human or cultural element has manifested itself. In short, the idea of cultural landscape is often taken to be the idea of the landscape in which culture and nature meet and interact on compatible terms.

Different academic fields and disciplines emphasize different characteristics of cultural landscapes that make such landscapes valuable. The cultural or local historian may consider the landscape valuable for its manifestation or evidence of cultural heritage; the biologist or landscape ecologist will emphasize the area's biological characteristics as worth preserving. Others find certain cultural landscapes worth preserving because of aesthetic, educational or recreational values. Common to these approaches is the view of the cultural landscape as something valuable to the extent that it imposes certain obligations regarding the manner in which people relate to it. In other words, the underlying concept of cultural landscape is "value- laden".

The special focus of ecosemiotics is on the way signs and processes of semiosis determine the way humans interact with their environment. By *semiosis* we mean any form of activity, conduct or process that involves *signs* including the production of *meaning*.

Ecosemiotics also raises the question of the semiotic threshold: what are the semiotic and the nonsemiotic aspects of our natural environment? Is semiosis always or only sometimes involved in the interaction of humans with their environment? What is the role of natural and cultural signs in the environmental semiosis?

Ecosemiotics can be defined as the semiotics of relationship between nature and culture. This includes research on the semiotic aspects of the place and role of nature for humans, i.e. what is and what has been the meaning of nature for us, humans, how and in what extent we communicate with nature.

Ecosemiotics deals with the semiosis going on between a human and its ecosystem, or a human in one's ecosystem. In this, it can be related to ethnology and sociology of man-nature relationships, to environmental psychology and the anthropology of environment, which, although quite close to ecosemiotics, deal more with the comparative than the semiotic aspects of the problem.

Ecosemiotics can be considered as a part of the semiotics of culture, which investigates human relationships to nature which have a *semiosic* (sign-mediated) basis.

Ecosemiotics (or ecological semiotics) is the study of sign processes in the interaction of humans with their natural environment. This semiotic field at the crossroads of nature and culture is most closely related to its neighboring fields of biosemiotics, cultural semiotics, but *semiosis* in the relation between humans and nature is also of concern to aesthetics, the visual arts, literature, hermeneutics. Environmental studies are not a discovery of semioticians. Natural philosophy, hermeneutics, cultural history, or ecology proper have a long tradition in environmental studies, and more recently numerous other eco-disciplines have been founded, such as ecopsychology, eco-ethology, human ecology, or ecolinguistics. All of them have a specific focus on humans in the context of their environment.

There are two concurring terminologies used in landscape studies. The first uses such terms as *place* and *space*, the other *–natural* and *cultural landscapes*. In both approaches there is a notion of how humans turn one into the other

The environmental implications of culture are embedded in its very origins, for the word *culture* is etymologically derived from *agriculture* (Bensdorff 1998:133).While one must not read whole explanations into etymologies, the connections between agriculture and culture is a curious one. The kind of agriculture, that is, the methods of cultivation that are employed and the technology that is utilized, results in qualitatively different environments. In cultivating the land, agriculture domesticates the landscape, that is, makes it home.

Speaking less literally, farming enables human habitation to establish itself, binding people to place. When hunter-gatherers turn to cultivation, they begin to transform the landscape, turning it increasingly into a humanscape. And this results in different human environments through the influence of many factors, not the least of which is the local culture, which itself evolves out of local environment and human conditions.

In the human transformations of the natural landscape lies a history of cultural activity far more pervasive than we usually realize. These alterations of the landscape assume patterns that have been guided by habit and local tradition, as well as by broader social and technological trends, for the cultural landscape began to replace the natural one with the emergence of human society.

This human landscape of culture and history is embodied not only in cultivated fields but in places remote and wild. It appears not only in the bucolic countryside but in the forms of buildings and roadways as well. This cultural environment is found, moreover, not only in the physical configuration of our surroundings but also in sounds, smells, and substances that fill our ears and lungs and are absorbed deep into our bodies.

A physical interaction of body and setting, a psychological interconnection of consciousness and culture, a dynamic harmony of sensory awareness all make a person inseparable from his or her environmental situation. Traditional dualism, such as those separating idea and object, self and others, inner consciousness and external world, dissolve in the integration of person and place.

A new conception of the human being emerges as an organic, conscious, social organism, an experiential node that is both the product and the generator of

environmental forces. These forces are not only physical objects and conditions, in the usual sense of environment. They include somatic, psychological, historical, and cultural conditions as well. Environment is the matrix of all such forces. As part of an environmental field, we both shape and are formed by the experimental qualities of the universe we inhabit. People are embedded in their world, implicated in a constant process of action and response.

RESULTS AND DISCUSIONS

The landscapes differ from one another in terms of power relations, land use patterns with respective technologies, and values people attach to them. However, a new formation is always not able to erase everything that the previous one has created; it rather adds a new layer of artifacts.

As a result we can speak of a landscape as a memory that contains remains of past land uses, remembering past power relations, but it also contains a set of narratives told from generation to generation that largely determine the identity of a place or a landscape.

Vos and Meekes (1999) and Palang and Mander (2000) have distinguished different landscape types: *ancient landscapes* which were shaped by their first inhabitants; *estate landscapes* controlled by landlords; *private farm landscapes*, which seem to be the dream landscape for so many of us; *collective farm landscapes* as symbols of communist power; *post-modern landscapes* , where the urban is preferred to the rural, land use is hectic and identity is lost.

Regardless of terminology, it is still people who create the place .A place becomes a place only after it has been given a name; it gets a story (legend, history, etc.). And with the end of the story the place ceases to exist, it returns to its former state of being a space, or a cultural landscape becomes once again a (pseudo)natural landscape.

According to its broad conception, cultural landscape is understood in contrast to natural landscape, as a landscape or area “bearing the imprint more or less of human activity”, or as “any landscape which is visibly influenced by human interference (Jones 1988:154).Conceived broadly, cultural landscape can be characterized as an outcome of an encounter between culture, understood in a general manner as human activity, and nature, without further specification of what the contribution or role of each in this encounter is.

Thus conceived, a cultural landscape is a humanly-affected environment, ranging from the drastically transformed industrial and urban environment, in which the signs of human activity are obvious, to rural areas where human activity is not so manifest.

A cultural landscape in the material sense is an individually identifiable area affected by human activity such that the area’s history has had humans among its participants. For humans to be participants in an area’s history, the area must be the arena of deliberate human activity. This does not, of course, mean that unintended or unforeseen effects of human activity are irrelevant to an area’s being a cultural landscape. But such effects must be tied to deliberation which

somehow involves the area. Furthermore, the activity that makes the area a cultural landscape in the material sense is tied to social or communal or collective practices, aspirations and expectations.

According to its narrow conception, a cultural landscape is a humanly modified environment possessing certain qualifying characteristics. A narrow conception implies certain conditions regarding the cultural contribution to the landscape, as exemplified with the rural landscape characterized by traditional agriculture (Frislid 1990:13) or landscape characterized by ancient monuments or cultural relics (Jones 1991:240), to the exclusion of areas that are highly urbanized or areas submitted to forms of agriculture and forestry that in a short period of time have drastically altered the land's biological and ecological characteristics.

Typical cases of cultural landscapes narrowly conceived maintain ecological health and biological diversity and are somehow continuous over an extended period of time with the area's original ecological characteristics. Perhaps one way of distinguishing between broad and narrow conceptions of cultural landscape is to say that it is consistent with the broad conception that nature serves as a mere substratum, a recipient of human transformation, for the formation of the cultural landscape, whereas a cultural landscape in he narrow sense requires that nature through its conditions and processes somehow be a participant in its formation and development. Thus conceived, a cultural landscape is an ecosystem in its own right.

CONCLUSIONS

Both *culture* and *landscape* are notions which allow broad and metaphorical interpretations. Both notions can be examined within the framework of very different fields –among the authors we can find geographers, art historians, environmental aestheticians, semioticians and literary scholars. Such a wide range of authors accounts for the pluralism of viewpoints. However, certain common features and dominants can be distinguished among such pluralism: the creative relationship of human beings with their environment, the relationship between the environment and art and the relationship between landscape and representation.

The value and the meaning of the complex cultural landscape has a material foundation in human activity in relation to the features of the land. Meaning and value are an immaterial dimension of the cultural landscape. The meaning is created in co-operation between the senses, memory, imagination and thinking. The conception of cultural landscape in contrast to natural landscape suggests that only humanly- modified landscapes can have such a dimension.

One can distinguish three senses in which cultural landscape can be understood: the humanly modified landscape in the broad sense as any landscape that has the physical or visible marks of human activity, the humanly modified landscape in the narrow sense as a landscape where the marks of human activity

are subject to the land's limiting conditions, and the landscape in the immaterial or symbolic sense of influencing people's views of themselves, of their history and identity.

Generally, landscape is the part of the environment experienced by man. Landscape and the environment can be used as synonyms, they are never seen as opposed to man, but as including, penetrating, embracing him.

Nature is maternal to man, it is important that he belongs to nature. Culture and nature are in symbiosis. Man creates the environment, and the environment creates man.

Ecological knowledge is not sufficient to understand or .solve the ecological problems which humans face, since these are consequences of certain deeply semiotic and cultural processes, intertwined with ecological and biological ones. There exist different types of cultures, among them some which have been able to create balanced relationships with nature, and many others which automatically create environmental problems for themselves. Consequently, ecosemiotics seems to be a possibility for facing these most important, and most difficult challenges of the contemporary world.

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ASPECTS REGARDING THE VERTICAL DECORATING MODALITIES BY USING A PERGOLA IN GREEN AREAS

ASPECTE PRIVIND MODALITATILE DE REALIZARE A DECORARII PE VERTICALA PRIN FOLOSIREA DE PERGOLE IN SPATIILE VERZI

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Abstract. *Pergolas are decorative constructions of different shapes: a pair of pillars or columns united in their upper ends with light liaison elements and they serve as support for climbing plant species in order to assemble the vertical decoration. The paper intends to present some pergola types, modalities for assembling them and the ornamental plant species that accommodate better for each pergola type. There are presented the modalities of pergola assembling, the material types from which they are manufactured and the best places to put a pergola, considering the place and their role in the composition. A very important step is choosing the plant species that can be used in vertical decorations; this paper is offering some variants of plant associations for each type of pergola, considering its location and purpose. Seven variants of pergolas are presented, realized from different or similar materials, of various sizes and shapes, which represent the support for the vertical decoration by using ornamental lianas in urban green areas.*

Rezumat. *Pergolele sunt construcţii decorative sub formă de perechi de stâlpi sau coloane reunite în partea superioară prin elemente uşoare de legătură şi servesc ca suport pentru plantele urcătoare în vederea realizării decorării pe verticală. Lucrarea îşi propune să prezinte câteva tipuri de pergole, modalităţile de realizarea a acestora şi speciile ornamentale care se pretează cel mai bine pentru fiecare tip de pergolă în parte. Se prezintă modalităţile de montarea a unei pergole, tipurile de materiale din care se confecţionează aceasta şi locul în care este indicat a se dispune pergolele, în funcţie de locul şi rolul lor în compoziţie. Deosebit de importantă este alegerea plantelor care pot decora pe verticală, lucrarea oferind variante de asociaţii vegetale pentru fiecare tip de pergolă, în funcţie de locaţia pergolei şi scopul amenajării acesteia. Sunt prezentate şapte variante de pergole realizate din materiale diferite sau asemănătoare, de dimensiuni şi conformaţii diferite care constituie suportul pentru realizarea decorării pe verticală prin folosirea lianelor ornamentale în spaţiile verzi urbane.*

Key words: pergola, green spaces, liana, vertical decoration

Pergolas are ornamental and utilitarian elements used in green spaces, allowing the construction of the vegetation bower, because they are made of climbing plants, full of volume, which thus cover the alleys and the terraces

against sunrays. The pergolas bring color and refinement to the areas where they are placed. They are those specific decorative elements of an arrangement that add value to the places meant for recreation, such as terraces or balconies.

Pergolas are placed on high areas, where they can be visualized and open beautiful perspectives.

It is best to build pergolas in a warmer climate area, with low frequency rainfall. There are at least two explanations for this increased popularity of the pergolas, because today we meet numerous prefabricated sets for pergolas, and the success the terrace's phenomenon encountered stimulated the need to have a shaded place to assure a link between house and garden.

MATERIAL AND METHOD

The materials used for the pergola's construction are, generally:

- natural wood; if we choose untreated, natural wood, we should have a rugged surface, which will better absorb paint, this combination resisting approximately ten years, that means twice better than a smooth surface.

- **treated wood**; submitted through different protection procedures (superficial carbonization against microorganisms, lacquer or paint applications for protections against exterior climate factors, water proof substances impregnation, antiseptically substances, fire proof covers etc.), the wood will resist better through time..

- wooden fiber; this cover type is realized by wooden fiber "linked" at heat and under pressure, combined with resin or wax. This finishing resists better than wood at temperature variations and and need less maintenance.

- plastic material; another material used for pergola's construction is plastic or, latter, PVC.. Because the PVC used for pergolas is protected against UV light, this aspect makes it immune to discoloration and so it does not need painting or other treatment. Because the colorant pigment is uniform distributed into the material, the scratches or the marks of some small mechanical shocks are almost invisible. The products are made of PVC 100% (unrecyclable) and thus they do not rot, deform, decompose, rust and they are not sensible to soil humidity, like wood, forged iron or masonry. Most of the PVC producers offer lifetime warranty for this material, and this means that, after installation, the only needing maintenance is to be washed with a water hose from time to time.

- **forged iron**; is a rarely used material, because it is not fit for any type of garden and needs repeated paintings. Usually, it is used for adosated pergolas, on block-building's terraces or balconies and rarely in gardens.

- **stone or bricks**; are used only for the construction of the vertical supports of the self-porting (traditional or oriental type) and are usually seen in the mountain houses' gardens.

The classic use of a pergola is the partial or entire masking of an alley, with a vertical structure covered in flowers and supports. The pergola can be placed against a wall or a green bush fence or it can be used as an element that limits an access area to a specific part of the garden. A modern use of pergolas is to create the frame of the terrace, which becomes nowadays a real outside chamber.

It is important to make sure that the construction material and the pattern are matching the house's and the garden's style – rustic pillars are decorative in a traditional environment, but they might look inappropriate in a more modern location. Furthermore, their structure must be resistant enough and well anchored in the ground

to cope with a big storm, especially because the pergola is covered with lianas and the weight of their stems, leaves, flowers and after that, fruits challenges a lot the resistance structure of the pergola.

RESULTS AND DISCUSSIONS

Considering their structure, meaning the structural content and auxiliary elements, the classification of the pergolas used in green spaces is the following: adosated pergolas; self-porting pergolas and modular self-porting pergolas.

Considering the construction type and their general aspect, pergolas can be: traditional; oriental; rustic and supported.

The traditional pergola is often an imposing structure, with brick or stone pillars that support strong wooden or iron girders, covered with climbing plants. For the gardens near houses, the best construction material is wood, even if metal built pergolas can be interesting in ultramodern scenery. The most recommended ornamental plants for this type of pergolas are lianas from the ornamental grape-wine plants' group *(Partenocissus tricuspidata, Ampelopsis aconitifolia* s.o.) as well as flower decorative species (*Campsis radicans, Clematis vitalba, Polygonum baldschuanicum* s.o.)

The oriental pergola is slightly different from the traditional one, in the binding mode of the horizontal and vertical elements. For the pergola to have an authentic oriental aspect, the transversal horizontal elements' ends must be up-curved, and the climbing plants recommended to be used for decorating it are species of oriental lianas: *Wisteria sinensis, Lonicera japonica, Parthenocissus tricuspidata* s.o.) (fig. 1 and 4).

Fig. 1. Oriental pergola

Fig. 2. Rustic pergola with roof

Rustic type pergola was long time used in the old gardens, especially for spontaneous climbing roses' species (*Rosa wichuraiana, R. multiflora* s.o.) but also for noble climbing roses' species from *Thea-Hibrida*, *Polyantha* and *Floribunda* groups (*Climbing Queen Elisabeth, Climbing Super Star, Royal Gold* breeds s.o.). (fig. 2). This structure is less resistant than other types, therefore it must be used a special waterproof glue and covered nails for the elements' binding. Also, it's good to add reinforcement props between the vertical pillars, to enhance the stability of the pergola.

The supported pergola can be used as kiosk, but lately it became preferred to enclose a terrace or only a part of it. It is a solid structure, leaned upon the wall with some girder's nails or by attaching the transversal elements on a horizontal wooden plaque, placed on the wall into the brick structure. (fig. 3.) Vertical decoration is recommended to be made with rustic lianas that assure the density of the vegetal material through their abundant leaves. (*Hederea helix, Parthenocissus quinquefolia*) and as well through flowers and fruits (*Lonicera periclymenum, Clematis x jackmannii*).

Fig. 3. Pergola with angular support

Fig. 4. Oriental pergola with roof

The adosated pergola is composed by three main elements:

- vertical elements (support) – are those frame elements, usually from wood or other materials as metal, stone, bricks or plastic materials. There are two elements for each sustaining pillar and for that, they are united with insurance screws. Keeping an equal distance between them is realized with wooden distance equalizer blocks that also connect these elements. In their lower part, the screws pass also through a metallic profile that facilitates the fixation into the soil or into the terrace's pavement.

- horizontal elements perpendicular to the vertical supports – are similar to the previous ones, and sometimes are made even from the same material. The fixation is made also with the insurance screws. At the opposite end, the elements are fixed in the same way to the vertical elements.

- transversal horizontal elements of the bowers and pergolas – are those structures that bind between them all the other elements. With their help it is realized a transversal rigid structure, becoming also more stable, even when it is "covered" with climbing plants. The fixation and the binding with the other components is identical, and the materials of these elements are the same as the one used for the perpendicular horizontal elements and sometimes, with the one used for the vertical supports. (fig. 5)

The adosated pergola can be decorated using ornamental leaves species (*Hedera helix* var. *discolor*, *Parthenocissus tricuspidata* var. *Lowii*), ornamental flower species (*Clematis x jackmannii "President"* – with big violet-blue flowers, *C. x jackmannii "Ville de Lyon"* – with big carmine red flowers, also the climbing roses species from *Polyantha* group(*Coral Dawn, Cordon Rouge, Golden Showers* s.o.).

The modular self-porting pergola is identical with the self-porting one, with the difference that between the vertical elements, along the alleys or terraces where they are placed, there are wooden cross-bared panels, metallic nets or plastic materials nets, and in the lower part, benches or resting chairs can be included. (fig. 6).

Fig. 5. Adosated simple pergola

Fig. 6. Simple modular pergola

CONCLUSIONS

1. Pergolas are decorative elements, but not only that, which create an area of gradual and personalized passing, from the exterior to inside, underline the recreational outside places, offering an intimate frame or underlining the main house entrance, personalizing a terrace or a balcony etc.

2. The materials used for pergolas are: natural wood, treated wood, wooden fiber, PVC (plastic material), stone, bricks, forged iron, s.o.

3. A pergola can be placed near a wall or a green bush fence or it can be used as an element that limits an access area towards a specific part of the garden; a modern use of pergolas is to create the frame for a terrace.

4. Considering the construction mode and the general aspect of the pergolas there are: traditional pergola, oriental pergola, rustic pergola, supported pergola, adosated pergola, self-porting pergola, modular self-porting pergola, s.o.

5. The ornamental species recommended for decorating the pergolas are chosen considering the modality of fulfilling the decorative function, through leaves, flowers or fruits, but also considering the decorative period, trying to phase it for a long period. We recommend the liana species from the ornamental grape-wine group *(Partenocissus tricuspidata*, *Ampelopsis aconitifolia* s.o.), flower and fruit decorative species (*Campsis radicans*, *Clematis vitalba*, *Polygonum baldschuanicum*, *Wisteria sinensis*, *Lonicera japonica*, *Lonicera periclymenum*, *Clematis x jackmannii* s.o.), climbing roses, spontaneous species (*Rosa wichuraiana*, *R. multiflora* s.o.) or noble climbing roses from *Thea-Hibrida*, *Polyantha* and *Floribunda* groups, s.o.

6. Most of the decorative liana species have known lately a great diversification, through enhancing the decorative features and creating numerous breeds, varieties and hybrids that can assure all the requirements and pretences in the vertical decorations' field.

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THE ANALYSIS OF SPECIALIZED PROFILE GREEN SPACES FROM INSIDE IASI

ANALIZA SITUAȚIEI SPAȚIILOR VERZI CU PROFIL SPECIALIZAT DIN MUNICIPIUL IAŞI

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Abstract. *The actual surface of Iasi is 3770 ha, from which the cultivated green spaces (with unlimited, limited or specialized profile access) occupy approximately 827 ha (22%). The specialized profile green spaces occupy 294,1 ha, from which 103,8 ha belong to the Botanical Garden, 2,3 ha are occupied by the Zoological Garden, 13,6 ha for sport parks, 113,8 ha for cemeteries, 39,4 ha are plantations for sustaining the slopes, 12 ha are occupied by tree nurseries and 9,2 ha are protection plantations for the water sources. This paper proposes to analyze, from the structural and functional point of view, these surfaces of specialized profile green spaces, observing and emphasizing their positive and negative aspects. The favorable combination of green spaces with constructed perimeters, with the main transportation lines, industrial platforms but also with residential areas, yet having a high potential of expanding the green spaces represents an appreciated solution for recovering Iasi's previous charm.*

Rezumat. *Suprafața actuală a municipiului Iasi este de 3770 ha, din care, spațiile verzi plantate (cu acces nelimitat, cu acces limitat şi cu profil specializat) ocupă cca. 827 ha (22%). Spațiile verzi cu profil specializat dețin 294,1 ha, din care 103,8 ha aparțin Grădinii Botanice, 2,3 ha ocupate de Grădina Zoologică, 13,6 ha pentru parcuri sportive, 113, 8 ha sunt ocupate de cimitire, 39,4 ha sunt plantații de consolidare a versanților, 12 ha sunt ocupate de pepiniere iar 9,2 ha sunt plantații de protecție a surselor de apă. Lucrarea îşi propune să analizeze din punct de vedere funcțional şi structural aceste suprafețe de spații verzi cu profil specializat, urmărind evidențierea aspectelor pozitive şi negative ale acestora. Îmbinarea fericită a spațiilor verzi cu perimetrele construite, cu principalele fluxuri de transport, platforme industriale dar şi zone rezidențiale, având potențialul încă ridicat de extindere a spațiilor verzi, reprezintă o soluție apreciată pentru regăsirea farmecului de odinioară al municipiului Iasi.*

Key words: green spaces, gardens, parks, specialized profile.

Into the specialized profile green spaces' category enter: botanical gardens, dendrology parks, rose gardens, zoological gardens and parks, exhibit area parks, cemeteries green spaces, plantations for slope support, nurseries and protection plantations for the water sources.

In this paper we want to present as detailed as possible the situation of this category of specialized profile green spaces, analyzed from a structural and functional point of view in order to emphasize their positive and negative aspects.

MATERIAL AND METHOD

The analysis of the territory around Iasi was conducted between May 2006-October 2007, by visual monitoring the actual status of the specialized profile green spaces areas from Iasi and the surroundings; more complex observations were made in cooperation with the specialists from Tree Research and Development Center Iasi, as part of a larger project.

The acquired and processed data were used for structuring the results regarding the vegetal carpet's composition, its health status and its placement into the Iasi's close perimeter in order to draw some conclusions in what concerns the areas with specialized profile green spaces and their actual status, pieces of nature altered enough by the human activity in the studied area.

RESULTS AND DISCUSSIONS

In the administrative territory of Iasi, the function of specialized profile green space is assured by the following green spaces:

1. Botanical Garden Iasi. Is a multiple function institution (didactic, scientific, cultural-recreational, hygienically-sanitary and for preserving the spontaneous plant species genetic stock) with a surface of 103.80 ha, representing an important green area in the northwestern side of Iasi, with an obvious role of support and protection against erosion on a soil otherwise liable to slip, also with a role of protecting the mineral water sources (in present intensively exploited) and climate protection against strong winds and excessive temperature.

This objective is always present on the list of the visitors coming to Iasi, having a benefic influence, of ecological education for everybody, becoming a reference place for this town. Also, the agreement function of this green space increased lately.

In essence, Botanical Garden Iasi represents an artificial ecosystem but with naturalization trends, in which the biotope (soil conditions, microclimate) is systematically improving and the biocenosis (vegetal and animal communities) are constantly enriching. (Leocov, M., Lupu, I.A., 1988).

The Botanical Garden's mixed vegetal carpet is herbaceous in proportion of 35% and ligneous in proportion of 65%, the ligneous species having an average height of approximately 15 m. In its ensemble, this botanical garden's vegetation induces to the visitor a sedative – relaxing influence against the every day stress, but also has some exciting – soliciting influences.

The multitude of landscapes, interchangeable, has a strong comforting action on the visitor through variations of shapes and volumes, through colors and scents.

Botanical Garden Iasi represents a semi natural ecosystem but also an important green space in the northwestern side of Iasi, highly cherished by the locals and not only.

2. Sport parks. The sport parks from inside Iasi occupy a cumulated surface of 13.6 ha, that is approximately 1.7 % from the sum of town's green spaces. The biggest part of this surface (12.3 ha) is herbaceous, asphalted or covered with cinder and the rest of it (1.3 ha) is planted as perimeter green curtains. These curtains' composition contains: 0.3 ha – resin trees, 0.7 ha – deciduous trees and 0.3 ha deciduous shrubs. The trees / shrubs ratio is 0.77 / 0.23 and the deciduous / resin trees ratio is 0.7 / 0.3. The most representative sport parks from inside Iasi are: „Emil Alexandrescu" City Stadium, „Constructorul" Stadium, „Tineretului" Stadium, „Penicilina" Stadium and „Tepro" Stadium. From all these, the most important is „Emil Alexandrescu" City Stadium, with a surface of 5.67 ha, from which the perimeter shrub green curtain occupies 1.08 ha, made of deciduous trees in proportion of 90%. The most valuable existing specie in this perimeter is the black American nut tree (*Juglans nigra*) which is perfectly accommodated here and realized considerable growths. The estimated necessary capacity for a city like Iasi is of approximately 30 ha of sport parks, noticing thus an existing deficit of almost 16 ha, which, unfortunately, underlines extremely well the increased lack of interest of the modern society for sports and related activities.

3. Zoological Garden. Placed at approximately 2.5 km south from the town border, into the frame of a separate body and with a surface of almost 2.3ha, the zoological garden does not accomplish the function it was created for. Thus we will mention the green space inside, with a surface of 1.70 ha, occupied by ligneous plants in the following proportions: 1.20 ha - deciduous trees and 0.50 ha - deciduous shrubs.

4. Cemeteries green spaces. The conducted studies show that in Iasi there was once an old Israeli cemetery in Ciurchi zone (Cihodaru, C., Platon Gh. şi col., 1980), and also a Turkish cemetery in Sărărie zone (mentioned in old documents from 1735). The cemeteries functioning today are: Eternitate (27 ha) Sf. Petru and Pavel - Eternitate extension (22 ha), Păcurari and Sf. Treime (26 ha), Sf. Vasile (8 ha), Buna Vestire (10 ha), Evreiesc (14 ha), Bucium (2.5 ha), Socola – Neuropsychiatry Hospital (0.5 ha), Copou - Sf. Atanasie and Chiril (1.5 ha). The sum of cemeteries surfaces from Iasi is of 113.8 ha.

The cemeteries' ligneous vegetation represents 11.40 ha from which: 2.30ha – resin trees, 4.10 ha - deciduous trees, 3.20 ha resin shrubs and 2.70 ha deciduous shrubs. The trees/shrubs ratio is 0.56 / 0.44, and the deciduous / resin species ratio is 0.60 / 0.40. The actual cemetery surface administered by Iasi council (app. 114 ha) covers the necessary for a town of Iasi's size, extensions being unnecessary.

5. Plantations for land support. It is well-known the fact that Iasi is placed in a region with lands liable to slip, because of the clay-marl under layer from the Sarmatia age and of the aquifer layers extremely uneven spread. (Barbu,

N., Ungureanu Al. şi col., 1987). These studies concluded that inside Iasi's actual perimeter there were many land slipping episodes through time, though the actual situation is relatively good, the active slipping lands being restrained as surface, in favor of the stabilized or going to be stabilized ones. As an effect of ligneous plantations for supporting the slopes we can admit that the old slipping episodes stopped on the western side of „La Cosari" Hill and on Manta Roşie Valley. Another effect of plantations for supporting the slopes is the action for stabilizing the land slipping areas from Cetăţuia, Galata and Ciric.

Also, through the conducted stabilizing measurement complex, including trees and shrubs plantations, we consider solved the problem of land slipping from Râpa Galbenă and Groapa lui Vodă (on the left bank of Cârlig creek). Inside Iasi city, the plantations for supporting the lands liable to slip or to form torrents are spread on 39.4 ha, including 4 ha resin trees (*Pinus sylvestris* and *Pinus nigra*), 27.4 ha deciduous trees (mainly *Robinia pseudacacia*) and 8 ha deciduous shrubs. The trees / shrubs ratio is 0.8 / 0.2 and the deciduous / resin species ratio is 0.9 / 0.2.

We need to mention the following aspects: in time, the role of ligneous plantations proved benefic in supporting the unstable lands; the land surface with supporting role is not sufficient in Iasi city, therefore there must be studied the five zones affected by slipping during 1969 - 1974 in order to establish a program of prevention measures for the close future.

6. Tree nurseries. The nurseries in Iasi show a deficit, the only town nursery is the one from „Moara de Vânt" with a surface of approximately 12 ha which includes, in the cultivated space: 1.2 ha with resin trees, 6 ha with deciduous trees (including seedlings selection facilities) 1.2 ha resin shrubs and 3.6 ha deciduous shrubs. The trees / shrubs ratio is 0.6 / 0.4 and the deciduous / resin species ratio is 0.8 / 0.2.

This nursery can't cover, quantitative and qualitative, the local demands for tree cultivar material; there are also 5 private nurseries, but most of them are in fact importers, not producers. The City Public Service Iasi searched possibilities for establishing another town nursery, the most probable location being outside town's perimeter, nearby the former Heavy Hardware Combine.

According to standards, the nursery necessary for a town like Iasi is of 30 ha, that leaving a deficit of almost 18 ha.

7. Water sources protection plantations. This category includes the planted spaces surrounding the water reservoirs Păcurari, Aurora, R.A.J.A.C. Company, I.C.H.V., Şorogari etc., the occupied surface being of 9.20 ha. The biggest part of this surface is the green space from the R.A.J.A.C. Company, of almost 1 ha, which was once a part of „ Ghica Vodă Promenade „ from Copou. In present, there are 43 taxons, from which 21% are resin species and 79% are deciduous species, and the percentages of trees and shrubs are: 58% trees - 42% shrubs.

In ensemble, the green spaces for water sources protection occupy a surface of 8.2 ha with ligneous plants and 1 ha with herbaceous species. It is necessary to

maintain and may be extend this surface once the existing reservoir are expanding or new ones appear.

For„ Chirița Lake" water source protection is necessary to assure a perimeter plantation of minimum 500 m wide, what means a planted surface of almost 240 ha.

The conducted analysis on these categories of green spaces from inside Iasi emphasizes the fact that for all green space categories the total necessary capacity is of 1684 ha, noticing a deficit of 857 ha, bigger than the existing green space surface which covers 827 ha.

It is imperatively necessary to establish other green spaces inside the Iasi city borders, therefore the local City Council approved „The National Program for improving the environment quality by implementing green spaces inside the urban area", initiated in 2007. Thus, the local municipalities in Iasi proposed creating four new green spaces, three of the proposed zones being situated in Dacia zone and one in Țigarete zone. A financial contract is desirable to be accessed: "*Environmental fund for the national program of improving the environment quality by establishing new green spaces*".

CONCLUSIONS

1. The paper realized an analysis of the specialized profile green spaces from inside Iasi, represented by: Botanical Garden, former Zoological Garden, cemeteries green spaces, plantations for land support, tree nurseries and green spaces for water sources protection.

2. Botanical Garden Iasi is „the happiest" example of specialized profile green space, representing an important green area in the northwestern side of Iasi, with an obvious role of support and protection against erosion on a soil otherwise liable to slip, with an obvious role of support and protection against erosion on a soil otherwise liable to slip, also with a role of protecting the mineral water sources (in present intensively exploited) and climate protection against strong winds and excessive temperature.

3. The estimated necessary capacity for a city like Iasi is of approximately 30 ha of sport parks, noticing thus an existing deficit of almost 16 ha, which, unfortunately, underlines extremely well the increased lack of interest of the modern society for sports and related activities.

4. The actual cemetery surface administered by Iasi council (app. 114 ha) covers the necessary for a town of Iasi's size, extensions being unnecessary.

5. The conducted studies underlined the fact that there is a deficit of plantations for slope support of approximately 21 ha, the existing land surfaces with a support role inside Iasi being not sufficient, therefore there must be studied the five zones affected by slipping during 1969 - 1974 in order to establish a program of prevention measures for the close future.

6. According to standards, the nursery necessary for a town like Iasi is of 30 ha, that leaving a deficit of almost 18 ha.

7. In what regards water sources protection, it is the same deficiency; in this case the deficit is of almost 11 ha.

8. The conducted analysis on these categories of green spaces from inside Iasi emphasizes the fact that for all green space categories the total necessary capacity is of 1684 ha, noticing a deficit of 857 ha, bigger than the existing green space surface which covers 827 ha.

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