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CONTENT

CUPRINS

THE CONTRIBUTION OF A COMPLEX OF TRACE ELEMENTS TO REALIZATION OF POTENTIAL OF GRAPE RESISTANCE TO LOW NEGATIVE TEMPERATURES

IMPACTUL COMPLEXULUI DE MICROELEMENTE ÎN REALIZAREA POTENŢIALULUI DE REZISTENŢĂ A PLANTELOR DE VIŢĂ DE VIE LA TEMPERATURILE NEGATIVE JOASE

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Abstract. *The resistance of perennial plants to the unfavourable conditions of growth is closely connected to the plant mineral status. Moreover, the trace element content that plays a very important role in many metabolic processes of plants is the basic limitative factor. As a rule, the soil under vine is insufficiently ensured with mobile forms of Fe, Mn, Zn, Ni, B etc. The efficacy of foliar treatment of vine with a specific complex of trace elements Microcom-V was studied in the greenhouse and field conditions. Foliar treatment of vine during the period of vegetation changed some physiological indices: intensification of phosphorus components and carbohydrate metabolism in leaves and shoots, free amino acids content in tissues, shoot growth and maturation. The modifications revealed led to the intensification of plant growth and development, formation and a fuller manifestation of genetically based potential of frost and winter resistance.*

Key words: resistance, vine, trace elements, xylem exudate, free amino acids, carbohydrates, phosphorus compounds

Rezumat. *Rezistenţa plantelor perene la condiţiile nefavorabile de creştere este strâns legată cu status-ul mineral al plantelor. Totodată, factorul principal limitativ este conţinutul de microelemente, care joacă un rol foarte important în multiplele procese metabolice ale plantelor. Ca regulă, solul în plantaţiile de viţă de vie este insuficient asigurat cu forme mobile de Fe, Mn, Zn, Ni, B etc. Eficacitatea tratamentului extraradicular a viţei de vie cu un complex specific de microelemente Microcom-V a fost studiată în condiţii controlate şi de câmp. Tratarea foliară a plantelor în perioada de vegetaţie a avut influenţă benefică asupra unor indicatori fiziologici: modificarea procesului de metabolizare a carbohidraţilor, conţinutului de compuşi fosforici, aminoacizilor liberi în ţesuturile plantelor, creşterea şi maturizarea lăstarilor, formarea şi manifestarea mai deplină a potenţialului de rezistenţă la ger şi iernare.*

Cuvinte cheie: rezistenţă, viţa de vie, microelemente, seva, aminoacizi liberi, carbohidraţi, compuşi fosforici.

INTRODUCTION

Vine grape, one of the most important species for the Republic of Moldova, is frequently injured due to exposion to critical negative temperatures during the winter period, they being the main factor of viticulture destabilization. The

majority of the varieties cultivated in the country, possess an enhanced genetic potential of producing capacity and resistance to frost and winter conditions. An eloquent objective provided for both intensive and ecological technologies within the strategies of a durable agriculture development in view of production of stable and high quality yields is to ensure the most complete manifestation of this potential.

Plant resistance to unfavorable factors is known to be a complex property. The multiple studies (H.J. Bohnert et al., 1995) have demonstrated that plant responses to stress are accompanied by accumulation of N-containing compounds (proline, other amino acids, polyamine compounds) and hydroxyl compounds (soluble glucides, oligosaccharides, sorbitol, inositol etc.)

The problem is to provide evidence demonstrating the impact of nutrients in this process. The perennial plant resistance to unfavorable growing conditions is closely connected with the plant mineral status. Moreover, trace element content that plays a very important role in many metabolic processes of plants is the basic limitative factor (Burzo I., Toma S. Et al., 2000; Toma S. et al., 2003; Alloway, 2006). As a rule, the soil under vine is insufficiently supplied with mobile forms of Fe, Mn, Zn, Ni, B etc. Therefore, it is important to provide plants with a necessary microelement complex during critical growth and development periods. A specific microelement complex, tentatively named Microcom-V, has been developed for this purpose.

This study has been conducted to elucidate the impact of the Microcom-V microelement complex on the accumulation of protective compounds meant to realize the winter resistance potential of vine plants. The efficacy of vine foliar treatment with this fertilizer has been studied in the greenhouse and field conditions.

MATERIAL AND METHOD

The studies have been performed on vine grape (industrial varieties Codrinschi and Aligote) from 2007 to 2009.The foliar treatment of plants with the Microcom-V microelement complex was carried out in three terms (1 – before flowering, 2 and 3 – at the stage of intensive shoot growth with an interval of 12-14 days). Water treated plants were used as control. Leaves were sampled for analyses in 3 and 6 days after foliar treatment, xylem exudate - at the budbreak stage.

The following analytical methods have been used: free amino acids using a AAA-300 analyzer, the phosphorus compound content after Bertran; microelement content using an atomic absorption spectrophotometer after dry calcination at 480^{o}C. Shoot growth and maturation was evaluated after the method of Lazarevskii M.A. (1963) and Alexandrescu I. et al. (1998).

The assessment of the vine resistance to winter conditions was conducted in the field conditions using the method developed by Cernomoreţ M. V. specifically for the vine crop (1985, 2000). The findings have been statistically manipulated using B.A. Dospekhov's method (1979).

RESULTS AND DISCUSSIONS

It is a common knowledge, that accumulation of glucides and other compounds having a stress protective action is one of the mechanisms of plant resistance to the action of negative temperatures, as well as other stress factors (E. Mazzucotelli et al., 2006; V.V.Kuznetsov, G.A.Dmitrieva, 2006). A dynamic evaluation of the glucide content in vine leaves after microelement treatment has demonstrated that the total glucides increase in the course of vegetation (Table 1).

The most favorable effect has been obtained after the treatment with the Microcom-V microelement complex. The more essential thing is an increase of the monosaccharide content. A concomitant insignificant increase of starch indirectly denotes an intensification of synthetic processes.

Treatment of plants with microelement solutions maintains the total level of free amino acids (FAA) during vegetation at a significantly higher level. The quantitative and qualitative changes are more pronounced after the third treatment (Table 1). Utilization of microelements in combination with other elements (Microcom-V) is more beneficial. The analysis of the qualitative content of FAA shows that the content of proline, valine, tyrosine, and phenylalanine grows in the treatments with microelements. The content of glutamic acid+glutamine rises by 2-3 times after three days of treatment.

Significantly, the content of FAA, particularly indispensable acids, increases in vine grapes, the highest value registered in the treatments with Dissolvin and the microelement complex. This evidences about a higher quality of grapes. The total sugars in berries increased only in the treatment with the microelement complex in comparison with the control.

Table 1

The content of sugars and free aminoacids (FAA) in vine organs, mg/100mg d.w.

Treatments	leaves						berries	
	5.06.07		19.06.07		10.07.08		28.08.07	
	FAA	Total sugars	FAA	total sugars	FAA	Total sugars	FAA	total sugars
Control	0,244	0,67	0,022	0,80	0,05	2,40	0,020	18,77
$FeSO_4$	0,262	0,93	0,024	1,13	0,103	3,06	0,036	17,77
$FeSO_4$	0,266	0,67	0,024	0,87	0,133	2,73	0,041	18,23
Microcom- V	18,23	1,07	0,028	1,33	0,164	3,46	0,052	19,67

Glucides and FAA are principal substances in perennial plant xylem exudate, as well. However, the relevant literature does not reflect the role of foliar treatment in the spring ascendant flow of protective compounds in vine grape.

The evaluation of the quantitative and qualitative content of glucides in xylem exudate has been carried out at the budbreak stage. Xylem exudate was sampled following the foliar treatment of plant with Fe salts ($FeSO_4$ and Dissolvin), $NiSO_4$ and the Microcom-V microelement complex in the preceding year. After the foliar treatment of plants in the preceding year, the xylem exudate contains significantly more glucides in comparison with the witness (fig. 1).

The content of saccharose, the principal transport form, has grown in the treatments with Microcom and $NiSO_4$ in the first place. The total content of glucides is the highest in the treatment with Fe in the form of chelate (Dissolvin) and with the microelement complex (Microcom-V).

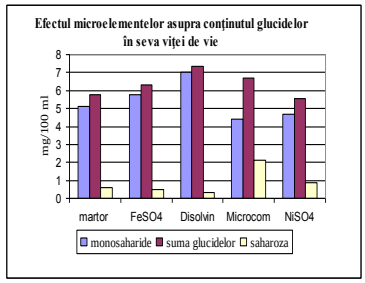

Fig.1. The content of glucide in vine xylem exudate, mg/100 ml, var.Codrinschi

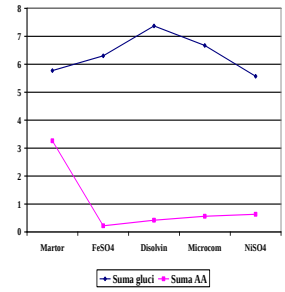

Fig. 2. The total content of glucides (mg/100 ml) and free amino acids (mkM/100) in vine xylem exudate.

Simultaneously, the content of free amino acids, that is the main form of the nitrogen reduced through vine xyleme, has been determined in xylem exudates (Burzo et al., 1999). About twenty free amino acids and amides have been found in xylem exudate. The findings received during two years allowed us to mention that the foliar treatment of plants during the vegetation contributes to essential modifications in xylem exudate composition: a sharp diminution of the total FAA content in the treatments with foliar treatment accompanied by an increase of the total glucide content (fig. 2).

Table 2

The quantitative content of amino acids in vine xylem exudate, % of the total content (2009)

Amino acids	Control	$FeSO_4$	Dissolvin	Microcom	$NiSO_4$
Asparaginic acid	5.70	13.1	10.20	5.00	7.50
Glutaminic acid	4.90	5.2	10.00	7.40	12.80
Proline	23.20	19.3	10.40	5.40	10.30
Tryptophane	7.80	5.2	2.60	5.10	5.10
Alanine	15.87	8.01	9.13	5.50	17.99
Glycine	10.00	5.2	5.30	6.40	7.00
Cysteic acid	2.20	9.9	14.10	6.90	8.00

The estimation of the quantitative FAA content in xylem exudate has demonstrated that the relative content of the so-called stress acids (Haldemann et al., 1988), proline and alanine, obviously reduces in comparison with the control. The diminution of the proline and tryptophane content, which results in peptide hydrolysis, may affirm the intensification of the synthetics processes at the

beginning of the vine vegetation in the plants treated the preceding year. The content of S-containing AA (cysteic acid et al.) increased.

Phosphorus compounds are very important for the development and manifestation of the frost and winter resistance degree. The studies carried out have revealed essential modifications in the content of some forms of these compounds in the vine organs after microelement treatment. A significant increase of the content of phosphorus lipids and nucleotides, acid soluble phosphorus and a significant reduction of etheric glucides has been established. The obvious modifications found in the content of the phosphorus compounds after the plants have been treated with the Microcom-V complex attest a beneficial effect of the microelements on enhancement of plant resistance to frost and winter conditions.

The optimization of the metabolic processes in the course of plant vegetation through application of microelements has influenced shoot growth and maturation. Table 3 summarizes the results of the estimation of the microelement effect on the length and maturation degree in the shoots in 2009.

The effect of the Fe-containing substances, especially Fe in combination with other microelements (Microcom-V) is much more pronounced than that of Ni.

Table 3

Growth and maturation of vine shoots depending on the foliar treatment, var. Codrinshi, October 31, 2009

Treatment	Total mean shoot length,M±m, cm	Mean mature shoot length, M±m, cm	Shoot maturation degree	
				± against control
Control	134,5±6,13	110,4±4,73	82,1	
$FeSO_4$ 0,3%	167,1±7,64	151,1±5,92	90,4	8,3
Dissolvin	152,3±5,34	131,7±3,41	86,5	4,4
Microcom -V	173,4±9,53	159,2±7,86	91,8	9,7
$NiSO_4$ 0,02%	141,8±4,20	119,5±3,12	84,3	2,2

The condition of vine buds after wintering in the plants treated with microelements during the preceding vegetation period has been assessed. The data obtained in the years 2008 and 2009 demonstrate that buds viability has increased significantly, the number of dead buds has decreased; the plants treated during the vegetation period of 2008 with Microcom or FeSO4 saved the highest number of viable buds. Eloquent results have been obtained regarding the condition of vine buds after the action of critical negative temperatures in the winter of 2009-2010, which proves a significant increase of bud viability (6%-8%) and reduction of the number of dead buds in the plants treated during the vegetation period with Microcom-V, Dissolvin, and FeSO4 in comparison with the witness.

CONCLUSIONS

1. The modifications in the content of amino acids, glucides, phosphorus compounds in vine tissues and xylem exudate under the influence of microelements confirm the impact of these elements, especially the Microcom-V microelement complex, on the regulation and stabilization of metabolic processes, enhancement of resistance to unfavorable temperatures.

2. The foliar treatment of vine grape during the vegetation period contributes to essential changes in spring in the composition of the ascendant flow: a sharp fall of the total content of FAA in the xylem exudate of the plants treated accompanied by an increase of the total glucide content.

3. The complex Microcom-V contributes to formation and a fuller manifestation of genetically based potential of frost and winter resistance of vine.

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RESEARCH ON THE VARIABILITY OF QUANTITATIVE AND QUALITATIVE TRAITS IN A POPULATION OF *RAPHANUS SATIVUS* L. VAR. *CAUDATUS* FOR BREEDING PUROPSES

CERCETĂRI PRIVIND VARIABILITATEA UNOR CARACTERE CANTITATIVE ŞI CALITATIVE ÎN CADRUL UNEI POPULAŢII DE *RAPHANUS SATIVUS* L. VAR. *CAUDATUS* ÎN SCOP DE AMELIORARE

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Abstract. *The study is done on several qualitative and quantitative traits of Raphanus sativus L. var. caudatus (rat-tail radish) to clarify the mechanisms of inheritance of these traits, for plant breeding purposes. Observations were perform on flower colour, presence/absence of anthocians on the stalks, color and length of the pods both in 2008 and 2009 using all the plants of this species obtained by sowing all the seeds obtained on open pollinated plants of the species population. The obtained data allowed the consideration of flower colour, presence/absence of anthocians on the stalk and pod color as alternative traits, while the length of pods presented a continuous variability characteristic for quantitative traits. Our results show that in the analyzed species the flower color, color of siliqua and the presence/absence of antocyans on stalks, as alternative characters, were inherited through Mendelian mechanisms while the length of siliqua proved to be a typical quantitative trait with a rather low heritability.*

Key words: *Raphanus sativus L.* var. *caudatus*, alternative/quantitative characters, segregation ratios.

Rezumat. *Studiul este făcut asupra unor caractere calitative şi cantitative ale speciei Raphanus sativus L. var caudatus menite să clarifice mecanismele de segregare a caracterelor în scop de ameliorare. Timp de doi ani, s-au făcut cercetări constând în observaţii şi intervenţii (autopolenizări) asupra plantelor din populaţia iniţială şi asupra plantelor aparţinând primei generaţii de consangvinizare. Caracterele urmărite au fost culoarea florilor, prezenţa sau absenţa antocianilor pe tulpini, culoarea şi lungimea silicvelor. S-au obţinut date care permit încadrarea modului de segregare a genelor, având ca punct de reper pentru culoarea florilor rezultatele cercetărilor făcute până în prezent asupra speciei înrudite, Raphanus sativus, şi recomandările literaturii de specialitate pentru celelalte caractere.Rezultatele obţinute arată că atât culoarea florii cât şi culoarea silicvei şi prezenţa/absenţa antocianilor pe tulpină sunt caractere alternative cu ereditate conform mecanismelor de segregare mendeliene în timp ce lungimea silicvei este un caracter cantitativ cu o ereditate slabă.*

Cuvinte cheie: *Raphanus sativus L.* var *caudatus*, caractere, segregare, culoarea florii

INTRODUCTION

In the contemporary period, due to globalization and the growing interest of people for a healthy diet, it is important to find new species with nutritional properties but also with high productivity and low requirements for environmental factors. *Raphanus* genus includes cultivated species worldwide, of which only two are known in Romania. Banga (1976) presented the history and evolution of four types of radishes grown today, as:

a. *Raphanus sativus* L. var. *radicula* (sin. *sativus*) - radish ;

b. *Raphanus sativus* L. var. *niger* - black radish;

c. *Raphanus sativus* L. var. *mougri* (sin. *caudatus*) - The rat-tail radish, which has a root rather unimportant as food, but it is grown as a vegetable in Southeast Asia for its edible foliage and pods used fresh, cooked or preserved;

d. *Raphanus sativus* L.var. D. *oleifera* – a radish type cultivated as fodder especially in northern Europe.

This paper tries clarifies some aspects of quantitative and qualitative inheritance of traits in a population of *R. sativus* L. var. *caudatus*. Analyses of these data are based on experimental results obtained in 2008 and 2009.

MATERIAL AND METHOD

Original material consists of a seed lot of *Raphanus sativus* L. var. *caudatus* purchased from India by a company representative of ALTozer Ltd, Cobham, United Kingdom. Examinations and measurements of the plants were made at the mentioned company. The qualitative characters analysed were the following: flower color, presence / absence anthocyans in pods and stem color, and of quantitative characters was observe only the pod length. To illustrate the consistency / deviation reports segregation obtained in the open-pollinated generation of theoretical reports expected under a particular model of action of genes, we used χ 2 test (Ardelean et al., 2007)

RESULTS AND DISCUSSIONS

Although specialized papers confirm the existence of four colors in the flowers of radish (Irwin et al., 2004, Strauss et al. 2004), we have identified only three colors: purple, pink and white. The yellow flowers, in the initial population, were missing.

The lack of yellow flowering plants could be explained by selection pressure that exerted when ruminants grazed the field where *Raphanus sativus* L. var. *caudatus* grew. According to data of Harder in 2006, the overwhelming majority of farm animals that feed on meadows with *Raphanus sativus* L. var.*caudatus* prefer plants with yellow flowers. This means that, as an allogamous plant, *Raphanus sativus* L. var. *caudatus* will be represented in the population especially by the other three colors and very seldom by the yellow colored flowers.

Adding to that the fact that the yellow flower is the double recessive homozygote (wwpp), it can be understood why in the population of *Raphanus sativus* L.var *caudatus* analyzed, the yellow color of the flower was missing.

Table 1

Types of flower color in *Raphanus sativus* L. var. *caudatus* plants observed in field to open-pollinated variety

Lot	Number of plants	Flower color			
		Purple	Pink	White	Yellow
1	55	28	14	13	0
2	53	19	19	15	0
3	55	41	12	2	0
4	52	20	8	24	0
5	56	38	6	12	0
TOTAL	**271**	**146**	**59**	**66**	**0**
Expected segregation 9:3:3:1		153	51	51	17
χ^2		11,6			
Comparison χ^2 for DF_3		11,6 > 7,8			

χ^2 for $P_{5\%}$ and $DF_3 = 7,81$

Data presented in table 1 correspond to the segregation model of open-pollinated populations for the four colors analyzed even if there were no yellow flowers. It is clear that most plants should have purple flowers (W_P_) because these genotypes takes 9:16 of the total segregants possible while plants with pink and white flowers represent only 3:16 of the total possible recombination.

Calculated value of χ^2, greater than the theoretical 11,6 for DF = 3 is very close to the lack of significance since the small deviation could be induced by the 17 plants with yellow flowers that ought to exist in the population and that in fact there were missing.

Pod length, analyzed in the open-pollinated population, is shown in table 2, according to four dimensions, taking into account the nature and objectives to obtain offspring with pods over 20 cm and between 6-7 cm.

In the initial population, we observed a high variability on the pod length (6.9 ÷ 16.1 cm). The data presented in table 2 reveals that large and very large pods were most frequently presents on the plants.

Of the 271 plants analyzed, 232 had pods with length over 11 cm. This means that in this population of *Raphanus sativus* L. var *caudatus*, long and very long dimensions of pods are very likely determined more by the effects of dominance of polygenes and less by the additive effects.

Table 2

Pod length (cm) of open-pollinated plants of *Raphanus sativus* L. var. *caudatus* observed in field

Lot	Number of plants	Pod length (cm)			
		≤7	7÷10	11÷15	≥16
1	55	1	9	40	23
2	53	0	7	33	7
3	55	1	10	34	15
4	52	0	4	24	4
5	56	0	7	52	0
TOTAL	**271**	**2**	**37**	**183**	**49**

The presence of anthocyanins in plant stems of open pollinated variety is a trait that affects less the pods and seed quality but more the quality of fodder obtained.

Table 3

Presence/absence of anthocyanin on stem pollinated plants of *Raphanus sativus* L. var. *caudatus* observed field

Lot	Number of plants	Anthocyanins on the stem	
		Absent	Present
1	55	13	31
2	53	12	51
3	55	21	45
4	52	22	22
5	56	16	38
Total	**271**	**84**	**187**
Expected segregation 3:1		68	203
χ^2		2,52	
Comparison with χ^2 for DF_1		2,52 < 3,84	

χ^2 for $P_{5\%}$ and $DF_1 = 3,84$

Generally, most authors who have dealt with this problem (Harder, 2006; Irwin et al., 2004; Strauss et al., 2004) agree that plants with anthocyanin stems are less preferred by the ruminants, probably because of the astringent taste given by the compounds containing of anthocyanins.

The ratio of segregation observed for the presence/absence of anthocyans on the stems in the original population, suggest that, this is a qualitative trait

determined by a single major gene that is dominant for the presence of anthocyanin over the absence of it.

In table 3, it is noted that the population of open pollinated plants with stem with anthocyanins predominated over the green stem, report being very close to 3:1 segregation. The value of χ 2 calculated is less than the theoretical value for P = 5%, which shows that the actual distribution of color classes is identical to the theoretical one.

The pod color is a qualitative trait determined by a single major gene that is dominant for the green pods over the purple pods. Pod color is more important in esthetic terms. Although the taste is sourer due to the presence of anthocyans, purple pods have a more attractive appearance.

Table 4

Color of pod to open-pollinated plants of *Rapanhus sativus* L. var. *caudatus* observed in field

Lot	Number of plants	Pod Color	
		Purple	Green
1	55	13	51
2	53	12	44
3	55	17	38
4	52	10	47
5	56	6	33
TOTAL	**271**	**58**	**213**
Expected segregation 3:1		68	203
χ^2		1,96	
Comparison with χ^2 for DF_1		1,96<3,87	

χ 2 for $P_{5\%}$ and DF_1 = 3,84

The presence of anthocyanins on the stem is not correlated with their presence on the pods. In table 4, there can be seen that the plants with green pods prevailed in the initial population, giving a segregation ratio very close to 3:1. The computed of χ^2, value is less than the theoretical value for P = 5% and DF = 3, which shows that the observed color distribution is identical to the theoretical one for the pods color.

CONCLUSIONS

1. The plants with yellow flowers did not occur in the initial population that we analyzed. Regarding the accurate assessment of color flower is recommended to be done in inbreeding generations and to use a color spectrum analyzer to avoid any doubt on the intensity of petal color.

2. Regarding the length, of pods, the initial population had a large variability. From the 271 plants analyzed, the majority were with pods size over 11 cm, which shows that this trait is determined more by the effects of dominance of polygenes and less by the additive effects.

3. According to the segregation ratio of the presence/absence of anthocyanins on the stem, we concluded that this is an alternative character determined by a single major gene, where the presence of the anthocyanin is dominant over its absence.

4. A single major gene determines pod color, which interested both aesthetically and qualitatively, that this time, green is dominant over purple color. The rate of segregation of this character in the initial population is 3:1, identical with the expected segregation ratio

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EFFECTS OF VANADIUM COMPOUNDS ON PLANT PHOTOSYNTHESIS

EFECTELE COMPUŞILOR VANADIULUI ASUPRA FOTOSINTEZEI PLANTELOR

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Abstract. *The effect of vanadium on growth and performance of photosynthetic apparatus of plants is controversial. In general, the toxicity of vanadium compounds is low. Pentavalent compounds are the most toxic and the toxicity of vanadium compounds usually increases as the valence increases. The effect of the treatment with vanadium on growth and photosynthesis for pepper plants is presented in this work. Pepper seeds were planted in the University of Agricultural Sciences and Veterinary Medicine Iasi greenhouse and they were grown in pots, in optimal conditions. After that we treated the plants separately with solutions containing different vanadium salts. In order to accomplish the goal of this experiment 20 ml solution were poured into the soil at the root of each plant. The procedure was performed once a week for two weeks in a row. A week after the end of the treatment the analysis of the photosynthetic activity was performed. Our experiments showed that the vanadium action is low but it increases as the valence increases.*

Key words: organically-chelated vanadium compounds, photosynthetic pigment

Rezumat. *Efectul vanadiului asupra creşterii şi performanţei aparatului fotosintetic al plantelor este controversat. In general, toxicitatea compuşilor vanadiului este mică. Compuşii pentavalenţi sunt cei mai toxici şi toxicitatea lor creşte cu valenţa. In această lucrare este prezentat efectul tratamentului cu compuşi ai vanadiului asupra creşterii şi fotosintezei la plantele de ardei. Seminţele de ardei au fost semanate la sera Universităţii de Ştiinţe Agricole şi Medicină Veterinară Iasi şi au fost crescute în ghivece în condiţii optime. plantele au fost tratate separat cu soluţii conţinând diferite săruri ale vanadiului. Pentru a realiza acest lucru la rădăcina fiecărei plante a fost picurată 20ml de soluţie şi această procedură a fost reluată două săptămâni la rând. După o saptămână de la sfârşitul tratamentului s-a realizat analiza activităţii fotosintetice. Experimentele noastrea arată că acţiunea vanadiului este mică dar aceasta creşte cu valenţa elementului.*

Cuvinte cheie: compuşi chelatici cu vanadiu, pigmenţi fotosintetici

INTRODUCTION

The effect of the element vanadium on growth and on the performance of photosynthetic apparatus of plants is controversial. The authors (Kasai M,., 1999) analyzed the concentration of V in soil water and examined the effect of such concentrations of vanadate on plant growth and metabolism. Vanadate-treatment

experiments with rye or wheat showed that 0.1 mM vanadate had slight effects on seed germination, growth, photosynthesis, respiration, contents of cellular various components etc. Alvarez and co-worker (Alvarez, 2002) have shown that higher concentrations of vanadium added to soil or in foliar sprays significantly increased the vanadium content of the lettuces, but they did not affect the yields of either fresh or dry matter. On the other hand, other authors (Tham, 1999), examining the responses of mycelia of *Ganoderma lucidum* to vanadium, selenium and germanium over a wide range of concentrations and they found that Se and V are highly toxic, but Ge was not toxic for the concentration level of test. In the paper (Wang, 1999) the authors investigated the effects of vanadium V^{5+} on the growth of soybean seedlings in two soils grown in the pots in glasshouse. They observed the symptom of vanadium toxicity appearing in the case of plants grown on fluvo-aquic soil. Addition of vanadium in six lakes, in different concentrations decreases photosynthetic rates of phytoplankton (Nalewajko, 1995). Another aspects on vanadium effects with different concentrations are presented in (Fargasova, 1999), (Olness, 2000), (Abu-Seidah, 1995), (Frajnt, 2002). In general, it is accepted that the toxicity of vanadium compounds is low. Pentavalent compounds are the most toxic and the toxicity of vanadium compounds usually increases as the valence increases (Barceloux, 1999). In his paper, K.H.Thompson (Thompson, 1999) summarizes current knowledge of the bioinorganic chemistry of vanadium, and the in vitro and in vivo effects of both inorganic and organically-chelated vanadium compounds, especially in medicine. The effect of the vanadium salts treatment on growth and photosynthesis for pepper plants (*Capsicum anuum*) is presented in this work. This specie was chosen because the pepper is one of the most widely cultivated vegetables in Romania.

MATERIAL AND METHOD

Research was carried out at the University of Agronomy and Veterinary Medicine Iasi. Twenty pepper seeds, were planted in the greenhouse of the University. After germination, seedlings were thinned one per pot and the plants were grown in optimal conditions. Concomitantly we prepared a 1% solution containing V^{3+}, V^{4+} and V^{5+}, namely: $V_2(SO_4)_3$, $VOSO_4*H_2$ and $Na_3VO_4*14\ H_2O$. But it is known that $V_2(SO_4)_3$ hydrolyses obtaining a strongly acid solution and it cannot be used to treat the plant. Moreover V^{3+} is believed to oxidize to V^{4+} or V^{5+} under physiological conditions but these transformations were not well studied. After that we treated the pepper plants separately with vanadium compounds, variants in study being the following:

1-control;

2- $VOSO_4*H_2O$- vanadyl sulfate (V^{4+});

3- $Na_3VO_4*14\ H_2O$- sodium orthovanadate (V^{5+})

For pigment analysis, 0.5 g of fresh leaf tissue were measured and the leaves were cut into small pieces (about 1 mm wide). The pigments were extracted by grinding in a mortar and pestle for 5 minutes. The extract was filtered and transferred to 50ml acetone. Absorbtion spectra were measured using a spectrophotometer SPECORD 200 from Analytik Iena immediately after the preparation of the solutions. All measurements for the pigment content were performed at the same phenological stage, so that the comparison was made on leaves in the same nodal position

(Oancea, 2005). Pigment content has been calculated according to Lichtenthaler formula (Oancea, 2007).

RESULTS AND DISCUSSIONS

In this experiment 20ml solution were poured into the soil at the root of each plant during two weeks. The plants treated with V^{5+} have been strongly affected (the leave necrosis began) as figure 1 shows. This is the reason that the experiments followed only for control and treatment with V^{4+}.

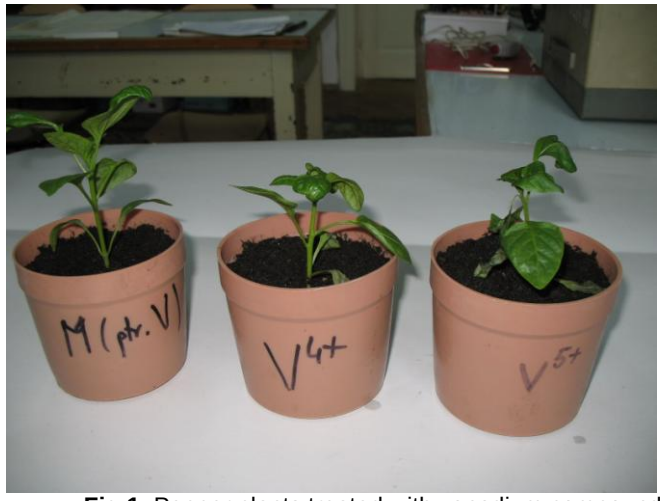

Fig.1. Pepper plants treated with vanadium compounds

The absorbtion spectrum of the photosynthetic pigments is presented in figure 2.

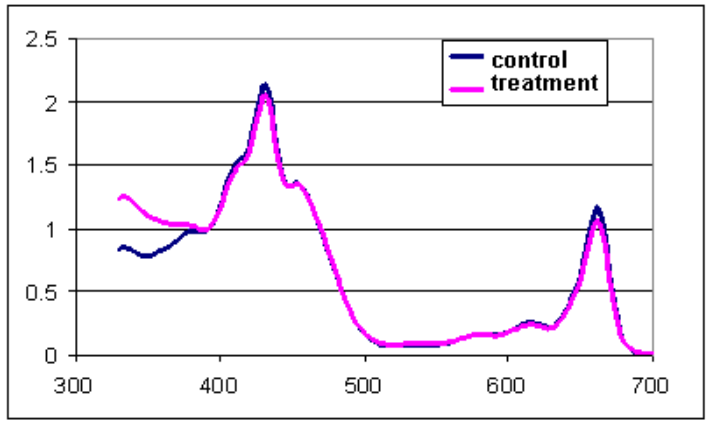

Fig.2. Absorbtion spectrum of the photosynthetic pigments from pepper leaves

The content of the photosynthetic pigments, chlorophyll a (Chla) and clorophyll b (Chlb) from pepper leaves are given in figure 3

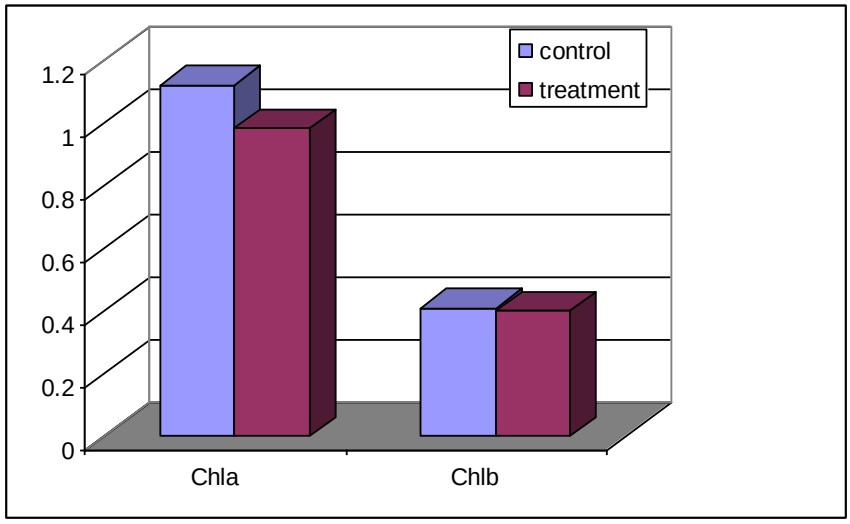

Fig.3. The content of chlorophyll a and chlorophyll b, mg/g fresh tissue, from pepper leaves

From figure 3 we can see that we obtained a diference for chlorophyll a but for chlorophyll b the results show aproximatively the same values for control and treatment variant. Therefore for the total content of clorophylls, which is shown in figure 4, a diference exist between control and the treatment variant.

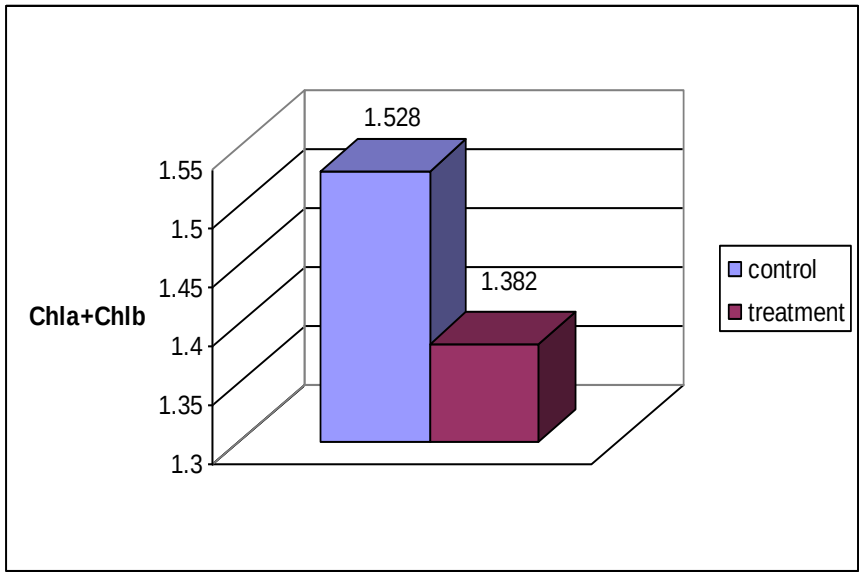

Fig.4. The total content Chl a+Chl b , mg/g fresh tissue, from pepper leaves

Due to a increases of the pigment content which have de maximum of absobtion for small wavelenght, the ratio Chla/Chlb decreases from control to treated variant as figure 5 shows.

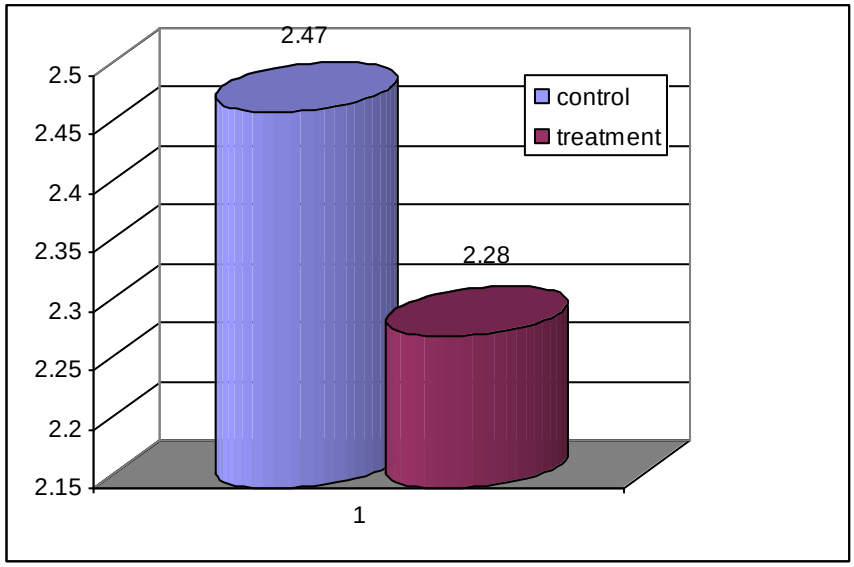

Fig.5. Ratio Chla/Chlb from pepper leaves

In fig 1, 2, 3, 4 and 5 it is shown that the chemical treatment induces modifications to the content of photosynthetic pigment in pepper leaves. Plants treated with vanadium compounds as compared with the control presented less photosynthetic activity. The reduction in the Chl a observed in the leaves of the treated plants confirms the phenomenon that chlorophyll accumulation in pepper plants can be disturbed when plants are treated with vanadium compounds.

The ratio Chl a/Chlb presented in fig. 5 shows that, both for control and for treatment this ratio is decreased than the usual value of 3, but is smaller for treatment than the control one.

CONCLUSIONS

The effect of vanadium compounds on the photosynthetic activity pf the pepper plants has been analyzed in this work. It is confirmed that the toxicity of vanadium compounds is low and the toxicity of vanadium compounds increases as the valence increases. Our results are concordant with those presented by Fargasova (Fargasova, 2000), which studied the seedlings of *Sinapis alba* which were grown in the presence of five trace metals. Metal ions Mn, V and Cu decreased in comparison with the control production of chlorophyll a, chlorophyll b and carotenoids.

As in any organism, plant tolerance to stress is determined by the functional integration of many individual traits and adaptation. Such possibilities may explain why some studies have demonstrated a relationship between treatment with vanadium compounds and other did not. Although the relationship between cellular plants and stress is not known, this study reveals that pepper are sensible

to stress produced by vanadium compounds. We can conclude that vanadium effects on plant growth are important and we will keep analyzing its effects on other studies that we will carry out.

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ADAPTIVE-FEEDBACK METHOD OF SYNCHRONIZATION FOR ENERGY SYSTEMS

O METODÃ DE SINCRONIZARE DE TIP FEEDBACH A SISTEMELOR ENERGETICE

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Abstract. *The issue of energy supply and demand has been valued worldwide with increasing development of economy. Energy resource including coal, petroleum, natural gas, water and electricity, and nuclear power etc., can be classified by renewable energy and non-renewable energy according to the capability of sustainable utilization. Energy resource system is a kind of complex nonlinear system, a three-dimensional autonomous system exhibiting very complex dynamical behavior. Researches on the complicated economic systems through nonlinear method have been achieved fruitfully and several authors supposed that both economic system and energy system are chaotic and nonlinear. Over the last decade, there has been considerable progress in generalizing the concept of synchronization to include the case of coupled chaotic systems, especially from technical reasons. In order to formulate the chaos control of the energy systems, in this work the synchronization of two energy systems using an adptive feedback method of synchronization is presented.*

Key words: energy supply and demand, nonlinear system, chaos control

Rezumat. *Problema cererii şi ofertei de energie a fost evaluată peste tot în lume odată cu dezvoltarea economiei. Resursele de energie incluzând cărbune, petrol, gaze naturale, apă şi electricitate, energie nucleară pot fi clasificate în reciclabile şi nereciclabile în funcţie de capacitatea lor de utilizare sustenabilă. Sistemul resurselor de energie este un sistem complex neliniar, un sistem tridimensional autonom care are o comportare dinamică foarte complexă. Cercetările sistemelor economice complicate prin metode neliniare au avut rezultate şi mai multi autori presupun că atât sistemul economic ca şi cel energetic sunt haotice şi neliniare. In ultimele decade există un progres considerabil în generalizarea conceptului de sincronizare pentru a include sistemele haotice, în special din motive tehnice. Pentru a realiza controlul haosului în sistemele energetice, în această lucrare sincronizăm două sisteme energetice folosind o metodă de feedback.*

Cuvinte cheie: cerere şi ofertă de energie, sistem neliniar, controlul haosului

INTRODUCTION

The issue of energy supply and demand has been valued worldwide with increasing development of economy. Energy resource including coal, petroleum, natural gas, water and electricity, and nuclear power etc., can be classified by

renewable energy and non-renewable energy according to the capability of sustainable utilization.

Sun and coworkers (Sun, 2006), (Sun, 2007a), (Sun, 2007b) established an energy resource system based on the background of the real energy resources demand supply in the East and the West of China. Energy resource system is a kind of complex nonlinear system, a three-dimensional autonomous system exhibiting very complex dynamical behaviors. The authors presented the situation of energy supply and demand in a province in East China, one of the provinces whose energy resources are severely insufficient. Nevertheless, the West regions of China are rich in energy resources and therefore the Chinese energy resources distribution features make it important to cooperate between East and the West. Researches on the complicated economic systems through nonlinear method have been achieved fruitfully and several authors (Sun, 2006), (Tian, 2007) supposed that both economic system and energy system are chaotic and nonlinear.

Over the last decade, there has been considerable progress in generalizing the concept of synchronization to include the case of coupled chaotic systems, especially from technical and economical reasons. When the complete synchronization is achieved, the states of both systems become practically identical, while their dynamics in time remains chaotic. Many examples of synchronization have been documented in the literature, but currently theoretical understanding of the phenomena lags behind experimental studies (Chen, 1998), (Shiying, 2000), (Yassen, 2005), (Yassen M., 2005), (Grosu I., 1997), (Lerescu, 2004), (Grosu, 2008), (Oancea, 2009a). In order to formulate the chaos control of the energy systems, in this work the synchronization of two energy systems using an adptive feedback method of synchronization is presented.

THEORY

The energy system is (Sun, 2007c) :

$$\begin{aligned}\dot{x}_1 &= -a_1 x_1\left(1 - x_1 / M\right) - a_2\left(x_2 + x_3\right)\\ \dot{x}_2 &= -b_1 x_2 - b_2 x_2 + b_3 x_1[N - (x_1 - x_3)]\\ \dot{x}_3 &= c_1 x_3\left(c_2 x_1 - c_3\right)\end{aligned} \qquad (1)$$

where $x_1(t)$ the energy resource shortage in *A* region, $x_2(t)$ the energy resource supply increment in *B* region, $x_3(t)$ the energy resource import in *A* region; *ai; bi; ci; M; N* are positive real constants.

This system has a chaotic behavior for :

$M=1.8,\ N=1,\ a_1=0.09,\ a_2=0.15,\ b_1=0.06,\ b_2=0.082,\ b_3=0.07,\ c_1=0.2,\ c_2=0.5,\ c_3=0.4$ (2)

Figure 1 shows that the attractor projected onto x_1x2x3 space for the chaotic system (1) with values from (2) and initial conditions $x_1(0)=0.82$, $x_2(0)=0.29$, $x_3(0)=0.48$.

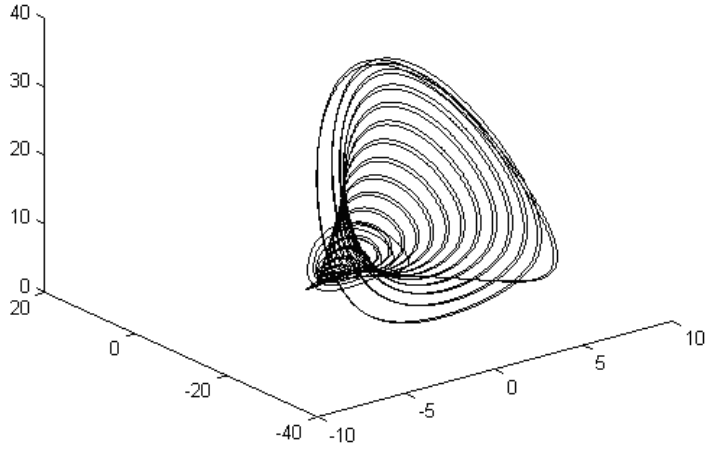

Fig. 1. Phase portrait of (x_1, x_2, x_3) for energy system

To synchronize two energy systems we used a simple method for chaos synchronization proposed by Guo et al. in (Guo., 2009a, 2009b) and used by Oancea (Oancea, 2009b).

If the chaotic system (master) is:

$\dot{x} = f(x)$ where $x = (x_1, x_2, ...x_n) \in R_n$

$f(x) = (f_1(x), f_2(x).....f_n(x)) : R^n \to R^n$

then the slave system is:

$\dot{y} = f(y) + z(y - x)$

where the functions $\dot{z}_i = -\lambda_i (y_i - x_i)^2$ and λ_i are positive constants

RESULTS AND DISCUSSIONS

The slave system for the system (1) is:

$$\begin{aligned}
\dot{y}_1 &= -0.09y_1(1 - y_1/1.8) - 0.15(y_2 + y_3) + z_1(y_1 - x_1) \\
\dot{y}_2 &= -0.06y_2 - 0.08y_2 + 0.07y_1[1 - (y_1 - y_3)] + z_2(y_2 - x_2) \\
\dot{y}_3 &= 0.2y_3(0.5y_1 - 0.4) + z_3(y_3 - x_3)
\end{aligned} \qquad (5)$$

The control strength is of the form:

$$\begin{aligned}
\dot{z}_1 &= -(x_1 - x)^2 \\
\dot{z}_2 &= -(y_1 - y)^2 \\
\dot{z}_3 &= -(z_1 - z)^2
\end{aligned} \qquad (4)$$

Fig. 2, 3, 4, 5, 6 and 7 show the syncronization of the two energy systems.

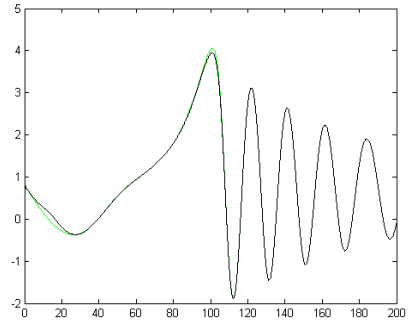

Fig.2. $x_1(t)$- green $y_1(t)$- black [$x_1(0)$=0.82, $x_2(0)$=0.29, $x_3(0)$=0.48; $y_1(0)$ =0.8; $y_2(0)$ = 0.2 $y_3(0)$ = 0.5; $z_1(0)$ =0.1; $z_2(0)$ = 0.1 ; $z_3(0)$ = 0.1]

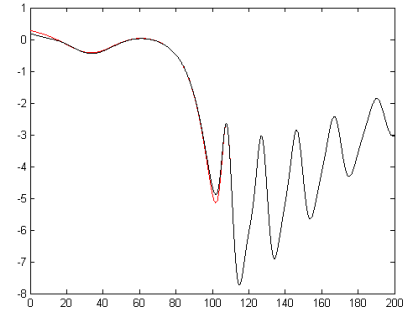

Fig.3. $x_2(t)$- red $y_2(t)$- black [$x_1(0)$=0.82, $x_2(0)$=0.29, $x_3(0)$=0.48; $y_1(0)$ =0.8; $y_2(0)$ = 0.2 $y_3(0)$ = 0.5; $z_1(0)$ =0.1; $z_2(0)$ = 0.1 ; $z_3(0)$ = 0.1]

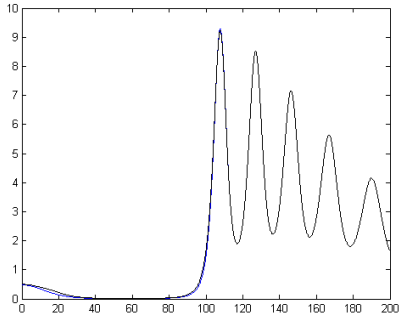

Fig. 4. $x_3(t)$- blue $y_3(t)$- black [$x_1(0)$=0.82, $x_2(0)$=0.29, $x_3(0)$=0.48; $y_1(0)$ =0.8; $y_2(0)$ = 0.2 $y_3(0)$ = 0.5; $z_1(0)$ =0.1; $z_2(0)$ = 0.1 ; $z_3(0)$ = 0.1]

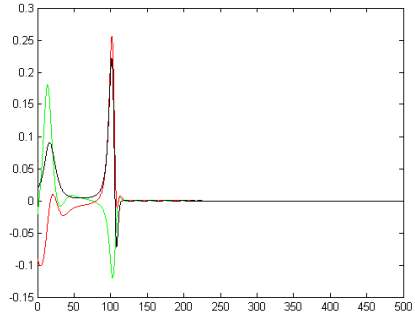

Fig. 5. Synchronization errors between master and slave systems [$x_1(0)$=0.82, $x_2(0)$=0.29, $x_3(0)$=0.48; $y_1(0)$ =0.8; $y_2(0)$ = 0.2 $y_3(0)$ = 0.5; $z_1(0)$ =0.1; $z_2(0)$ = 0.1 ; $z_3(0)$ = 0.1]

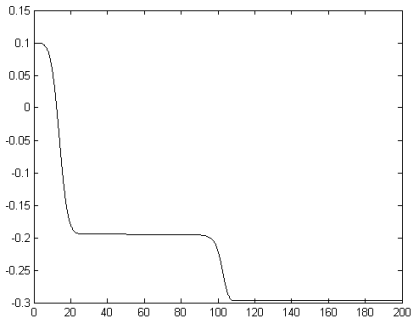

Fig. 6. The control strength z_1[$x_1(0)$=0.82, $x_2(0)$=0.29, $x_3(0)$=0.48; $y_1(0)$ =0.8; $y_2(0)$ = 0.2 $y_3(0)$ = 0.5; $z_1(0)$ =0.1; $z_2(0)$ = 0.1 ; $z_3(0)$ = 0.1]

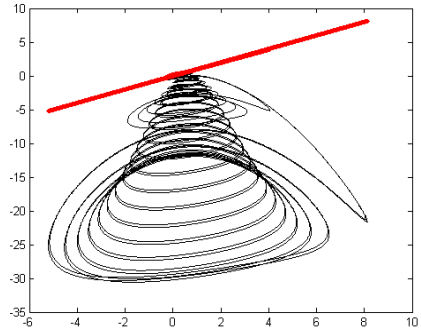

Fig. 7. Phase portrait of (x, x_2) and (x_1, y_1) for energy system [$x_1(0)$=0.82, $x_2(0)$=0.29, $x_3(0)$=0.48; $y_1(0)$ =0.8; $y_2(0)$ = 0.2 $y_3(0)$ = 0.5; $z_1(0)$ =0.1; $z_2(0)$ = 0.1 ; $z_3(0)$ = 0.1]

Debin Huang (Huang, 2005), by testing the chaotic systems including the Lorenz system, Rossler system, Chua's circuit, and the Sprott's collection of the simplest chaotic flows found that we can use a single controller to achieve identical synchronization of a three-dimensional system (for Lorenz system this is possible only we add the controller in the second equation).

For the system (1), we achieved the synchronization if one controller is applied only in the first equation; the synchronization errors are given in figure 8.

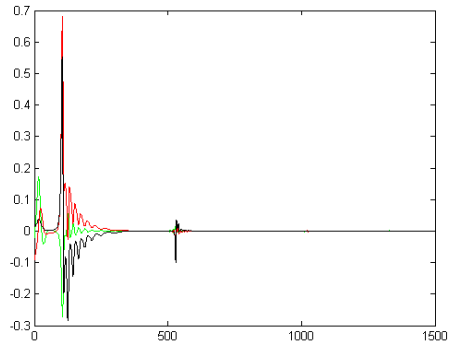

Fig. 8. Synchronization errors between master and slave systems. [$x_1(0)=0.82$, $x_2(0)=0.29$, $x_3(0)=0.48$; $y_1(0)=0.8$; $y_2(0)=0.2$ $y_3(0)=0.5$; $z_1(0)=0.1$]

If two controllers are applied, then the synchronization is achieved earlier than for one the controller but later than all controllers have been used (figure 9).

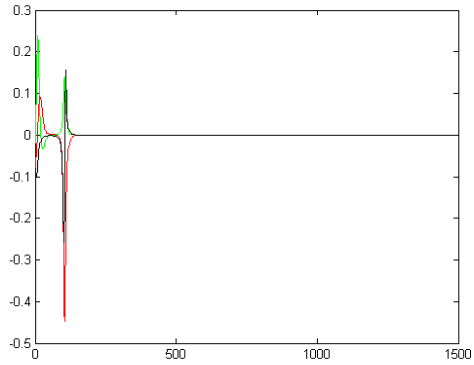

Fig. 9. Synchronization errors between master and slave systems. [$x_1(0)=0.82$, $x_2(0)=0.29$, $x_3(0)=0.48$; $y_1(0)=0.8$; $y_2(0)=0.2$ $y_3(0)=0.5$; $z_1(0)=0.1$, $z_3(0)=0.1$]

CONCLUSIONS

In order to formulate the chaos control the synchronization of two energy systems is presented in this work. The transient time until synchronization depends on initial conditions of two systems and the strength and number of the controllers. The control method described in this paper is very easy and might be useful in the case of the other chaotic systems.

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RESEARCHES ON THE ALGOFLORA OF LAKE OSTROVENI (VÂLCEA COUNTY)

CERCETĂRI PRIVIND ALGOFLORA LACULUI OSTROVENI (JUDEŢUL VÂLCEA)

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Abstract. *Lake Ostroveni was formed in 1977. After the building of the Râmnicu Vâlcea dam, Goranu, a former arm of the Olt river started to silt up upstream, while, downstream, the dam of the hydropower lake at Râureni closed it completely, and for nearly three years the lake served as a basin collecting the waste waters of the city of Râmnicu Vâlcea. Lake Ostroveni is not even today recorded by the database of the Vâlcea County Agency for the Protection of the Environment, so the results we have obtained in consequence of the present study can be used as a starting point for subsequent ecological researches. Water samples were taken from representative areas. The phytoplankton community was studied. Following the processing of the samples, 32 species were identified, grouped in 25 planktonic genera; the data obtained are essential for evaluating the trophic state of Lake Ostroveni.*

Key words: Vâlcea County, Ostroveni Lake, phytoplankton, diversity

Rezumat. *Lacul Ostroveni s-a format în anul 1977. După îndiguirea de la Rm. Vâlcea, Goranu, un fost braţ al râului Olt, a început să se colmateze spre amonte, iar în aval digul lacului de acumulare de la Râureni l-a închis complet. Timp de aproape trei ani lacul a servit drept bazin de colectare a apelor uzate ale municipiului Rm. Vâlcea. Nici în prezent lacul Ostroveni nu este în evidenţa Agenţiei Judeţene Pentru Protecţia Mediului Vâlcea, iar rezultatele obţinute de noi în urma acestui studiu pot constitui o bază de plecare pentru cercetări ecologice ulterioare. S-au prelevat probe de apă din secţiuni reprezentative. S-a studiat comunitatea fitoplanctonică. În urma prelucrării probelor, s-au identificat 32 de specii grupate în 25 de genuri planctonice datele fiind esenţiale pentru evaluarea stadiului trofic al lacului Ostroveni.*

Cuvinte cheie: Judeţul Vâlcea, Lacul Ostroveni, fitoplancton, diversitate

INTRODUCTION

Olt River has the largest hydrographic basin from our country with a length of 615 km and a reception area of the basin of 24050 Km and is the main shaft of the Vâlcea County which goes from north to south for a length of 135 Km with a slope median between 1-1,5% (Cârstea, Constantinescu, 1980). Fitting Olt river flow due to fluctuations and due to the development of human communities on its banks involved construction of 26 lakes of accumulation with multiple uses such as water intakes for the population and industrial, agricultural irrigation, creating a path to prevent floods but also in helping to hydroelectric plants.

Lake Ostroveni was formed in 1977. After the building of the Râmnicu Vâlcea dam, Goranu, a former arm of the Olt River started to silt up upstream, while,

downstream, the dam of the hydropower lake at Râureni closed it completely, and for nearly three years the lake served as a basin collecting the waste waters of the city of Râmnicu Vâlcea. After 1979 the city declined to further dump used water in the lake, through the inauguration of the purification station which went directly into Olt and thus the lake belonged to the custody of the municipality yielded to a cleaning program intense and for modernization.

At the beginning of the year 1981, they began work on systematization of the lake, cutting the actual form, building the river banks, cementing the north zone, then the east, actually where there was the clogging very evident and for allowing to directly connect with the ”fresh” streams of the Olt river penetrated the right side of the Râureni dam with the help of some metallic tubes Ø 1500 mm. Due to the permanent connections with the waters from Olt river, a phenomenon was produced to auto cleanse the Ostoveni Lake, this made possible to enter in the sight of the municipalities which on the February 18th 1982, decided to transform the Ostroveni perimeter into a recreational park, which besides the lake and campsite having the same name also has a belt of newly planted forest.

It is noteworthy that due to the fact that because of alluvial brought on by the torrents, from the Ocnele and Capela hills the cap of Ostroveni Lake is clogged. This thing is observed especially in the central zone of the water glistening downstream. A strangeness of the lake is the fact that in the clogged zone the maximum depth does not go beyond 1,5m, the greatest depths being found in the flow zone, practically near the banks, but also in the piercing zone towards Olt river in the draught season and when the lake level of Râureni accumulation decreases, through the center of Ostroveni Lake appeared an arrow on the sand which becomes a place to look for food to the storks and seagulls in the one. Lake Ostroveni is not even today recorded by the database of the Vâlcea County Agency for the Protection of the Environment.

MATERIAL AND METHOD

The biological determinations were realized through the testing of the water samples taken every two months, respective November 2008 and February and April 2009, using customary methods, in glass vases with 0,25 - 0,3 l volume. Sampling was done in representative sections (right bank – left bank) and on the depth levels (water surface – 1,5m). The phytoplankton was characterized from the qualitative point of view. The microscopic analysis of the fresh samples was made using OPTIKA B-253 microscope, with 10, 20, 40 lenses and 10 and 15 oculars, and the photographs were made with the CANON A 630 camera. To determine the species, we used the Romanian tools (Francisc, Barna, 1998; Ionescu, Péterfi, 1981, 1979) and European tools (Hindák *et al*, 1975; Hortobagyi, 1973) representative for the study field, from which we noted and saprobity index (Mălăcea, 1969, Vlăduţu, 2005).

RESULTS AND DISCUSSIONS

After processing the samples, were identified 32 species in 25 genera grouped planktonic belonging *Chlorophyta* (12), *Bacillariophyta* (5), *Euglenophyta* (3), *Cyanophyta (Cyanobacteria)* (3), *Pyrrophyta* (1) and *Crysophyta* (1).

Table 1

Taxonomic composition and diversity of phytoplankton in Lake Ostroveni

Nr. crt.	Taxa list	November	February	April
	Cyanophyta (Cyanobacteria)			
1	*Oscillatoria sp.* Vaucher ex Gomont	-	-	+
2	*Anabaena sp.* Bory ex Bornet & Flahault	-	-	+
3	*Cylindrospermum sp. K*ützing ex É. Bornet & C. Flahault	-	-	+
	Euglenophyta			
4	*Trachelomonas caudata* Ehrenberg	-	-	+
5	*Euglena spirogyra* Ehrenberg	-	-	+
6	*Euglena caudata* Huber	-	-	++
7	*Euglena intermedia* (Klebs) Schmitz	-	-	+
8	*Phacus sp.* Dujardin	-	-	+
	Pyrrophyta			
9	*Peridinium spp.* Ehrenberg	-	-	++
	Chrysophyta			
10	*Synura uvella* Ehrenberg	-	-	++
	Bacillariophyta			
11	*Synedra ulna* (Nitzsch) Lang.-Bert.	-	-	+
12	*Diatoma vulgare* Bory	-	-	+
13	*Navicula radiosa* Kützing	-	-	+
14	*Pinnularia sp.* C.G. Ehrenberg	-	-	+
15	*Pinnularia viridis* (Nitzsch) Her.	+	+	+
16	*Hantzschia amphioxys* (Ehrenberg) Grunow	-	-	+
	Chlorophyta			
17	*Chlorella vulgaris* Beijerinck	-	-	++
18	*Ankistrodesmus falcatus* (Corda) Ralfs	-	-	++
19	*Selenastrum gracile* Reinsch	-	-	+
20	*Scenedesmus acutus* Meyen ex Ralfs	-	-	++
21	*Scenedesmus acuminatus* (Lagerheim) R. Chodat	+	++	++
22	*Scenedesmus linearis* Komárek	+	++	++
23	*Scenedesmus quadricauda* (Turpin) Brébisson & Godey	+	-	++
24	*Scenedesmus dimorphus* (Turpin) Kützing	-	++	++
25	*Pediastrum sp.* Meyen	-	-	+
26	*Chlamydomonas sp.* Ehrenberg	-	-	++
27	*Pandorina morum* (Müller) Bory	-	-	+
28	*Volvox sp.* Linnaeus	-	-	+
29	*Cosmarium subcostatum* Nordstedt	-	-	+
30	*Closterium attenuatum* J. Ralfs	-	-	+
31	*Spirogyra sp.* Link	+	+	+
32	*Mougeotia sp.* C.A. Agardh	-	-	+

Legend: + (rare individuals present in the lake), + + (numerous individuals present in the lake) - (species absent)

In the months of November and February phytoplankton from Ostroveni lake was very poor and a little diversified showing just algae from Bacillariophyta types (genus *Pinularia*) and Chlorophyta (genus *Scenedesmus* and *Spirogyra*), while in the warm season, the number of species increased considerably (table 1).

In the warm season, the green algae was the most common, which were representated from sixteen taxa, followed by the diatoms with six taxa, euglenophyta with five and blue algae with three taxa (figure 1).

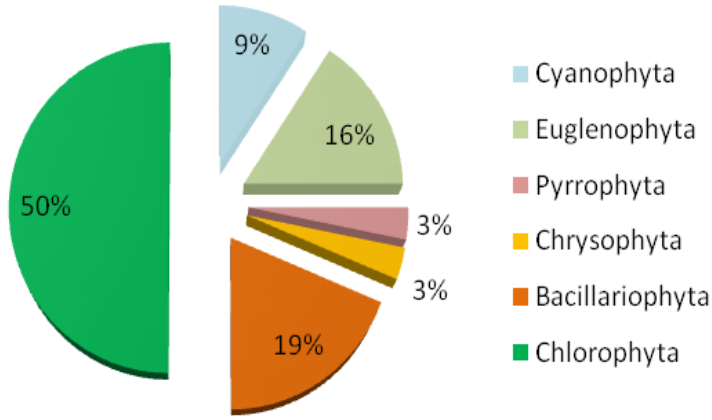

Fig. 1. Phytoplankton composition in Lake Ostroveni in April

Analyzing the samples from the two banks of the lake, it was observed a slight difference in the species composition, as shown in table 2. The following dates refer to the same species identified in the warm season and sampled from the 1,5m depth.

In the samples from the right bank of the lake, there were a larger number of species identified, but in both cases, from the numeric point of view, there were predominant species genus *Scenedesmus*.

The phytoplankton is an important ring in the trophic chain from the aquatic ecosystem of lentic type, mirroring for the most part the changes in the water quality.

The system of saprobes of Kolkwitz and Marsson (1908-1909) reviewed by Liebemann (1962), analyzing the corresponding saprobity index for each species (table 3) determined from Ostroveni lake was made part of the mezosaproba lake (the medium contaminated zone) and, especially from subzone β-mezosaproba (β-m) where the oxidation processes are predominant compared to those in reduction, the water being considered slightly polluted.

Table 2

Taxonomic composition and diversity of phytoplankton in Lake Ostroveni sampling depending on where the sample

Genus/Species	Right bank	Left bank	Genus/Species	Right bank	Left bank
Oscillatoria spp.	+	+	*Chlorella vulgaris*	+	+
Anabaena spp.	+		*Ankistrodesmus falcatus*	+	+
Cylindrospermum spp.	+		*Selenastrum gracile*	+	
Trachelomonas caudata	+		*Scenedesmus acutus*	+	+
Euglena spirogyra	+		*Scenedesmus acuminatus*	+	
Euglena caudata	+		*Scenedesmus linearis*	+	+
Euglena intermedia	+		*Scenedesmus quadricauda*	+	+
Phacus spp.	+		*Scenedesmus dimorphus*	+	+
Peridinium spp.	+		*Pediastrum spp.*		+
Synura uvella	+	+	*Chlamydomonas spp.*		+
Synedra ulna		+	*Pandorina morum*	+	
Diatoma vulgare	+		*Volvox spp*	+	
Navicula radiosa	+	+	*Cosmarium subcostatum*	+	
Pinnularia spp.	+		*Closterium attenuatum*	+	
Pinnularia viridis	+	+	*Spirogyra spp.*	+	+
Hantzschia amphioxys		+	*Mougeotia spp.*	+	+

Table 3

Composition of phytoplankton in Lake Ostroveni and saprobity index for each species

Genus/Species	Saprobity index	Genus/Species	Saprobity index
Anabaena sp.	β-m	*Pediastrum spp.*	β-m
Ankistrodesmus falcatus	β-m	*Peridinium spp.*	o
Chlamydomonas spp.	β	*Phacus spp.*	β
Chlorella spp.	p-α	*Pinnularia spp.*	o şi β-m
Closterium attenuatum	α-m şi β-m	*Pinnularia viridis*	o şi β-m
Cosmarium subostatum	o	*Scenedesmus acutus*	β-m
Cylindrospermum spp.	α-m şi β-m	*Scenedesmus acuminatus*	β-m
Diatoma vulgare	β-m	*Scenedesmus linearis*	β-m
Euglena caudata	p	*Scenedesmus quadricauda*	β-m
Euglena spirogyra	p	*Scenedesmus dimorphus*	β-m
Euglena intermedia	o-α	*Selenastrum gracile*	β-m
Hantzchia amphioxys	α	*Spirogyra spp.*	o-β
Mougeotia spp	o	*Synedra ulna*	β-m
Navicula radiosa	α-m	*Synura uvella*	β
Oscillatoria spp	α	*Trachelomonas caudata*	β
Pandorina morum	α	*Volvox spp.*	o

Legend: (o = oligosaprobity; β = beta-mezosaprobity;
α = alfa-mezosaprobity; p = polisaprobity)

CONCLUSIONS

1. Biological diversity has been reduced in Ostroveni Lake, were found 32 phytoplankton species belonging to various systematic groups: *Cyanophyta (Cyanobacteria), Pyrrophyta (Dinophyta), Chrysophyta, Bacillariophyta, Euglenophyta, Chlorophyta;*

2. Biological findings made were essential for assessing the trophic status of Lake Ostroveni;

3. The phytoplankton association presented variations from one season to the other, from a sample section to another; it was determined that autotrophic forms predominated in disfavor of those heterotrophic;

4. Just as from the qualitative aspect but also form a quantitative, the phytoplankton registers a larger number of species in the aestival period, determining a massive growth of chlorophyta which touched a maximum in the month of April;

5. Toward the end of fall and beginning of winter, algal decline appears and there are large amounts of organic matter in different stages of decomposition, especially in deep water layers;

6. Ostroveni Lake, whose main usage is that of a leisure lake and fishing lake and had water category II quality and in terms of trophic lake was classified as the mesotrophic.

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COMPARATIVE DATA REGARDING THE HISTO-ANATOMY OF THE VEGETATIVE ORGANS IN TWO *ORNITHOGALLUM* TAXA FROM THE FLORA OF ROMANIA

DATE COMPARATIVE PRIVIND HISTO-ANATOMIA ORGANELOR VEGETATIVE LA DOI TAXONI DE *ORNITHOGALUM* DIN FLORA ROMÂNIEI

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Abstract. *The study deals with the histo-anatomy of vegetative organs in two spontaneous Ornithogalum taxa (Ornithogalum boucheanum and Ornithogalum orthophyllum ssp. kochii) collected from Gârboavele Forest from Romania. The aim of the study is to identify the inter–specific variation of histo–anatomical characters correlated with the ecological factors of the enviromment in whitch the investigated taxa grow. The results showed that they present similar characteristics, with some specific features: the structure of the vascular bundles in the inferior part of the stem; the structure of the mesophyll, the density of the stomata on both sides of the leaf.*

Key words: histo-anatomy, vegetative organs, *Ornithogalum orthophyllum* ssp. *kochii* Jka., *Ornithogalum boucheanum* (Kunth) Asch.

Rezumat. *Autorii cercetează structura aparatului vegetativ la doi taxoni spontani de Ornithogalum (Ornithogalum boucheanum şi Ornithogalum orthophyllum) colectate din pădurea Gârboavele, România. Scopul studiului este de a evidenţia variaţiile interspecifice ale caracterelor histo–anatomice, corelate cu factorii ecologici în care trăiesc speciile luate în studiu. Din analiza microscopică comparativă a structurii organelor vegetative la Ornithogalum orthophyllum ssp. kochii Jka. şi Ornithogalum boucheanum (Kunth) Asch., remarcăm că ele prezintă caractere asemănătoare, cu unele particularităţi: alcătuirea fasciculelor libero-lemnoase din partea inferioară a tulpinii; structura mezofilului limbului foliar, densitatea stomatelor pe ambele feţe ale frunzei*.

Cuvinte cheie: histo-anatomie, organe vegetative, *Ornithogalum orthophyllum* ssp. *kochii* Jka., *Ornithogalum boucheanum* (Kunth) Asch.

INTRODUCTION

Zaharidi C. has brought important contributions to the understanding of the structure of the vegetative apparatus in species of the genus *Ornithogalum*, by publishing various articles in journals, both in the country and abroad. He has studied, throughout several years (1961 - 1965), the morphology, anatomy, cytology, ecology as well as the biology of the blooming of some species of *Liliaceae,* among which species of the genus *Ornithogalum*.

Some cytology aspects regarding the *Ornithogalum* species belong to Lungeanu I. (1970-1971).

In the foreign literature, Cullen J. and Ratter J. A. (1967) as well as Agapova N.D. (1977) have conducted studies which deal with the taxonomy, cytology and anatomy of this genus.

Ornithogalum boucheanum and *Ornithogalum orthophyllum* are ephemerous taxa, adapted to the thermal conditions offered by the forest steppe , with an average yearly temperature of 9,5 – 9,6°C, that grow especially in the shade, in wet soils with water accessible between 15% and 30%.

The aim of the present study is to highlight the interspecific variations of the histo-anatomical characters, correlated with the ecological factors within which the studied species live.

MATERIAL AND METHOD

The material of the research

It is represented by mature plants (in the anthesis stage) of *Ornithogalum orthophyllum* ssp. *kochii* Jka. and *Ornithogalum boucheanum* (Kunth) Asch.

Histo-anatomy researches

The cross sections of the vegetative organs done by the hand microtome, were coloured with iodine - green and ruthenium - red, analysed and photographed with the Olympus BX51 photonic microscope equipped with an Olympus E-330 photo camera.

Morphometric analysis

In order to calculate the density of the stomata on both sides of the leaf there have been made superficial sections through the leaf. There have been counted the stomata from 27 microscopic fields (100x resolution) for both sides of the foliar limb, the samples being chosen randomly (leaves from different levels, different regions of the limb). The data were statistically analised, using the Anova (Microsoft Excel) programme.

RESULTS AND DISCUSSIONS

The structure of the stem (fig.1-4)

Characteristic to all the monocot species, the axial vegetative organs have only a primary structure.

For both analysed taxa, the stem is protected along its entire length by a unistratal epidermis, with more or less isodiametric cells, having the external wall much thicker than the others and covered by a thin cuticle. Here and there, there can be noticed stomata which are on the same level with the real epidermic cells.

The bark is meatus type parenchymatic-cellulose, thicker (5-6 strata) in the superior part of the stem and thinner (3 strata) on the base. The diametre of the cortical cells increases centripetally.

The central cylindre begins with a thick pericycle, made up of cells with thickened cellulose walls in the greatest part of the stem, lignified only in the

base region. The vascular bundles of closed collateral type are placed in several circles in the fundamental meatus type parenchyma. Their size increases centripetally, the smallest bundles being located in the sclerenchymatous pericycle.

There can be noticed a structural specific feature of the vascular bundles from the lower third of the stem for both species that were studied: the manner of the placement of the vascular bundles (grouped on several rows – for the *Ornithogalum ornithophyllum* ssp. *kochii* Jka; they were grouped in a single file for the *Ornithogalum boucheanum* (Kunth) Asch).

Some cells of the fundamental parenchyma disorganized, resulting numerous aeriferous cavities of various dimensions, especially in the central region of the stem.

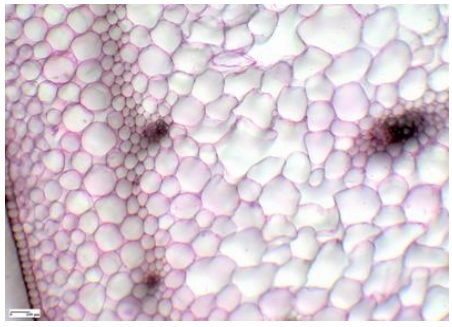

Fig. 1. Cross section through the superior third part of the stem of the *O. ornithophyllum ssp. kochii* Jka

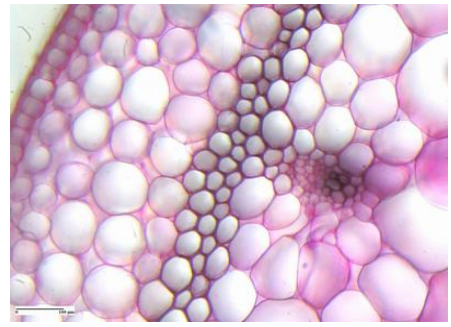

Fig. 2. Cross section through the middle third part of the stem of *O. boucheanum* (Kunth) Asch.

Fig. 3. Cross section through the inferior third part of the stem of *O. ornithophyllum ssp. kochii Jka.*

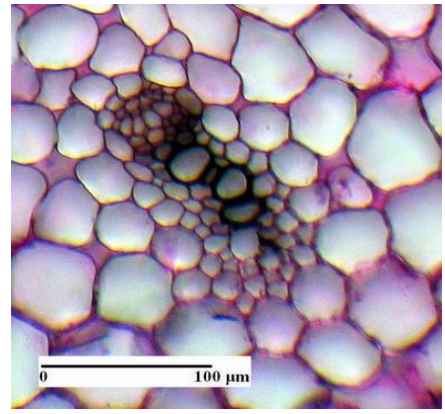

Fig. 4. Leading fascicle in cross section through the inferior third part of the stem of *O. boucheanum* (Kunth) Asch .

The structure of the leaf

The structure of the leaf differs in the two taxa that were analysed. Thus, for *Ornithogalum ornithophyllum* ssp. *kochii* Jka. (fig. 5), the limb presents a bifacial isofacial heterogeneously centred structure (a layer of high palisade cells under both epidermises and central lacunous tissue), in comparison to *Ornithogalum boucheanum* (Kunth) Asch. (fig. 6), in which the mesophyll is homogeneous for the greatest part of the limb (bifacial isofacial homogeneously centred structure), some unistratal palisade tissue with short cells being possible to be found in some areas (under the lower epidermis).

For both taxa, in the lacunous tissue, big aeriferous cavities and numerous vascular bundles of various dimensions (bigger in the central part of the limb), corresponding to the parallel ribs can be found.

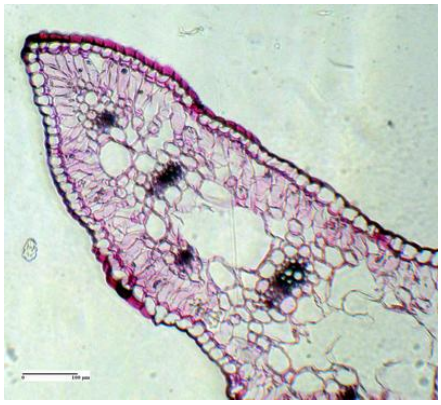

Fig. 5. Cross section through the *O. ornithophyllum* ssp. *kochii* Jka . leaf

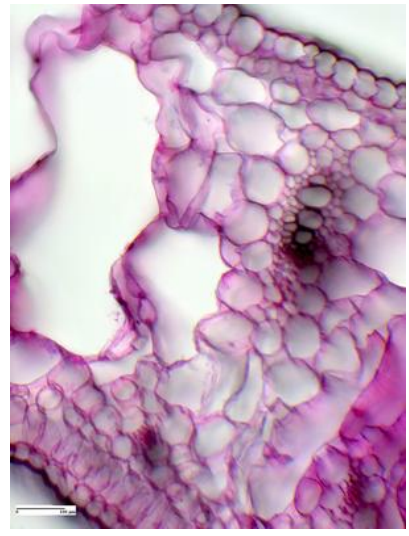

Fig. 6. Cross section through the *O. boucheanum* (Kunth) Asch. leaf

The density of stomata (fig. 7) on both sides of the foliar limb varies in the two taxa that were analysed, being much higher in the leaves of *Ornithogalum orthophyllum* (the data have a statistic significance - Anova Single Factor, F>F crit.).

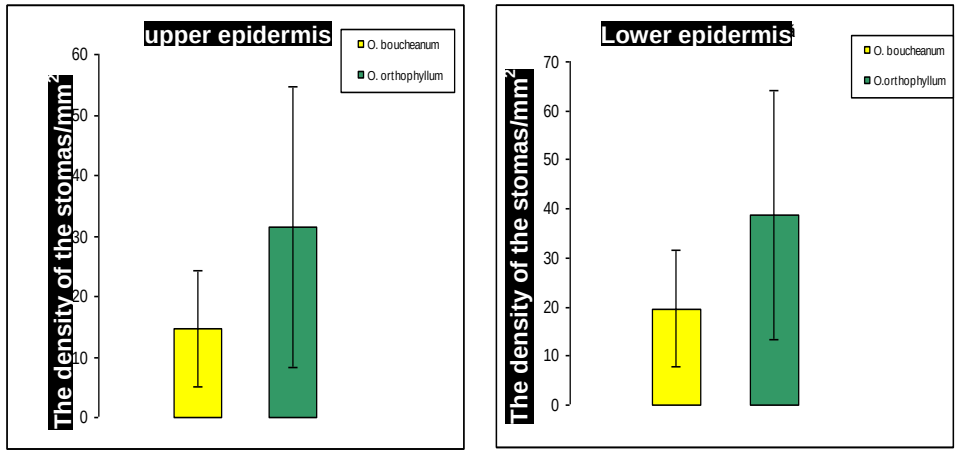

Fig. 7. Comparasion between the density of the stomas in the upper epidermis (left) and the lower one (right) of the *Ornithogalum boucheanum* (Kunth) Asch. and *Ornithogalum orthophyllum* ssp*. kochii* Jka. leaf

CONCLUSIONS

From the comparative microscopic analysis of the structure of the vegetative organs of the la *Ornithogalum orthophyllum* ssp. *kochii* Jka. and *Ornithogalum boucheanum* (Kunth) Asch., we remark that they present similar characters as to the structure of the stem in its superior third part and in its middle.

As for the differences between the two taxa we can mention that: for the *Ornithogalum orthophyllum* ssp. *kochii* Jka. in the base region of the stem the vascular bundles are grouped in several rows, while for the *Ornithogalum boucheanum* (Kunth) Asch. the vascular bundles are grouped in one row.

We noticed that the structure of the leaf differs in the two taxa, thus for *Ornithogalum orthophyllum* ssp. *kochii* Jka. the limb presents a central heterogeneous isofacial bifacial structure and for *Ornithogalum boucheanum* (Kunth) Asch. the limb has a central homogeneous isofacial bifacial structure.

As a result of the analysis of the density of stomata, in the two taxa, we can specify that the stomata are more numerous in the *Ornithogalum orthophyllum* ssp. *kochii* Jka. leaves in comparison to the number of stomata in the leaves of the *Ornithogalum boucheanum* (Kunth) Asch.

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ECOPHYSIOLOGICAL RESEARCH DURING THE ONTOGETENIC CYCLE OF ROSES

CERCETĂRI ECOFIZIOLOGICE ÎN TIMPUL CICLULUI ONTOGENETIC LA TRANDAFIRI

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Abstract. *Rose plant resistance to adverse conditions such as drought and high temperatures changes during ontogenesis, by the appearance of periods of high sensitivity, as the period of vegetative growth and flowering.* The *present study aims to analyse the eco-physiological response of varieties of roses to the climatic conditions of the year 2008 induced by global warming, estimated by the evaluation of the process of photosynthesis, measuring the photosynthetic and flavonoid content of leaf pigments, and by assessing the resistance of varieties in the study to dehydration, during the phenological phases. Leaf pigment content was analyzed spectrophotometrically by determining the ability of light absorption by acetone extract of pigments, in the blue and red areas of the visible spectrum. The study of the leaf pigments content and the rate of dehydration of the leaves to the respective species in the study showed the changes induced by environmental conditions on the quality and vitality of plants.*

Key words: rose**,** drought, leaf pigments, dehydration

Rezumat. *Rezistenţa plantelor de trandafir la condiţiile nefavorabile, cum ar fi seceta şi temperaturile ridicate, se modifică în timpul ontogenezei, prin apariţia unor perioade de sensibilitate ridicată, aşa cum sunt perioada de creştere vegetativă şi înflorirea. În lucrarea de faţă ne-am propus să studiem reacţia eco-fiziologică a unor soiuri de trandafiri, faţă de condiţiile climatice ale anului 2008 induse de încălzirea globală, apreciată prin evaluarea procesului de fotosinteză, determinând conţinutul de pigmenţi clorofilieni şi flavonoizi din frunze, şi prin aprecierea rezistenţei soiurilor luate în studiu la deshidratare în diferite fenofaze. Conţinutul de pigmenţi din frunze a fost analizat spectrofotometric, prin determinarea capacităţii de absorbţie a luminii de către extractul acetonic de pigmenţi, în zonele albastră şi roşie ale spectrului vizibil. Studiul conţinutului de pigmenţi foliari şi a ritmului de deshidratare a frunzelor la soiurile luate în studiu a evidenţiat modificările induse de condiţiile de mediu asupra calităţii şi vitalităţii plantelor.*

Cuvinte cheie: trandafiri, secetă. pigmenţi foliari, deshidratare

INTRODUCTION

The extreme meteorological phenomena that have appeared in the context of global worming have had catastrophic ecological consequences. At the same time, they have also had a negative influence on the normal development of cultivated plants and their vegetation cycle (Gore Al., 2007). The atmospheric and pedological draught has determined the modification of certain physiological and biochemical processes which have had severe repercussions over the

ultrastructure and the physiological activity of plant cells. (Pârvu C., 2005, Jităreanu Carmen Doina, 2007). The visible effects are represented by the withering of leaves, the reduction of the stoma opening, perspiration and also the decrease of the photosynthesis' intensity due to the poor supply of CO_2 (Wagner Şt., 2002). If mankind were capable of limiting the rise of global temperature, agriculture could adjust to the new climatic conditions by differently cultivating the soil and by growing plants that can adapt to the new conditions (Toma Liana Doina, Jităreanu Carmen Doina, 2007). Of extreme importance is the growth of plants with deep roots such as the rose (Şelaru Elena, 1993).

In the present paper we intended to study the eco-physiological reaction of a variety of roses grown in the Copou area of Iaşi to the climatic conditions existent in 2008 that were induced by the global worming. The eco–physiological reaction was estimated after evaluating the process of photosynthesis, determining the content of photosynthetic and flavonoid pigments from the leaves and estimating the dehydration resistance of the species included in the study.

MATERIAL AND METHOD

There were four varieties of roses tested during the present study: *Luchian, Rose Gaujard, Madame Meilland, Emeraude d'Or.* They were grown at the farm of the Experimental Didactic Station of U.S.A.M.V in Iaşi, in the climatic conditions of 2008.

Analysis of climatic conditions. The evolution of the climatic factors in 2008, from the Copou area of Iaşi was submitted to a monthly analysis that made it possible to establish the monthly mean and sum of the air temperature and of the level of precipitations, as well as the deviation from the multi-annual mean.

Analysis of the foliar pigments content. The analyses of the foliar pigments content were made during the following phenophases: *vegetative growth, flowering and the beginning of the repose stage* at the leaves of the vegetative and floriferous shoot. The foliar pigments were extracted by solubilization in acetone and their content was estimated using the *computerized spectrophotometric method,* by determining the light absorption capacity of the acetonic extract in the blue and red areas of the visible spectrum, which characterize the wave lengths with maximum absorption for chlorophyll (431 – 432, 453 – 454 and 662 – 663). The results are presented in absorption units.

Establishing the dehydration rhythm of the rose leaves. The water forms present in the leaves can suggest the different physiological processes within the plants. At a foliar level, the water forms can indicate the intensity of the perspiration process that is represented by the free water content.

RESULTS AND DISCUSSIONS

The evolution of the climatic factors in 2008, in the Copou area in Iaşi was submitted to a monthly analysis and thus establishing the monthly mean and sum of the air temperature and of the precipitations as well as the deviation from the multi-annual mean. The dynamic study of the monthly mean temperatures demonstrates that, during the first three months of 2008 this ranged between -1.3^{o}C in January and 7.1^{o}C in March, the deviations from the multi-annual mean ranging between 1.4^{o}C and 3.6^{o}C. These values had a positive influence over the way the roses managed to get out of winter as it is well known that once the sap

starts circulating, plant freeze at temperatures between -5°C and -10°C (fig. 1). The precipitation level during the period that was analyzed showed a deficit of -12.8mm, respectively 20.2 mm in January and February, while in March there was an excess of 4.6 mm. These conditions did not affect the rose culture, roses having a powerful reaction to the moderate humidity.

In April, the monthly mean temperature was of 11.2°C, the deviation from the multi-annual mean being of only 0.9°C and in May there was a negative deviation (-0.3°C) with a monthly mean of 15.8°C. Given the monthly mean temperature of 20.6°C and the deviation of 1.1°C in respect to the normal one, we can say that these months have favored the growth of vegetative copse and flower development, roses needing daily variations of temperature below 4°C at night and over 16°C during the day. If we consider the hydric conditions, the growth registered in this period was significant, of 46.2mm in April followed by a slight deficit in May (-5.8 mm) and June (-4.2 mm). These results did not affect the roses which, due to their structure and origin, have a deep root system resistant to draught.

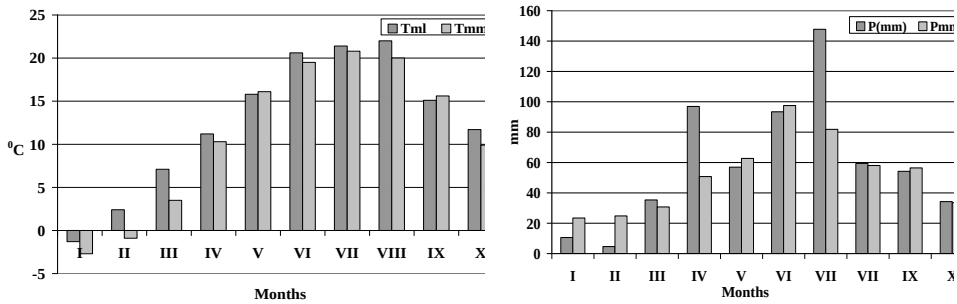

Fig. 1. The evolution of the climatic conditions in 2008

The average temperatures for July and September were close to the multi-annual mean, in August being registered a thermic growth of 2°C. Given the hydric surplus of 65.9 mm in July and the level of precipitation close to the multi-annual mean in August and September, the rose experienced the most propitious conditions during the flowering phenophase, with high temperatures and moderate humidity.

The analysis of the foliar pigments content in the copse's leaves of the four varieties of roses demonstrates a differentiated evolution, according to the phenophase and the variety of pigments.

It was noticed that in June, during the phenophase of shoot's growth, the content of photosynthetic pigments, respectively the *a* chlorophyll 662 – 663 nm, the *b* chlorophyll 453 – 454 nm and the *a* chlorophyll 434 – 435 nm, have minimum values at the *Luchian* variety and maximum values at Emeraude d'Or. The content of flavonoid pigments with absorption at the wave length of 320-322nm is maxim at *Madame Meilland*, but it has registered minimum values at *Emeraude d'Or* (fig. 2). The same results prove a highly efficient photosynthesis in the case of the *Emeraude d'Or* allochthonous, as well as a minimum resistance in case of climatic or biotic stress at the same phenophase. The other varieties, the autochthonous *Luchian* and the French varieties *Rose Gaujard* and *Madame*

Meilland, show a modest capacity of light absorption and biosynthesis of the assimilated as well as a moderate resistance to stress factors.

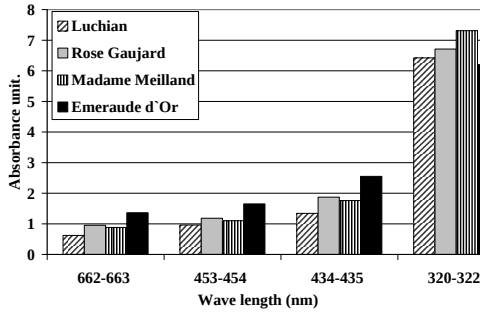

Fig. 2. The content of photosynthetic pigments in the phenophase of vegetative growth

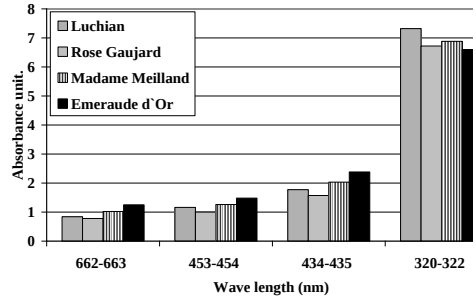

Fig. 3. The content of photosynthetic pigments in the first part of the flowering phenophase

In July, during the first stage of the flowering phenophase, the evolution of the photosynthetic pigments has, in general, a similar dynamic, the ratio between the varieties analyzed being almost the same. Nevertheless, the autochthonous variety *Luchian* presents a maxim content of flavonoid pigments at that can offer it a higher resistance to stress in respect to the French varieties (fig. 3).

This characteristic becomes more intense in August when plants continue their flowering phenophase. In these conditions, the *Luchian* variety makes itself noticed with its capacity to absorb light - represented by the *a* chlorophyll 434-435 nm and *b* chlorophyll 453-454 content - to synthesize the assimilated represented by the *a* chlorophyll 662-663 content and especially with its resistance to stress represented by the flavonoid pigments with maximum absorption at wave lengths of 320-322 nm, all of them being superior to the French varieties (fig. 4).

In October, plants continued flowering but in the same time the assimilated were directed toward depositing the starch in the branches, accomplishing the maximum of autumn. What follows now, is the maturation of the wood that is meant to assure the plants' resistance to low temperatures. In this phenophase it is noticed the high content of photosynthetic pigments at the autochthonous variety *Luchian*, that could suggest a proper preparation to winter when the content of flavonoid pigments is minimum. The allochthonous varieties present moderate values of light absorption capacities and biosynthesis of the assimilated, but a high content of flavonoid pigments; the maximum values were registered in the case of *Madame Meilland*, followed by *Emeraude d'Or* (fig. 5). These results suggest the existence of two different physiological mechanisms of assuring resistance during cold season in the case of two varieties with different origin; for the autochthonous *Luchian* this mechanism is based on the intensification of carbohydrate deposit resulted from photosynthesis while for the allochthonous varieties they are based on biosynthesis and accumulation of flavonoid pigments.

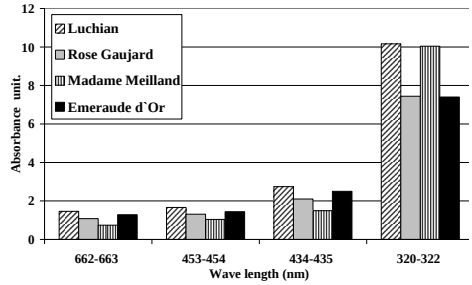

Fig. 4. The content of photosynthetic pigments in the second stage of the flowering phenophase

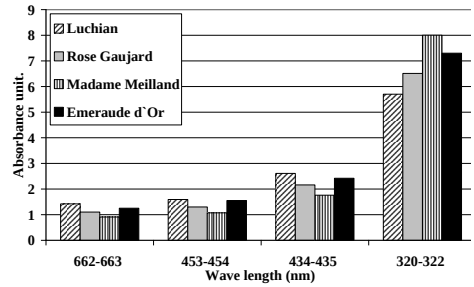

Fig. 5. The content of photosynthetic pigments at the beginning of the repose phenophase

The results of the analysis meant to establish the **dehydration rhythm of the rose leaves** demonstrates that in the phenophase of vegetative growth, *Madame Meilland* presented the lowest level of perspiration that was expressed by the amount of water lost in the first hour and the lowest content of free water, represented by the amount of water lost in 24 hours. We may say that this variety of rose has the highest capacity to retain water during the vegetative growth as well as the highest capacity to deal with hydric stress in this phenophase (fig. 6).

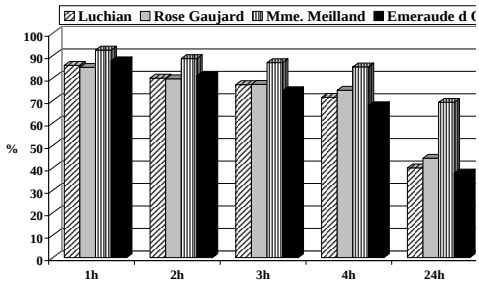

Fig. 6. The dehydration rhythm during the phenophase of vegetative growth.

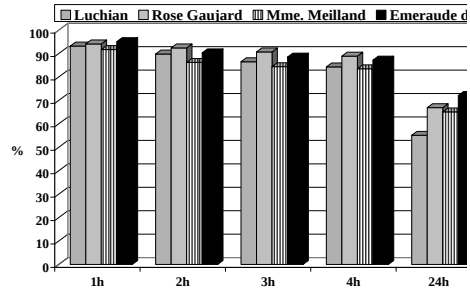

Fig. 7. The dehydration rhythm during the first stage of the flowering phenophase

In July, during the first stage of the flowering phenophase, it was noticed that the values of the intensity of the perspiration process were similar for all the varieties included in the study (fig. 7). The difference between the Romanian variety (*Luchian*) and the French ones (*Madame Meilland*, *Emeraude d'Or*, *Rose Gaujard*) is represented by the free water content that demonstrates a minimum resistance of the foliar system to the hydric stress for the autochthonous variety in relation to the allochthonous varieties.

In August, during the second stage of the flowering phenophase, the values of the perspiration intensity were higher, some French varietys becoming more sensitive to the thermic and hydric stress represented by draught; the content of free water at the level of the leaves is also different, being minimum for the *Rose Gaujard* and *Luchian* and maximum for the *Emeraude d'Or* variety (fig. 8).

In October, at the moment when plants begin their repose phenophase, the differences between the varieties with different origins become clearer. The

autochthonous *Luchian* variety presents the lowest rhythm of foliar dehydration with minimum values for the perspiration intensity and the free water content in the leaves. In the case of the allochthonous varieties included in this study, the highest rhythm of dehydration was registered at *Madame Meilland* and *Rose Gaujard* (fig. 9).

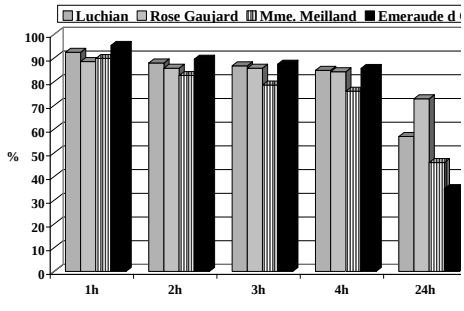

Fig. 8. The dehydration rhythm during the second stage of the flowering phenophase

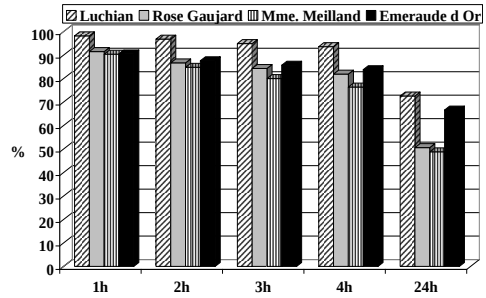

Fig. 9. The dehydration rhythm when plants begin their repose phenophase

These data underline the distinct behavior that varieties with different origins have when preparing to winter; the autochthonous variety makes itself noticed by a metabolic activity of retaining water when preparing to winter.

CONCLUSIONS

1. After the analysis of the eco-physiological conditions of 2008 in the Copou area in Iaşi it resulted that they are auspicious for the ontogenetic cycle of rose plants, for all the varieties that were studied.

2. From the analysis of foliar pigments results that the *Emeraude d'Or* variety is characterized by a maximum photosynthetic efficiency while the autochthonous *Luchian* variety presented a maximum content of flavonoid pigments during the growth and flowering phenophases that offer this variety a higher resistance to stress.

3. From the analysis of the dehydration rhythm the *Madame Meilland* variety presents the highest capacity to retain water and the highest resistance to hydric stress. During the flowering phenophase it was noticed an intensification of the perspiration process to all varieties analyzed, less resistant being the autochthonous *Luchian* variety that intensified its water retaining activity for the wood maturation and wintering while on repose.

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RESEARCHES ON THE INFLUENCE OF SEVERAL PESTICIDES ON THE ROOT OF *CUCUMIS SATIVUS* L.

CERCETĂRI PRIVIND INFLUENŢA UNOR FUNGICIDE ASUPRA RĂDĂCINII DE *CUCUMIS SATIVUS* L.

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Abstract*. Originating in India, the cucumber has spread all over the world, over the 3,000–4,000 years since it started being used as food, now occupying an important place in the assortment of fresh vegetables, in the canned foods industry, in pharmaceutics and cosmetics. The chemical protection of cultivated plants has contributed, over the past few decades, to increased productions, while the substances used have accumulated in the environment. The Topsin Al 70 PU (T) fungicides and the Bordeaux mixture (B) were applied to Cucumis sativus in two ontogenetic stages in its lifetime, i.e. the seed, and the young plant ones. T stimulates the growth of the root in both ontogenetic stages, and accumulates in the inter-cell spaces when applied in the young plant stage, affecting the walls of the rhizodermic cells, of the cortex parenchyma, and of the pericycle. B inhibits the length growth of the root, in both ontogenetic stages, and in a similar manner as T, affects the cell walls, which results in the contraction of the root.*

Key words: *Cucumis sativus* L., Topsin, Bordeaux mixture, seed, seedlings growth, morphology, anatomy.

Rezumat*. Originar din India, castravetele s-a răspândit în decursul celor 3,000-4, 000 de ani de când este utilizat, în toată lumea, ocupând un loc important în sortimentul de legume proaspete, în industria conservelor, în cea farmaceutică şi cosmetică. Protecţia chimică a plantelor cultivate a contribuit în ultimele decenii la creşterea producţiei, dar în acelaşi timp substanţele utilizate s-au acumulat în mediu. Fungicidele Topsin Al 70 PU (T) şi Zeamă bordeleză (Z) au fost aplicate la Cucumis sativus în două stadii ontogenetice din ciclul de viaţă, în cel de sămânţă şi în cel de plantulă. T stimulează creşterea rădăcinii în ambele stadii ontogenetice, se acumulează în spaţiile intercelulare când se aplică în stadiul de plantulă şi afectează pereţii celulelor rizodermice, ai parenchimului cortical şi ai pericliclului. Z inhibă creşterea în lungime a rădăcinii, în ambele stadii ontogenetice şi, similar T, afectează pereţii celulari, ceea ce are ca efect contracţia rădăcinii.*

Cuvinte cheie: *Cucumis sativus* L., Topsin, zeamă bordeleză, sămânţă, plantulă, creştere, morfologie, anatomie.

INTRODUCTION

Coming from India, the cucumber has spread worldwide, over the 3,000-4,000 years since it has been used, and now occupies an important place in the assortment of fresh vegetables, in the industry of canned foods, in pharmaceutics and cosmetics. The chemical protection of the plant has contributed, over the past

few decades, to securing increased productions (Băbeanu et al., 2002), but, at the same time, the substances used have accumulated in the environment. The danger represented by pesticides came into public attention in 1962, when Carson's book, *The Silent Spring*, was published, where the process of bioaccumulation of pesticides across the food chains is described, with the first link represented by plants (Primack et al., 2008).

The goal of the present contribution was to test the influence of the fungicides Topsin and Bordeaux mixture on the growth, morphology and anatomy of the root of cucumber, *Cucumis sativus* L., through applying those fungicides during two different ontogenetic stages of the plant's life cycle.

MATERIAL AND METHOD

Topsin Al 70 PU (T) is a fungicide which contains 70% metyl thiophanate, the action of which is preventive and curative in cereals, trees, etc. The Bordeaux mixture (Z) is a fungicide containing 80% copper sulphate, with 20% metallic copper and calcium hydroxide, having a wide gamut of action in vegetable crops, tree orchards, etc. The influence of these fungicides on the growth, morphology and cyto-histology of the root of *Cucumis sativus* L. has been studied by applying them during two ontogenetic stages in the life cycle of the plant. In the seed stage, the following concentrations of T were applied: 0.025% (V1T), 0.05%, (V2T), 0.1% (V3T), 0.2% (V4T), 0.50%, and for Z: (V1Z), 0.75% (V2Z), 1% (V3Z), 2% (V4Z). In the little plant stage, the concentrations of T applied were: 0.025% (V5T), 0.05% (V6T), 0.1% (V7T), 0.2% (V8T), and those of Z: 0.50% (V5Z), 0.75% (V6Z), 1% (V7Z), 2% (V8Z). In order to apply the fungicides in the seed stage, the seeds were hydrated for 3 hours, 20 seeds for each variant, and they were subsequently immersed into the fungicide for one hour.

The seeds, thus treated, were laid to germinate in Petri boxes. The culture vases were maintained at room temperature (18ºC), in conditions of natural lighting. To apply the fungicides in the little plant stage, the hydrated seeds were laid to germination in the Petri boxes. After the seeds had germinated, and the cotyledonous little plants were obtained, the latter were immersed for one hour, in keeping with the variants presented. The immersed little plants were washed in tap water, and then placed back into the Petri boxes. In order to determine the longwise growth of the roots, they were periodically measured, and the arithmetic mean value was calculated for each variant. The results were interpreted statistically by means of the LSD (Least Significant Difference) test.

The morphological peculiarities of the little plants' roots were determined through macroscopic observations and the periodic photography of the vegetative material. The cyto-histological modifications of the little plants' roots were evinced in cross-sections that were either fresh, or treated with Javel water and coloured with Geneva reagent, and the pictures were made under an Optika B 250 microscope with a digital camera Canon Power Shot A630.

RESULTS AND DISCUSSIONS

Growth of the root. The measurements conducted to determine the length of the roots, 11, 15, 18 and 22 days from the inception of the experiment, in the case of the seed immersion, indicate the fact that the latter stimulates growth, in nearly all the experimental variants (fig. 1). After 11 days, the most intense

lengthwise growth of the root was recorded in the control sample (M). After 15 days, and then after 18 days, the fact was noticed that, in the case of variants V2T-V4T, the greatest mean values of the root length were recorded. When 22 days had passed from the inception of the experiment, the lengthwise growth of the root was stimulated in all the experimental variants.

The results obtained agreed with the physiological effect of the cytoquininic type exerted by the metyl thiophanate and its main metabolite, carbedasyme (Huţanu-Bashtawi et al., 2008b), to stimulate seedlings growth. In the case of the seeds immersed in Z, the measurements conducted on the length of the roots, after 11, 15, 18 and 22 days from the inception of the experiment, show an effect contrary to that obtained for the immersion into T.

Thus, after 11 days a decrease in the mean value of the root length is noticed, from M to V4Z. That influence is maintained, so that, upon subsequently measuring it, a decrease in the root length mean values is found, from V1Z to V4Z. After 18 days, and then 22 days pass from the inception of the experiment, the mean values recorded for V3Z are smaller than those for V4Z.

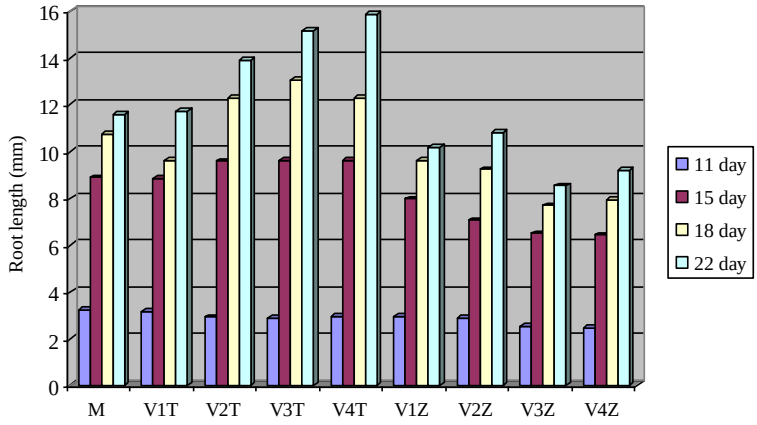


Fig. 1. Growth of the embryo roots of the little plants of *Cucumis sativus* L. obtained from seeds immersed in Topsin and in the Bordeaux mixture

In the case of the seeds immersed into T and Z, 22 days after the inception of the experiment, there occurred significant differences between the following variants: M-V3T (sig.0,042), M-V4T (sig.0,047), M-V3Z (sig.0,022), V1T-V3T (sig.0,030), V1T-V4T (sig.0,034), V1T-V3Z (sig.0,031), V2T-V1Z (sig.0,020), V2T-V2Z (sig.0,049), V2T-V3Z (sig.0,001), V2T-V4Z (sig.0,004), V3T-V1Z (sig.0,002), V3T-V2Z (sig.0,005), V3T-V3Z (sig.0,000), V3T-V4Z (sig.0,000), V4T-V1Z (sig.0,005) (sig.0,002), V4T-V2Z (sig.0,006), V4T-V3Z (sig.0,000), V4T-V4Z (sig.0,000).

On immersing the little plants into T, the same effect is found, of stimulating the lengthwise growth of the root (Fig. 2). When 10 days had passed from the inception of the experiment (3 days after immersion in T), variant V8T is

recorded as having the greatest mean value, followed by variant V6T; the same influence can be noticed in the next measurements. In the case of little plants being immersed in Z, an inhibitory effect is found upon the lengthwise growth of the roots, by comparison with M. Moreover, in the specific case of variants V6Z and V8Z, the last measurement found a decrease in the length of the roots, from 5.37 mm to 4.60 mm in V6Z, and from 5.69 to 5.28 in V8Z. That contraction of the roots was also noticed in the little plants of *Pisum sativum* that were immersed in Ridomil Gold Plus, a fungicide that contains mephenoxam (2.5%) and metallic copper (40%) (Soare et al., 2008).

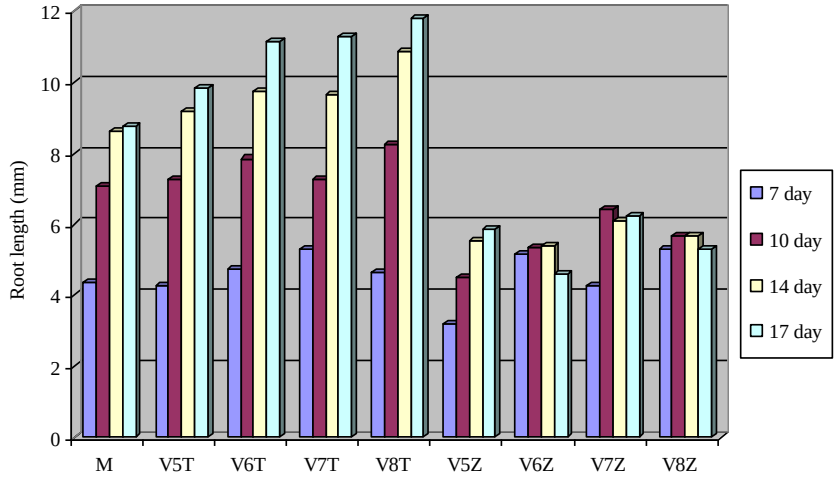


Fig. 2. Growth of the embryo roots of the little plants *Cucumis sativus* L. immersed in Topsin and in the Bordeaux mixture (orig.)

In the specific case of the little plants' immersion into T and Z, after 17 days from the inception of the experiment, one can notice there are significant differences (sig.<0.05) between the following variants: M-V7T (sig.0,036), M-V8T (sig.0,012), M-V5Z (sig.0,016), M-V6Z (sig.0,001), M-V7Z (sig.0,033), M-V5Z (sig.0,006),V5T-V5Z (sig.0,001), V5T-V6Z (sig.0,000), V5T-V7Z (sig.0,002), V5T-V5Z (sig.0,000), V6T-V5Z (sig.0,000), V6T-V6Z (sig.0,000), V6T-V7Z (sig.0,000), V6T-V8Z (sig.0,000), V7T-V5Z (sig.0,000), V7T-V6Z (sig.0,000), V7T-V7Z (sig.0,000), V7T-V8Z (sig.0,000), V8T-V5Z (sig.0,000), V8T-V6Z (sig.0,000), V8T-V7Z (sig.0,000), V8T-V8Z (sig.0,000).

Morphology of the roots. The roots of the little plants obtained from seeds immersed into T, and respectively into Z, have a normal morphology, similar to that of M (fig. 3). In the case of the variants V1Z-V4Z, the fact was found that the radices are more developed than those of the variants V1T-V4T. That can be accounted for through the fact that, although T stimulates cell division, it hinders the process of differentiation of the more specialized tissues (Huţanu-Bashtawi et al., 2008a). The little plants immersed into T have a morphology similar to that of

M, and the effect of lengthwise growth stimulation is highlighted for both the main root, and the ramifications (fig. 4).

Immersing the little plants into Z alters the normal morphology of the root (fig. 4), and the main root is affected, as can be noticed in the case of variant V6Z, no less than the ramifications, which are fewer and shorter.

Fig. 3. *Cucumis sativus* – morphology of embryonal roots of the control sample little plants, and of those obtained from seeds immersed in Topsin and in Bordeaux mixture, 15 days after the inception of the experiment (orig.).

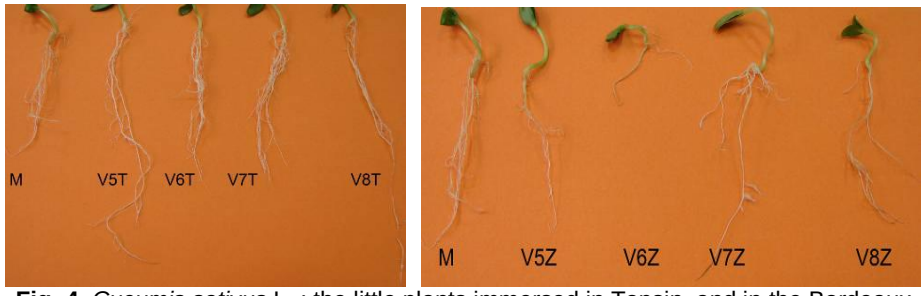
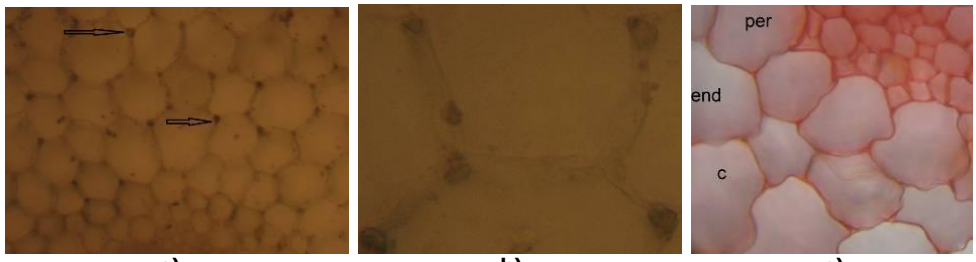


Fig. 4. *Cucumis sativus* L. : the little plants immersed in Topsin, and in the Bordeaux mixture, 30 days after the inception of the experiment, and 19 days after the immersion (orig.).

Anatomy of the root. The root of the control sample little plants and that of those obtained from seeds exhibits a primary structure specific to the dicotyledonous plants (Andrei, 1978; Fahn, 1982; Sitte, 1999; Şerbănescu-Jitariu & Toma, 1980).

In the little plants immersed in T, the accumulation of the fungicide in the inter-cell spaces of the root cortical parenchyma can be noticed (fig. 5a,b). In both the little plants immersed in T, and those immersed in Z, the fact was noticed that the walls of the rhizodermic cells, and those of the cortical parenchyma were affected (fig. 5c).

Due to the fact that T stimulates cellular division, the effect of shortening is not visible in variants V5T-V8T, while that effect is occurs in variants V5Z-V8Z, in which the same effect is found of wrinkling or corrugation of the cell walls, in a similar manner to what occurs in the case of the metamorphosed contractile roots (Fahn, 1982).



a) **b)** **c)**

Fig. 5. *Cucumis sativus* L. V8T– root cross-section: **a-b** accumulations of Topsin in the inter-cell spaces of the cortical parenchyma (arrow) (**a**-oc. 10x, ob. 10, zoom 4; orig; **b**-oc. 10x, ob. 40, zoom 4; orig.), **c**: root cross-section where the affectation is noticed of the walls of the cortical parenchyma, the endoderm and the pericycle (oc. 10x, ob. 40, zoom 4; orig.)

CONCLUSIONS

Topsin stimulates the growth of the root, and accumulates in the inter-cell spaces when applied in the little plant stage; it affects the rhizodermic walls, as well as the walls of the cortical parenchyma and the pericycle.

The Bordeaux mixture inhibits longwise growth of the root, and in a similar manner to Topsin, it affects the cell walls, which triggers the contraction of the root. Morphologically, significant alterations occur in the little plants immersed in the Bordeaux mixture.

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ON THE POSSIBILITIES OF USING NATURAL BIOACTIVE COMPOUNDS AS PLANT GROWTH REGULATOR

EVALUAREA UNOR COMPUŞI NATURALI CU ACTIVITATE BIOLOGICĂ ÎN REGLAREA CREŞTERII PLANTELOR

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Abstract. *The aim of this study is to examine the possibility of using polyphenolic compounds as rape plant growth regulators. The natural bioactive compounds were obtained by successive hot aqueous extraction of different raw material: spruce bark, grape seeds, chestnuts shell, Asclepias syriaca plant. The aqueous extracts were characterized in terms of total polyphenolic content by using Folin Ciocalteu method. The influence of polyphenolic compounds on rape plantlet, growth and development was followed in hydroponic culture and germination tests. Biometric measurements of rootlets, hypocotyls and cotyledons of rape plantlet, quantitative determination of fresh biomass and the assay of assimilatory pigments content (chlorophyll **a** and **b**) allowed the evaluation of polyphenolic compounds role in plant growth and development. It was observed similar phytohormones effects, stimulating or inhibiting effects on rape plant development, depending on the type of aqueous extract administered during the experiment.*

Key words: *Brassica napus,* polyphenols, total polyphenolic content, chlorophyll a, b.

Rezumat. *Studiul îşi propune evaluarea unor compuşi polifenolici ca bioregulatori de creştere a plantelor de rapiţă. Compuşii polifenolici au fost obtinuţi prin extracţia apoasă succesivă, la cald, a diferitelor surse de biomasă vegetală: coaja de molid, seminţele de struguri, coaja fructelor de castan, planta Asclepias syriaca. Extractele au fost caracterizate din punct de vedere al conţinutului total de polifenoli, utilizând metoda Folin Ciocalteau. Influenţa extractelor polifenolice asupra creşterii şi dezvoltării plantulelor de rapiţă a fost monitorizată prin intermediul unor teste de germinare şi culturi hidroponice. Analizele biometrice privind alungirea radiculelor, hipocotilelor şi cotiledoanelor plantulelor de rapiţă, alături de determinările cantitative de biomasă verde şi conţinut în pigmenţi asimilatori (clorofila **a** şi **b**) au permis evaluarea comparativă a rolului compuşilor polifenolici în creşterea şi dezvoltarea plantelor. Rezultatele obţinute au evidenţiat efecte similare fitohormonilor, de stimulare sau inhibare a dezvoltării plantulelor de rapiţă, în funcţie de natura extractului apos administrat pe parcursul experimentului.*

Cuvinte cheie: *Brassica napus,* compuşi polifenolici, conţinut total de polifenoli, clorofila a, b.

INTRODUCTION

The polyphenols represent one of the most important classes of the plants secondary metabolites which play an important role in biosynthesis process. Natural growth regulators or synthetic ones influenced and controlled the growth

and development of roots, stems, shoots, buds, seed gemination processes, etc. Natural bioactive compounds present a large spectrum of action both on whole plant and only on certain tissues and organs intervening also in the regulation of important metabolic processes. Normal plant growth largely depends on the balance that is estabilished between the content of phytohormones and inhibitors (Anghel et al., 2001).

The previous studies have shown the growth regulator potential of chestnuts shell polyphenolic extracts on oat and rape plants. Also, it have been studied the influence of natural bioactive compounds separated from spruce bark, grape seeds and *Aslepias syriaca* plant, by using different technics, on bean plant growth and development (Stingu et al., 2009). Inhibitory or stimulatory effects depends on extract nature, total polyphenolic concentration and also on tested plant species.

This study presents the influence of different polyphenolic extracts on rape plant growth and development. The rape plant response was monitorised in germination test and hydroponic culture experiments.

MATERIAL AND METHOD

Aqueous extraction. Vegetable raw materials, carefully selected, were ground with a mill to obtain a fine powder (0.5mm). 10 g of dry material were succesively extracted (three times) in 125 mL distilled water on a water bath at 80-90°C for 45 min. The aqueous filtrates were collected and brought to a final volum of 500 mL with distilled water (Rozmarin et al., 1984).The tested solution were suggestively noted (spruce bark extract – SB, chestnuts shell extract – CS, grape seeds extract – GS, *Asclepias syriaca* extract - AS) in correlation with the type of extracted vegetal raw material.

Total polyphenolic content determination. Folin Ciocalteu method was used to determine the total polyphenolic content (TPC). The principle of this colorimetrically method is based on the reducing properties of phenolic compounds in contact with Folin Ciocalteau reactiv which present a dark blue coloration with a maximum absorbance at 750nm. The results were expressed in mg gallic acid/L (Bao et al., 2005).

Germination tests. Germination tests were carried out in Petri dishes in fivereplicates for each sample. Each one contained ten rape seeds, carefully selected to do not present major visible damage, placed on a filter paper and 10 mL of tested polyphenolic extract. The control sample was represented by tap water. Petri dishes were placed in a thermostat at 25°C for a period of seven days, when the rape seedlings were analyzed.

Hydroponic culture. Rape seedlings obtained after seven days of germination were transfered in plastic containers containing 150 mL Hoagland nutrients solution (1mM KH_2PO_4, 5mM KNO_3, 5mM Ca $(NO_3)_2$ $4H_2O$, 2mM $MgSO_4 \cdot 7H_2O$, 11.8μM $MnSO_4$ H_2O, 0.7μM $ZnSO_4$ $7H_2O$, 0.32μM $CuSO_4$ $5H_2O$, 0.16μM $(NH_4)_6Mo_7O_{24}$ $4H_2O$, 46.3μM H_3BO_3, 5μM Fe) and 10 mL of each tested polyphenolic aqueous extracts. The influece of natural bioactive compounds separated from different raw material on rape plantlets growth and development was tested in four replicates (four plantlets/containers) for three weeks. Nutrient solutions were changed every five days.

Plantlet analyses. The concentrations of assimilatory pigments, extracted from rape plantlet fresh leaves in 80% acetone, were tested spectrophotometrically by

reading the absorbance values at fixed wavelengths 470, 646, 663nm. The chlorophyll **a** and **b**, carotene content (expressed in µg/g of green material) were established by using the characteristics extinctions coefficients proposed by Lichtenthaler and Wellburn (1983).

RESULTS AND DISCUSSIONS

The results shows that the aqueous extract obtained from *Aslepias syriaca* plant present the highest values regarding the dry matter and organic matter content and the lowest content in total polyphenols (72mg/L extract). Spruce bark and grape seeds polyphenolic extracts are characterized by the highest values for total polyphenolic content (table 1). The most significant values for total polyphenolic content were registered for spruce bark extract (191mg/L) even if the dry matter content and organic matter content registered the lowest values compared with the other extracts.

Table1

Polyphenolic extracts characterization

Extract type	Dry matter content (g/L extract)	Organic matter content (g/L extract)	Total polyphenolic content (mg/L)
SB (spruce bark)	1.004	0.964	191
CS (chestnuts shell)	1.606	1.602	165
GS (grape seeds)	1.832	1.536	188
AS (*Asclepias syriaca*)	1.852	1.668	72

Germination tests results shown that all four tested polyphenolic extracts stimulates pigments assimilations (chlorophyll **a** and **b**,carotene) in the seedlings of *Brassica napus.*The highest values for chlorophyll **a** and **b** concentrations were registered under SB and GS extract treatments. The carotene bioaccumulation is also stimulated by the presence of grape seeds aqueous extract in the growth medium (table 2). Biometric measurements evidenced the stimulatory effects of CS and GS extracts on radicles elongation (fig.1).

Table 2

Assimilatory pigments concentrations ((µg/g) in rape seedling germination tests

Extract type	Chl a	Chl b	Carotene	Chl a+b	Chl a/b
Control	57.91	92.13	20.30	150.50	0.62
SB	64.88	102.70	30.16	167.58	0.63
CS	61.08	96.27	30.87	157.35	0.63
GS	64.88	102.70	52.14	167.58	0.63
AS	58.08	91.96	35.47	150.62	0.63

Hypocotyls length was stimulated under AS aqueous extract treatment. The growth index for rape plantlets recorded higher values, comparing with control, in

the presence of polyphenolic extract obtained from *Asclepias syriaca* plant (fig.2). This situation could be explained by the presence of different individual polyphenolic compounds, in different concentrations in the aqueous extracts, varying with the nature of vegetal raw material extracted.

The natural bioactive compounds extracted from spruce bark, depending on their nature and concentrations, may develop similar action as auxin and cytokinin phytohormones (Simionescu et al., 1991). On the other side, we should take into account the interactions that can be estabilished between plant phytohornones and polyphenolic compounds from the extracts, which can promote stimulatory or inhibitory effects on some biosynthesis process.

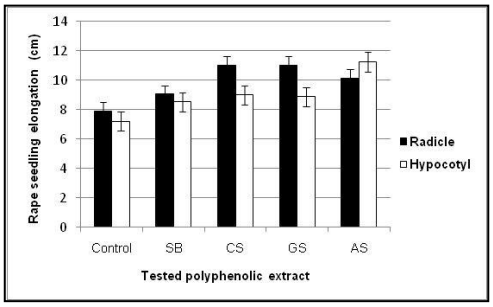

Fig. 1. Radicles and hypocotyls elongation in the presence of different polyphenolic extracts of rape seedling in germination tests

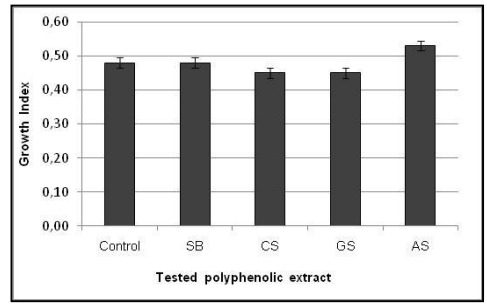

Fig. 2. Rape seedling Growth index registered in germination tests

Green biomass accumulation was stimulated by the presence of polyphenolic extracts in the growth medium, mostly under grape seeds extract treatment.Inhibitory effect on rootlets biomass was registered for rape plantlet in the presence of spruce bark and *Asclepias syriaca* polyphenolic extracts (fig.3).

The presence of aqueous polyphenolic extracts in the rape plantlet growth medium stimulates the chlorophyll **a** and **b** biosynthesis process. Grape seeds polyphenolic extracts present major stimulatory effect in pigments assimilation (chlorophyll **a** and **b**, carotene). *Asclepias syriaca* and spruce bark extracts inhibit carotene assimilation in *Brassica napus* cotyledons (table 3).

Table 3

Assimilatory pigments concentrations (µg/g) in rape plantlet hydroponic culture

Extract type	Chl a	Chl b	Carotene	Chl a+b	Chl a/b
Control	438.76	128.39	113.59	567.166	3.41
SB	570.49	151.66	108.66	722.16	3.76
CS	584.89	153.42	122.85	738.321	3.81
GS	704.87	184.60	138.26	889.47	3.81
AS	505.87	132.99	96.90	638.86	3.80

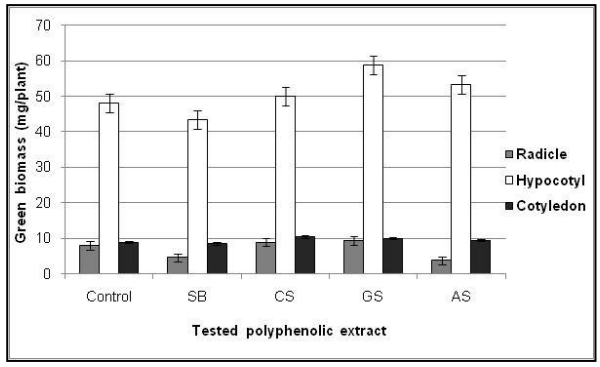

Fig. 3. Variation of green biomass accumulation in rape seedling under polyphenolic extracts treatments in germination tests

In hydroponic culture experiment roots elongation was stimulated in the presence of grape seeds extract, mean while the hypocotyls length was significantly stimulated under SB and AS extracts treatment (fig.4). The highest value of growth index of rape plantlet was registered in the presence of spruce bark aqueous extract (fig.5).

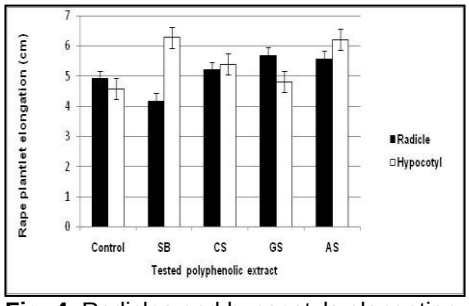

Fig. 4. Radicles and hypocotyls elongation in the presence of different polyphenolic extracts of rape plantlet in hydroponic culture

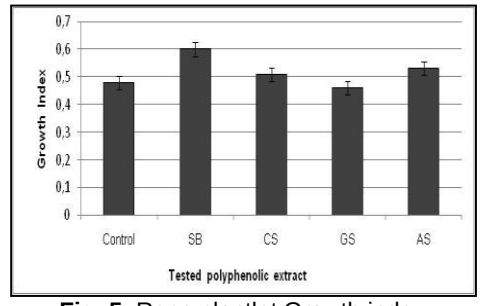

Fig. 5. Rape plantlet Growth index registered in hydroponic culture

Green biomass accumulation in hypocotyls was stimulated by AS extract. Not the same thing could be said regarding cotyledons green biomass accumulation, which seems to be inhibited by all four tested polyphenolic extracts (fig.6).

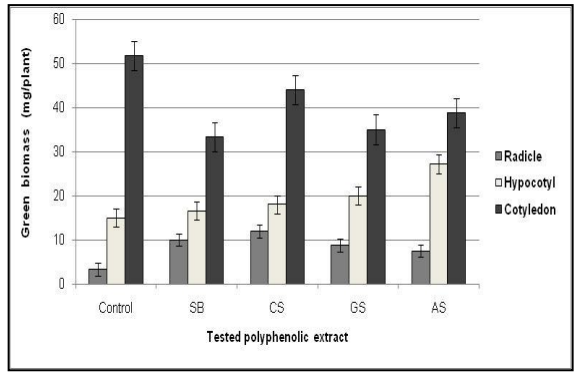

Fig. 6. Variation of green biomass accumulation in rape plantlets under polyphenolic extracts treatments in hydroponic culture

CONCLUSIONS

1. The aqueous polyphenolic extracts obtained from spruce bark, chestnuts shell, grape seeds and *Asclepias syriaca* plant present stimulatory effects on rape plant growth and development, assimilatory pigments biosynthesis (chlorophyll **a** and **b**, carotene) and green biomass accumulation.

2. These processes could be correlated with the nature of tested polyphenolic extract (concentration, composition, total polyphenolic content) and also with the growth medium conditions. From all of four tested extracts, the one obtained from grape seeds present the major stimulatory effect on rape plant growth and development and also on pigments assimilation (both chlorophyll and carotene).

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BIOACCUMULATION OF HEAVY METAL IN OAT PLANT UNDER POLYPHENOLIC COMPOUNDS TREATMENT

BIOACUMULAREA METALELOR GRELE ÎN PLANTELE DE OVĂZ ÎN PREZENŢA UNOR EXTRACTE POLIFENOLICE

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Abstract. *Contamination of cereal crops by heavy metals is a major problem, as long as there is permanently a major risk to be ingested by humans. Secondly, the plant sensitiveness response to different pollutants action could be properly used in monitoring several pollution processes. The aim of this paper is to analyze the morpho- physiological response of Avena sativa plant in the presence of copper and cadmium ions through germination test experiments. The influence of spruce bark aqueous extract, in different concentrations (total ploy phenols content 130, 191, 190 mg/L extract) on bioaccumulation of heavy metals ions in different parts of oat plantlet was evidenced by spectrophotometrically atomic absorption method. The biometric measurements were performed, along with quantitative determination of biomass accumulation and assimilatory pigments concentrations (chlorophyll **a** and **b**). Spruce bark polyphenolic extracts, block the bioaccumulation of heavy metal ions in oat plant, depending on extracts concentration applied in the experiment.*

Key words: copper, cadmium, chlorophyll **a** and **b**, atomic absorption spectrophotometry

Rezumat. *Contaminarea culturilor de cereale cu metale grele este o problemă majoră, atât timp cât există riscul ca acestea să fie utilizate în alimentaţia umană. Pe de altă parte, sensibilitatea unor plante la acţiunea poluanţilor poate fi folosită pentru biomonitorizarea unor procese de poluare. Lucrarea îşi propune o analiza a răspunsului morfo- fiziologic al plantulelor de ovăz în prezenţa ionilor de cupru şi cadmiu prin folosirea unor teste de germinare. Influenţa extractului apos din coaja de molid, în diferite concentraţii (conţinut total de polifenoli 130, 191, 190 mg/L extract) asupra bioacumulării ionilor metalici la nivelul diferitelor parţi componente ale plantulelor de ovăz a fost evidenţiată prin spectrofotometria de absorbţie atomică. De asemenea, au fost efectuate măsurători biometrice, determinări cantitative privind biomasa acumulată alături de concentraţia pigmenţilor asimilatori (clorofila **a, b**). Extractele obţinute din coaja de molid, în funcţie de concentraţia aplicată, blochează bioacumularea ionilor metalici la nivelul radicular al plantulelor.*

Cuvinte cheie: cupru, cadmiu, clorofila **a** şi **b**, spectrometria de absorţie atomică

INTRODUCTION

The main sources of heavy metal contamination are represented by ferrous platforms, ore processing industry, sludge from wastewater treatment stations, wastewater irrigation, fertilization and soil amendment. Crop species present different charactheristics depending on their sensitivity to micronutrients

deficiency or toxicity. Metal phytotoxicity is defined by the excessive concentration in essential or unessential metals. Cultivated plants that tolerate high concentrations of heavy metals represent a greater risk for consumer's health than those who are more sensitive and show different symptoms of toxicity.

Tannins are polyphenolic compounds with multiple hydroxyl groups and show a special affinity for heavy metals, especially uranium. Araújo do Nascimento (2006) noticed that citric, oxalic, vanillic and gallic acids, applied at 10 or 20 mmol/kg, solubilized significant amounts of Zn, Ni, and Cd from soil.

In this context the aim of this work is to underline the polyphenolic compounds role in copper and cadmium bioaccumulation process to different parts of oat plant.

MATERIAL AND METHOD

Obtain and characterization of aqueous polyphenolic extract. The polyphenolic extract was obtained through successive extraction in 125mL distilled water of 5, 10 and 20 g dry and milled spruce bark, raw material on a water bath at 80-90°C for 45 min. The aqueous polyphenolic extract was characterized in terms of dry matter content, organic matter content and total polyphenolic content. The total polyphenolic content was determined by using Folin Ciocalteau method and the concentrations were expressed in mg gallic acid/L extract (Bao et al., 2005).

Germination Tests. Germination tests were carried out in Petri disches. The Petri dishes were incubated in a thermostatic chamber at 25-27 °C for seven days. After 168h, oat seedling were exposed to day light for 48 h to promote chlorophyll pigments bioshynthesis. At the end of the experiment biometric measurements and quantitative determination were done. We tested three different concentrations of copper and cadmium ions (5, 12.5 and 25 µg/mL $CuSO_4$/$CdCl_2$) with and without spruce bark aqueous extract addition. The tested solutions were suggestively noted as: Me-5, Me-12.5, Me-25 for copper and cadmium salts and SB5Me-5, SB5Me-12.5, SB5Me-25 ; SB10Me-5, SB10Me-12.5, SB10Me-25 ; SB20Me-5, SB20Me-12.5, SB20Me-25, in the case of spruce bark extract (SB) addition. The experiment was carried out in triplicate. The experimental results were statistically processed.

Pigments assimilation assay. The chlorophyll was extracted in 80% acetone and spectrophotometrically determinated by reading the absorbances at fixed wavelength of 470, 646, 663 nm. The concentrations of chlorophyll pigments were calculated by using the specific coefficients suggested by Lichtenthaler and Wellburn (1983). The results were expressed in µg/g green biomass.

Heavy metal concentration evaluation. Copper and cadmium ions concentrations were spectrophotometrically determined by using a GBC Avanta atomic absortion spectrophotometer. Plantlet dry samples were mineralizated in nitric acid (65%) and H_2O_2 (30%) on a hot plate at 120°C,for at least five hours (Smith et al., 2008; Stingu et al., 2009).

Bioaccumulation coefficient = metal ions concentration into the plant / metal concentration into the growth medium (Stingu et al., 2009).

Translocation factor = metal ions concentrations into the shoots / metal ions concentration into the root (Sun et al., 2008).

RESULTS AND DISCUSSIONS

The spruce bark aqueous extract present the following characteristics (table 1). Dry matter content, organic matter content and total polyphenolic content increased proportionally with increasing the amount of extracted spruce bark raw material.

The presence of spruce bark polyphenolic extracts in a copper contaminated environment stimulates the rootlets and hypocotyls elongation and oat hypocotyls green biomass accumulation but inhibit the cotyledons growth and development, compared with the reference (fig.1- fig.3).

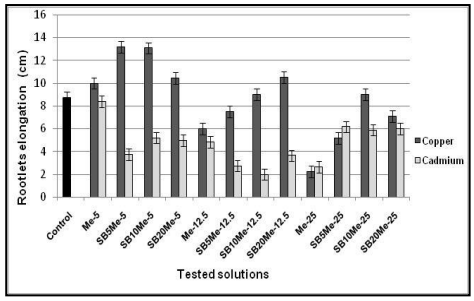

Fig. 1. Oat rootlets elongation under heavy metal stress and polyphenolic extracts treatments

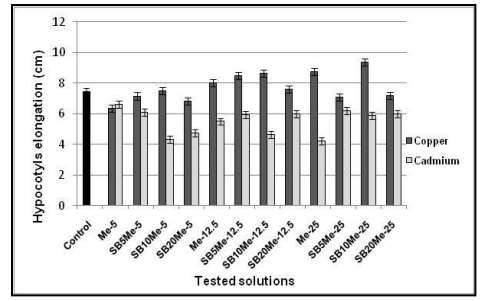

Fig. 2. Oat hypocotyls elongation under heavy metal stress and polyphenolic extracts treatments

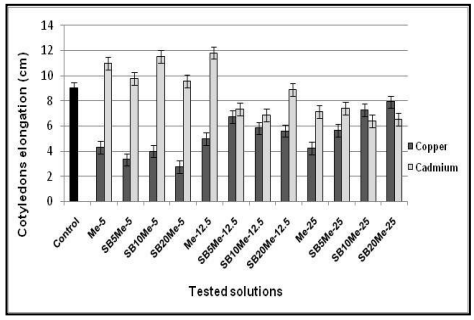

Fig. 3. Oat cotyledons elongation under heavy metal stress and polyphenolic extracts treatments

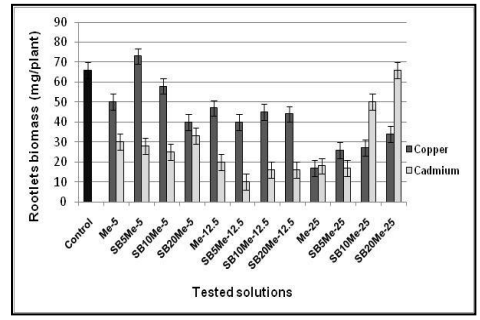

Fig. 4. Rootlets biomass variation under heavy metal stress and polyphenolic extracts treatments

Even if the spruce bark aqueous extracts treatment do not shows major stimulatory effects compared with the control, it was noticeable a decreasing of copper inhibitory action on plant growth and development in the presence of polyphenolic extracts.

Table 1

Spruce bark aqueous extract characterization

Extracted spruce bark, (g)	Dry matter content (g/L extract)	Organic matter content (g/L extract)	Total polyphenolic content (mg/L extract)
5	0.580	0.483	130
10	1.004	0.964	191
20	1.912	1.917	190

When the environment was contaminated with cadmium ions it could be observed that natural bioactive compounds from aqueous extract stimulate both green biomass accumulation and cotyledons elongation (fig.4 – fig.6). In the absence of natural extracts, the harmful effects of metal ions on *Brassica napus* plant growth and development would be much more noticeable.

Chlorophyll a biosynthesis was stimulated in heavy metal contaminated environment (5µg/mL $CuSO_4$/ $CdCl_2$) under spruce bark polyphenolic extract (20g) treatment. The polypeholic extracts in every concentration, in a copper contaminated growth medium, stimulate Chl **a** biosynthesis.

Not the same effects could be observed when the medium is contaminated with cadmium ions (table 2). Spruce bark extracts (0.58g/L, 1.91g/L) promote Chl **b** assimilation both in copper and cadmium (5µg/mL) stress conditions. Not any significant effects were registered for the other level of heavy metal contamination, comparing with control.

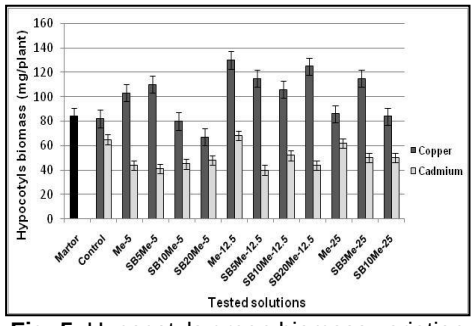

Fig. 5. Hypocotyls green biomass variation under heavy metal stress and polyphenolic extracts treatments

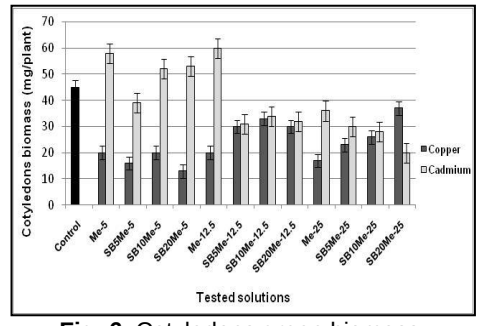

Fig. 6. Cotyledons green biomass variation under heavy metal stress and polyphenolic extracts treatments

Bioaccumulation coefficient registered minor values for copper contamination than for cadmium pollution. It could be observed a decreasing of copper bioaccumulation in oat plantlet under spruce bark aqueous extracts treatment.

Applying the spruce bark extract (1.912g/L) in oat plant growth medium, block the access of copper ions into the roots level (fig.7, fig. 8).

Applying polyphenolic extract in less concentrated solutions (0.85 ; 1.004 mg/L) translocation factor values increased and copper ions were transported to the upper parts of the plantlet.

The presence of polyphenolic extracts in a cadmium contaminated environment promote the bioaccumulation with increasing metal concentration level but reduce the translocation of the metal to the aerial parts of the plant.

These effects could be correlated with the possibilities of certain polyphenolic compounds from spruce bark aqueous extract to complex with heavy metal. All these interactions depends upon metal ions concentrations, total polyphenolic compounds concentrations and growth medium conditions.

Table 2

Assimilatory pigments content (µg/g)

Tested solutions		Chl a	Chl b	Chl a+b	Chl a/b
Martor		275.79	92.69	368.48	2.97
Copper	Me-5	565.12	83.84	648.97	6.74
	SB5Me-5	357.72	98.35	456.08	3.63
	SB10Me-5	497.71	81.86	579.57	6.07
	SB20Me-5	594.24	99.94	694.18	5.94
	Me-12.5	516.10	89.56	605.67	5.76
	SB5Me-12.5	348.88	39.71	388.59	8.78
	SB10Me-12.5	470.13	92.27	562.40	5.09
	SB20Me-12.5	446.23	75.44	521.68	5.91
	Me-25	119.17	6.87	126.05	17.37
	SB5Me-25	279.84	13.87	293.71	20.17
	SB10Me-25	384.41	69.55	453.96	5.52
	SB20Me-25	238.29	67.31	305.61	3.54
Cadmium	Me-5	291.95	170.83	462.81	1.70
	SB5Me-5	265.22	210.34	475.57	1.26
	SB10Me-5	269.63	166.63	436.26	1.61
	SB20Me-5	476.76	200.04	676.81	2.38
	Me-12.5	400.32	207.59	607.91	1.92
	SB5Me-12.5	540.68	193.82	734.50	2.78
	SB10Me-12.5	293.63	193.82	734.50	2.78
	SB20Me-12.5	362.68	210.17	572.86	1.72
	Me-25	516.91	251.36	768.27	2.05
	SB5Me-25	511.93	225.14	737.07	2.27
	SB10Me-25	442.16	230.44	672.61	1.91
	SB20Me-25	405.28	225.93	631.22	1.79

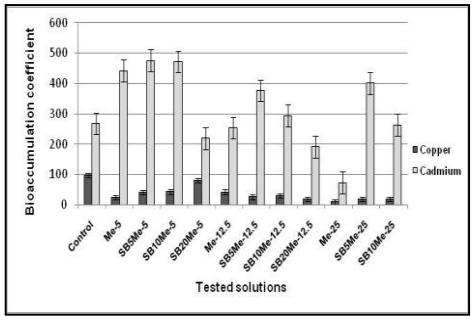

Fig. 7. The influence of polyphenolic extracts treatment on heavy metal bioaccumulation

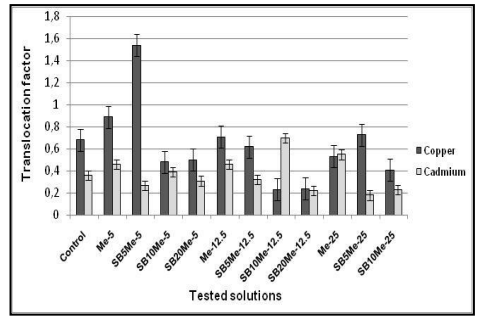

Fig. 8. The influence of polyphenolic extracts treatment on translocation factor variation

CONCLUSIONS

1. Oat plant shows a special affinity for cadmium ions bioaccumulation than for copper. The total polyphenolic compounds identified in aqueous extract (130mg/L extract) promote a decreasing trend in copper bioaccumulation process. On the other side, spruce bark extract (191mg/L) stimulate cadmium bioaccumulation in oat plant and blocked them into the roots level, protecting in that way the potential consumers.

2. Spruce bark aqueous extract could be properly used in amelioration of harmfully effects caused by the presence of heavy metals in the environment. Polyhenolic extract could be considered natural amendments with large spectrum of utilisation in phytostabilisation and phytoextraction.

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STUDIES REGARDING THE INCIDENCE OF CHROMOSOMAL ABERRATIONS AT PLANT REGENERATED „IN VITRO" VERSUS PLANTS OBTAINED FROM SEEDS AT *BRASSICA OLERACEA* L.

STUDII PRIVIND INCIDENŢA ABERAŢIILOR CROMOSOMIALE LA PLANTELE REGENERATE „IN VITRO" VERSUS PLANTE OBŢINUTE DIN SEMINŢE LA *BRASSICA OLERACEA* L.

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Abstract. *Brassica oleracea contains many important vegetable crops, such as cabbage, cauliflower, broccoli and brussels sprouts. Among them, one of the most popular crop is white cabbage (Brassica oleracea var. capitata, forma alba). Currently, the breeding techniques involve the utilization of tissue culture for the regeneration of plants. But, during the "in vitro" culture, due to the medium culture composition, alteration of chromosomes morphology may occur According with the literature, chromosome aberrations have been used as a measure of reproductive success in plants for many years and have been correlated with morphological changes, fertility-sterility relationships, mutations, etc. The main objective of the present paper is screening of some aspects regarding the type and frequency of chromosomes aberrations that appeared at cabbage plants regenerated from "in vitro" culture versus seed-born plants. The main types of aberrations identified at regenerated plants and seed-born plants are: contraction, stickiness, fragmentation, inter-chromatin bridges, ring chromosomes, C-mitosis.*

Key words: cabbage, genetic, analyses, vitro, plant

Rezumat. *Brassica oleracea cuprinde numeroase plante legumicole cum ar fi varza, conopida, broccoli şi varza de Bruxelles. Dintre acestea, cea ma mare popularitate o înregistrează varza albă pentru căpăţână (Brassica oleracea var. capitata, forma alba). Astăzi, tehnicile moderne de ameliorare implică utilizarea culturilor de ţesuturi pentru regenerarea de plante. Dar, pe parcursul cultivării „in vitro", datorită compoziţiei mediului de cultură, se pot genera alterări ale morfologiei cromosomilor. Conform literaturii, aberaţiile cromosomiale au fost utilizate curent pentru determinarea succesului regenerării „in vitro", fiind corelate cu schimbări ale morfologiei, relaţiilor fertilitate-sterilitate, mutaţii. Principalul obiectiv al studiului de faţă este realizarea unui screening privind tipul şi frecvenţa aberaţiilor cromosomiale ce pot apărea la plantele de varză cultivate „in vitro" versus plante obţinute pe cale clasică din seminţe. Principalele tipuri de aberaţii identificate la plantele de varză regenerate „in vitro" şi la plantele obţinute din seminţe sunt: contractare, stickness, fragmentare, punţi, C-mitoze, cromosomi în inel.*

Cuvinte cheie: varza, genetic, analize, vitro, plante

INTRODUCTION

Brassica oleracea contains many important vegetable crops, such as cabbage, cauliflower, broccoli and brussels sprouts. In the literature are numerous reports regarding the plant regeneration from explants in several *Brassica* species including *B. napus* (Glimelius, 1984; Zhao et al., 1995), *B. oleracea* (Jourdan and Earle, 1989; Hansen and Earle, 1994), *B. campestris* (Zhao et al., 1994), *B. juncea* (Kirti and Chopra, 1990; Bonfils et al., 1992), *B. carinata* (Jaiswal et al., 1990) and *B. nigra* (Narasimhulu et al., 1993). Still there are few studies regarding the chromosomes aberrations that may appear during the cultivation of explants "in vitro". Chromosome aberrations have been used as a measure of reproductive success in plants for many years and have been correlated with morphological changes, fertility-sterility relationships, mutations etc.

The cultivation of different explants on nutritive media "in vitro" is often related with an increase in the frequency of structural chromosomal alterations as well as an increase in the frequency of gene mutations. How these factors are related to one another and how they cause changes in the chromosome and gene mutation rates are not well understood. However, the fact that all these external agents cause similar changes and indicate a broad fundamental process may be a primary cause of mutations.

Somaclonal variation (that may affect the "in vitro" regenerated plants) can pose a severe threat to the genomic integrity of regenerated plants, which is particularly required during the genetic transformation experiments. For the multiplication techniques, one important goal is to achieve genetic uniformity of the propagules and to maintain with fidelity the genetic structure of mother plants. Somaclonal variation can either bring the changes at the DNA level or it may induce changes in chromosome numbers. For most of the micropropagated crops only 5 % somaclonal variation is permitted (Leela *et al.* 2003). Although reports are available for propagation of cabbage *via* tissue culture, relatively few results are available on the type and frequency of chromosomal aberration that may occur during the cultivation of plant tissues "in vitro".

Understanding the cytogenetic of the plant has a key role for controlling the „in vitro" behaviour of different explants by a better understanding of the influence of these peculiar conditions over the growth processes. Subsequent studies at different plant species have shown that plant chromosomes exhibit many different types of aberration, as a result of different types of chemicals used for the preparation of "in vitro" culture medium.

MATERIAL AND METHOD

The experiments were performed in the Laboratory of Tissue Culture at Vegetable Research and Development Station Bacau, Romania.

The biological material is represented by seeds belonging to two genotypes of cabbage (*Brassica oleracea* L.IS 21 and IS 57 provided by Vegetable Research and Development Station Bacau, Romania.

The seeds were subjected to experiments regarding the "in vitro" multiplication of these valuable genotypes and the meristematic root tips were excised from the "in

vitro" plantlets regenerated on V2-V4 variants, characterized through the presence of BAP and Kinetin alone or in association with IAA - table1.

The seed born plants were obtained through the classic germination technique, in sterile Petri dishes (variant V1).

Table 1

Experimental variants utilized in the cytogenetic studies at *Brassica oleracea* L.

Components	V1	V2	V3	V4
Macro elements	seed born plants	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 ‰

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 coloured with the basic colouring solution Carr.

The root meristems were displayed using squash technique and for each genotype and variant an average number of 5000 cells were counted. Dates regarding the type and frequency of chromosomal aberrations for each phase of divisions were recorded and subjected to statistical analyses, both for plants regenerated „in vitro" and for seed born plants.

RESULTS AND DISCUSSIONS

The results of the present study show that there are no significant differences between the seed-grown and tissue-cultured plants. In the root meristems of both type of plants we identified similar chromosomal aberration, the incidence of these aberrations in tissue-cultured plants does not exceed the values recorded for seed born plants.

The results obtained for each genotype and variant (V1 – V4) are presented in table 2 and 3, as media of cells with aberrations and illustrated in fig. 1 and 2.

Table 2

Types and frequency of chromosomal aberrations observed in root meristematic cells - genotype IS 21

Variant	Total no of cells	% in prophases	% in metaphases	% in A+T	$\bar{X} \pm s\bar{X}$ %
V1	5312	1.11	1.59	1.82	1.50±0,07
V2	5430	1.02	1.24	1.54	1.26±0,06
V3	5390	1.23	1.71	1.95	1.63±0,05
V4	5294	1.26	1.43	1.69	1.46±0,05

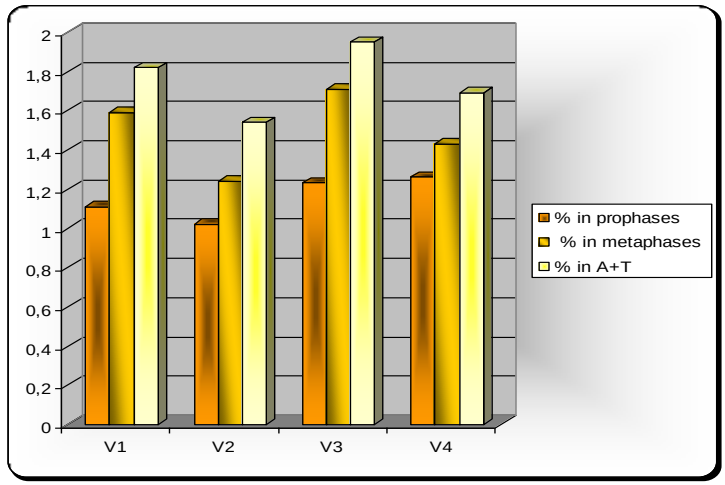

Fig. 1. Types and frequency of chromosomal aberrations observed in root meristematic cells – genotype IS 21

Table 3

Types and frequency of chromosomal aberrations observed in root meristematic cells – genotype IS 57

Variant	Total no of cells	% in prophases	% in metaphases	% in A+T	$\bar{X} \pm s\bar{X}$ %
V1	5129	1.23	1.62	1.07	1.30±0,04
V2	5085	0.88	1.39	1.69	1.32±0,02
V3	5226	1.11	1.20	1.92	1.41±0,05
V4	5112	1.16	1.51	1.32	1.33±0,02

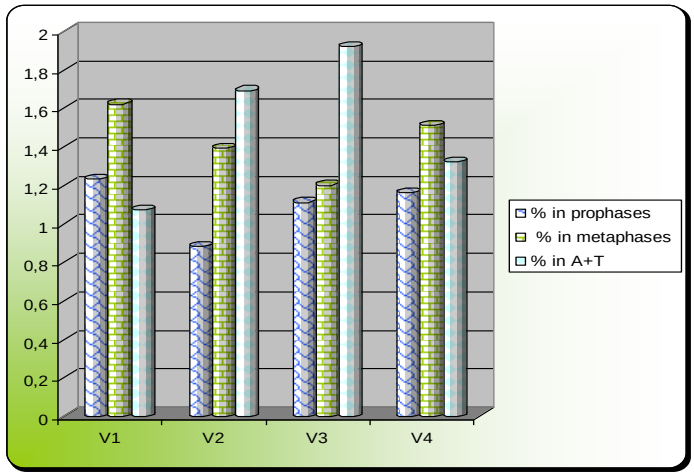

Fig. 2. Types and frequency of chromosomal aberrations observed in root meristematic cells – genotype IS 57

The cytogenetical studies accomplished in the present study demonstrate that the cultivation of cabbage shoot tips on nutritive medium modified with

Kinetin and BAP allows the regeneration of new plants with a stable genetic material that shows little genetic variability. This variability manifested at cellular level through the different types of chromosomal abnormalities does not exceed the natural variability present also on plants germinated in natural conditions.

Both at plants generated "in vitro" and at plants from seeds, the main types of aberrations identified are chromosome clumping, contraction, stickiness, paling, fragmentation, dissolution, chromosome and chromatid bridges, C-mitosis and endoploidy.

The highest incidence of aberrations was observed in ana-telophases. The most common abnormalities were ana-telophases with simple or multiple bridges, expelled or late chromosomes and multipolar ana-telophases (figure 3). The average percentage of cells in ana-telophase that presented these type of aberrations ranged between 1.07-1.92 at IS 57 genotype and 1.54-1.82 at IS 21 genotype.

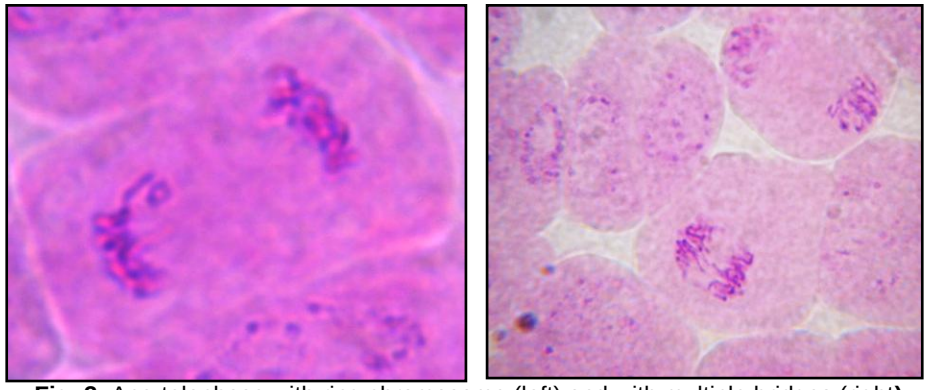

Fig. 3. Ana-telophase with ring chromosome (left) and with multiple bridges (right**)**

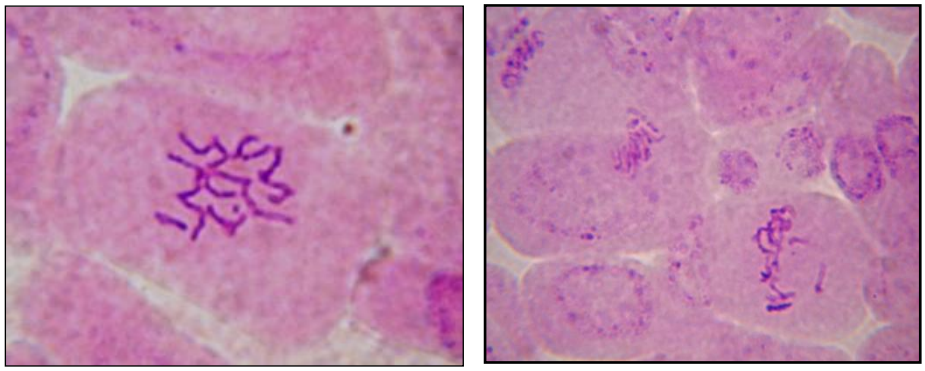

Fig. 4. C-metaphase (left) and metaphase with late chromosomes

The values registered for tissue cultured plants were similar with seed born plants, slightly higher, the difference between them being not significant. The highest number of aberrations were detected at plants regenerated on culture media supplemented with kinetin, which suggests that BAP is a much proper

growth regulator. We also detected abnormalities is metaphases that were abnormally organized, with ring chromosomes, minutes, expelled chromosomes, fragment, C-metaphases etc (figure 4).

In a smaller number we detected prophases that presented different types of chromosomal aberrations like late prophases, with ring chromosomes, expelled chromosomes etc.

Both IS 21 and IS57 genotypes had the same cytogenetic behavior, the plants regenerated from "in vitro" culture presenting abnormalities in similar percentages as plants obtained from seeds.

CONCLUSIONS

1. Among the plants regenerated "in vitro", the highest number of aberrations were detected at plants regenerated on culture media supplemented with kinetin, which suggests that BAP is a much proper growth regulator. The cultivation of cabbage shoot tips on nutritive medium modified with BAP allows the regeneration of new plants with a stable genetic material that shows little genetic variability.

2. Both IS 21 and IS57 genotypes had the same cytogenetic behavior, the plants regenerated from "in vitro" culture presenting abnormalities in similar percentages as plants obtained from seeds.

3. No significant differences were observed between tissue cultured plants and seed born plants suggesting that genetic fidelity of tissue cultured plants can be maintained if appropriate plant growth regulators are used with less number of subcultures in the multiplication stage.

4. The main types of aberrations identified at regenerated plants and seed-born plants are: contraction, stickiness, fragmentation, inter-chromatin bridges, ring chromosomes, C-mitosis.

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ONLINE FOREIGN LANGUAGE TEACHING. RESOURCES AND TOOLS IN SUPPORT OF TEACHERS OFFICE INTERACTORS, LAPROF, LET'S GO PROJECTS

PREDAREA ONLINE A LIMBILOR STRĂINE. RESURSE ŞI INSTRUMENTE DE LUCRU PENTRU ASISTAREA PROFESORILOR OFFICE INTERACTORS, LAPROF, LET'S GO PROJECTS

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Abstract. *The article aims to present a series of guidelines, tools and resources meant to assist foreign language teachers in going online. The authors believe that familiarization with ICT tools and online learning resources is still a step to be taken by many teachers of foreign languages. The importance of this issue becomes even more apparent when we think of today's learners: most of them are ICT literate, highly capable of handling computers, and attracted by the online environment. In order to meet the learners' expectations, teachers need to adapt to the realities of the present, and be aware and capable of using state-of-the-art technologies and resources.*

Key words: blended learning, ICT tools, foreign languages, intercultural communication

Rezumat. *Lucrarea prezintă o serie de indicaţii, instrumente şi resurse al caror scop este asistarea profesorilor de limbi străine care doresc să folosească predarea online. Autorii acestei lucrări consideră că deprinderea de aptitudini în zona de tehnologia comunicarii este un pas pe care mulţi profesori încă trebuie să îl facă. Importanţa acestei situaţii este şi mai evidentă atunci când privim lucrurile din perspectiva studentului de astăzi: familiarizat cu lucrul pe calculator, atras de materialele online şi de noile media. Pentru a întampina cu succes aşteptările studenţilor, profesorii trebuie să se adapteze realităţilor prezente şi să devină capabili să utilizeze tehnologii şi resurse inovative.*

Cuvinte cheie: învăţare mixtă, unelte ICT, limbi străine, comunicare interculturală

INTRODUCTION

Experince shows that foreign language teaching/learning means a lot more than simply teaching grammar and vocabulary items. If we want all this information to be delivered in a logical sequence in order to provide authentic opportunities for practising the foreign language, teaching should also include information on the culture of the target countries. In this way, the teaching process will support learning by providing a genuine background for the language

intake. Moreover, the tools for information transfer and processing used nowadays represent key elements which are instrumental in successful teaching and learning. In a world where mobility matters, teaching has to adjust to the needs of different types of ”clients”. Virtual learning environments do meet this requirement, which explains why they are increasingly used due to their superior accessibility and variety of resources and teaching methods compared to traditional teaching systems.

METHOD AND MATERIAL

The three European projects presented in this article, i.e. ***Office InterActors, LaProf*** and ***Let's go***, have as their primary goal developing and testing teaching and learning resources, which implicitly includes validating and implementing the products with the final beneficiaries – foreign language learners. All the projects have been developed within European partnerships with the direct contribution of all the experts of the projects teams.

Office InterActors is a Leonardo da Vinci transfer-of-innovation project which was implemented starting December 2008. The activities of the project are scheduled up until December 2010. The main aim is to create a virtual learning environment via a Moodle platform which can be accessed at www.euroed.ro/online - to access the courses on the platform contact us at lucia.petrescu@euroed.ro. All the materials uploaded target all those interested in the field of business and business administration, no matter if students or experienced professionals or persons who want to re-train.

Another product of this project is the *Office InterActors Kit* which may be accessed free of charge at www.officeinteractors.eu. This kit provides information and details to all those who are interested in running courses based on the Office InterActors methodology. The Office InterActors methodology includes not only team-work sessions organized at national level (teams set up according to the language competence level – basic or advanced), but also online exercises for international negotiation sessions on the Moodle platform or via Skype.

The activities on the platform are run around a scenario developed by the project team which aims at developing entrepreneurial skills, ICT and less widely used languages skills.

LaProf is a multilateral project which undertakes to develop a set of language teaching resources with special attention to the fields of ICT and agriculture. The end-beneficiaries of this project are experts in the afore-mentioned fields who think of emigrating and who therefore need not only a basic knowledge of the foreign language, but also an operational command of specialized terminology. One of the first stages of the project focused on designing a set of exercises whereby learners can get acquainted with both field-specific aspects and relevant culture and civilization elements. By means of an ongoing assessment and updating process, the project proposes high-quality products, flexible and readily adaptable to the needs of the beneficiaries.

Examples of exercise-generating formats are available at:

http://lefo.net/en/gtests.html?start=1&test=324&path=Fun%2F+Beginners.

Additionally, a website was created in order to publish information on the working methodology, beneficiaries and final products of the project. This website can be accessed at www.laprof.eu.

In its turn, *Let's go* project evolved from a previous project, LeTS (Language eTeacher Services), which targeted specifically university teachers. Within this

particular project the final outcome was a training pack designed to support teachers in using online teaching/learning materials.

Some of the major aspects covered by these materials are: selection criteria for the ICT technologies used in teaching/learning, using online resources to supplement or substitute traditional courses etc.

The present project *Let's go* focuses on promoting the outcomes of the previous project while extending the list of beneficiaries and adjusting the final products with a view to meeting the needs of pre-university teachers and trainers.

Each partner comes with a team made of teachers and trainers who will also pilot the courses at each and every stage:

- introduction to e-learning
- research and assessing of the online foreign language teaching/learning materials
- planning and developing the online foreign language teaching/learning materials
- efficient use of the online foreign language teaching/learning materials.

Implementing these courses is meant to facilitate updating of LeTS portal as well as further adjustment to the needs of the new categories of beneficiaries.

RESULTS AND DISCUSSIONS

The three projects, *Office InterActors*, *LaProf* and *Let's go*, are at different stages of implementation and product development. Irrespective of the stage, they clearly uphold and promote European values by integrating a number of priority aspects at European level.

As far as the project ***Office InterActors*** is concerned the partnership has already run the first series of courses for beneficiaries from 5 countries: Bulgaria, France, Lithuania, Romania, and Spain. The second round of Office InterActors courses was scheduled for the spring of 2010, this time facilitated via the Moodle platform www.euroed.ro/online . The associated activities will revolve around a newly created scenario developed from the previous one and updated according to the feedback received from beneficiaries, internal and external evaluators, and also from the project partners.

The two trainer training rounds constitute another significant outcome of this project. The first round took place in February 2009, while the second is scheduled on the occasion of the international conference in February 2010.

The three-day event had as its main objective raising participants' awareness of the working methodology and the materials created within the partnership. The first day was dedicated to introducing the Office InterActors partnership and presenting the project outcomes. On the second day, the main focus was on practical activities facilitated by the international facilitators. Those particular activities aimed to provide participants with the opportunity of experiencing hands-on a small part of the Office InterActors course by working on a scenario sequence specially designed for this event. Participants worked in three groups simulating three different countries and the online communication the actual courses involve. Following the conference closure, participants were

invited to take part in post-activities organized on the Office InterActors platform. All those interested in participating in the third round of courses, contact us at lucia.petrescu@euroed.ro.

The ***LaProf*** partnership conducted a survey of the available literature and materials for the project target groups. The final product of this study, available at http://www.laprof.eu/viewDeliverables.do , includes references to methodologies, approaches and materials commonly found in the practice of ICT and agriculture. The batteries of exercises for the end-beneficiaries will be developed on the basis of this material.

Let's go project aims to:

- create an online cooperation network made up of 200 pre-university teachers and 100 trainers
- update LeTS portal
- putting together a database of teachers' and trainers' experiences, and assessments of existing materials
- design 10 new mini-courses in the field of online language teaching
- write reports on the use of LeTS portal by students and trainers
- integrate LeTS portal within the national education and training system.

CONCLUSIONS

1. Use of the new language teaching technologies represents an extremely important training opportunity not only for the end-beneficiaries, i.e. students, but also for the trainers teachers.

2. Development and use of these new online technologies have to be regularly updated and adjusted to the needs of the beneficiaries. This has a direct bearing on the relevance of the final results.

3. Piloting, assessing and validating the materials have to be included as compulsory stages within the overall process of developing new materials and skills.

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INSTRUMENTS FOR QUALITY ASSURANCE OF FOREIGN LANGUAGE RESOURCES

PREDAREA LIMBILOR STRĂINE – INSTRUMENTE DE CERTIFICARE A CALITĂŢII

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Abstract. *Faced with a lack of innovative language teaching materials in the past decades, language teaching staff and institutions must face nowadays yet another challenge: how to select the adequate, high-quality resources for their learners from a multitude of resources available. This article focuses on several instruments (such as linguistic audits or quality checklists) developed for quality assurance in the area of linguistic materials. Moreover, the methodology of employing these instruments shall be presented, with guidelines for university language departments, language centres, teachers and learners. This is a result of the research undertaken on three main instruments of ensuring quality in language learning*

Key words: foreign language teaching, quality assurance, online learning

Rezumat. *Pentru profesorii de limbi străine, până acum un deceniu, provocarea era să identifice materiale inovative de predare - învăţare. Acum, provocarea se constituie din alte realităţi, specifice ultimilor ani: profesorii, dar şi studenţii sau departamentele de predare a limbilor străine din universităţi, trebuie să aleagă materiale corespunzătoare din punct de vedere calitativ, dintr-o multitudine de resurse disponibilie. Acest articol abordează problema asigurării calităţii în cazul resurselor de predare-învăţare a limbilor străine, axându-se pe prezentarea câtorva instrumente dezvoltate în acest scop. De la audituri lingvistice până la indicaţii cu privire la selectarea resurselor de calitate, vom prezenta aceste instrumente, incluzând indicaţii de implementare pentru catedre de limbi străine, pentru centre de predare, pentru profesori si studenţi. Această prezentare constiuie rezultatul unei cercetări întreprinse pe trei instrumente principale de asigurare a calităţii în zona resurselor de învăţare a limbilor străine.*

Cuvinte cheie: predarea limbilor străine, asigurarea calităţii, învăţarea online

INTRODUCTION

The article dwells on the particular strategies implemented in three European projects focusing on quality assurance in teaching foreign languages. EuroEd Foundation is a partner in two of these projects (Lingu@net and TOOL Tipls) and the coordinating institution in the IN-CLASS partnership. The quality assurance intruments for the selection of

language resources that have been developed under the aegis of the three projects provide the main research focus for the purposes of the present article. As such, we will present a number of results that clearly indicate the possibility of transferring the afore-mentioned instruments to other foreign language teaching/learning contexts.

The three projects tackle various dimensions of the linguistic instruments under discussion. For instance, the first project - Lingu@net World Wide - aims at promoting quality in the area of online learning instruments. The second, In-Class, promotes quality assurance for linguistic instruments mainly used in SMEs, while the third, TOOL Tipls, undertakes to design foreign language quality assurance instruments in the area of professional and vocational education, and, by extrapolation, in the hospitality industry. By approaching this highly topical field of study, the authors address directly the needs for support and orientation of foreign language teachers and students as to how quality study materials should be selected. In addition, the article is also of interest for institutions that deliver language courses or plan to hire providers of language services that can guarantee a good level of language performance for their staff.

MATERIAL AND METHOD

The three projects under study are concerned with quality assurance at various levels of foreign language learning. We shall therefore analyse in turn the strategies as well as the particular instruments used in each of them. On that basis, we shall propose a series of transferable instruments and methods for quality assurance in foreign language learning.

Lingu@net World Wide project, which has been implemented since 1998, has so far uploaded on the dedicated project platform a number of 3,700 online resources for the learning of 20 foreign languages. All in all, till the end of 2012, this project will provide guided access and support for accessing over 5,000 resources for 32 languages (of which five new languages of international circulation: arabic, Chinese, Hindi, Japanese adn Russian).

Lingu@net World Wide (*504830-LLP-1-2009-1-ES-KA2-KA2MP*) is a project funded by the European Commission, Directorate for Education and Culture, in the framework of the Lifelong Learning Programme.

So far, the internet page www.linguanet-europa.org has recorded 100,000 visitors monthly, and a further 400,000 visitors per month are estimated up until 2011. Owing to the large number of resources, languages and professionals involved in cataloguing all the online resources, quality assurance has been of the utmost importance for all the partners working in Lingu@net project. As definition of the appropriate instruments is a pre-requisite in quality assurance (Byram, M. - Routledge Encyclopedia of Language Teaching and Learning), the partnership duly created an instrument meant to help standardise the process of introducing a resource onto the project platform. It is our intention to present this instrument here, while the results concerning the transferability of the quality assurance instrument to various foreign language teaching contexts will be discussed in the following section.

Adding a resource to the Lingu@net World Wide project platform follows the steps of a standardised process strictly observed by each and every project member

involved in cataloguing. Figure 1 shows the stages a new resource follows towards platform uploading:

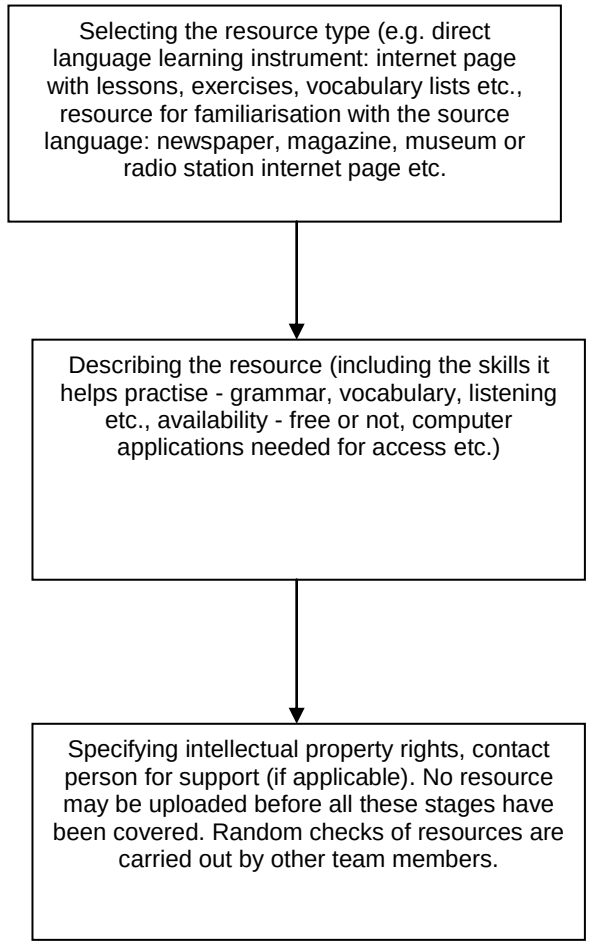

Fig.1. Adding resources onto the Lingu@net World Wide platform

The second project we consider here, similarly focusing on quality assurance of foreign language learning resources, is called IN CLASS (International Communication and Language Assessment). IN CLASS (LLP/LdV/ToI/2009/RO/010) is a transfer-of-innovation project funded by the European Commission, Directorate for Education and Culture, in the framework of the Lifelong Learning Programme. Beyond the aim of quality assurance for linguistic instruments, this project also has a more general goal: the quality assurance of the overall international, intercultural communication process in which SMEs take part. As a rule, SMEs are particularly vulnerable to difficulty arising from linguistic barriers (see the ELAN study, 2007: http://ec.europa.eu/education/policies/lang/doc/multireport_en.pdf), which leads to the loss of potential partners for no less than 11% of the SMEs.

The main objectives of IN-CLASS project are piloting a communication audit on a European scale and a training pack for auditors. The audit programme will be piloted in 30 SMEs from the three beneficiary countries. The training programme incorporates an e-learning component for auditors of language materials for English, Romanian, Italian and Hungarian.

The following section gives a thorough presentation of our results, in particular the transferability potential of the audit programme, be it as a whole or partially, for institutions and professionals working in an intercultural context.

In its turn, TOOL Tipls project aims at increasing transparency in the evaluation of language competences through developing and using consistently things like levels of reference, common certification principles etc. This is again a transfer-of-innovation project funded by the European Commission, Directorate for Education and Culture, in the framework of the Lifelong Learning Programme. As such, the project will define the language skills level for English – used for professional purposes in the target group. As concerns the working approach, we will start from the existing curriculum for professional and vocational education in each of the participating countries: Lithuania, Finland, Romania, and Latvia. Having their roots in the CEFR (http://www.coe.int/T/DG4/Linguistic/CADRE_EN.asp) and ECVET (http://ec.europa.eu/education/lifelong-learning-policy/doc50_en.htm), appropriate descriptors of professional language skills for English will be designed. The main instrument TOOL Tipls project undertakes to create is a framework – based on initial data regarding the teaching of a foreign language for specific purposes such as: level of competence, specific vocabulary, higher-order skills (Strevens P. - Special Purpose Language Learning: a perspective. Language teaching and linguistic abstracts) – that favours the development of instruments for the certification and validation of acquired competences which target clearly defined groups of professionals. The following section presents the results of our research with regard to the possibilities of successful transfer of the instrument to various teaching/learning contexts.

RESULTS AND DISCUSSIONS

The analysis of the quality assurance instruments in the three projects under study has to cover the main steps any individual or institution interested in foreign language learning has to take in order to make sure they select quality instruments, from merely checking out an internet page to the choice of a long-term strategy meant to boost the language performance of staff or students. All three projects, of which two are still at the beginning of implementation, undertake to develop transferable products, while also sensitising professionals in the field with regard to the importance of quality.

Having analysed the three main instruments developed in the three projects already described, we are now in a position to present the specific results of the research on the applicability and transferability of the instruments to various foreign language teaching contexts. Moreover, we will also share the results of our research on the integration of these instruments into the actual teaching process.

1. The instrument whereby a learning resource is uploaded onto the Lingu@net project platform can definitely be adapted to serve the cataloguing needs for foreign language learning online resources of different institutions:

foreign language teaching centres, internet pages of universities or foreign language chairs, gathering students' projects, cataloguing resources for libraries or distance education.

Systematic use of a model with mandatory components will necessarily help ensure standardisation and consistency all across the learning resources databank, without limiting user access to the resources in the process.

2. The specific activities in the audit programme developed by the IN-CLASS project are readily transferable to the punctual evaluation of staff skills or of a company's communication strategies. On top of the auditor training itself, we have found the following transferable products: quality assurance procedures, reference terms and notions, methods for a feasibility study as regards the optimum ratio amount of resource investment vs. results.

3. As concerns the certification instruments developed in TOOL Tipls project, we have found a high degree of methodological transferability to similar certification in areas of professional activity that require use of foreign languages for specific purposes. Accordingly, the model we created for vocational education and for the English language can be adapted to certification of competences in other foreign languages (widely or less widely used) on the basis of the Common European Framework of Reference and the specific instruments provided by specialised communities and institutions. In its turn, the vocational education certification model (hospitality services) can be readily adapted to meet certification needs in other areas of activity such as: business administration, agriculture, soil science, art and design, construction, the public sector etc.

CONCLUSIONS

The vast array of foreign language learning resources, particularly online, will naturally undergo a process of screening during which professionals in the field of quality assurance linguistic instruments have to assist the beneficiaries in selecting specific instruments and acquiring a set of personalised strategies and mechanisms for evaluating the quality of the resources they use. The goal of our study is to do with assessing the transferability of three quality assurance instruments used in foreign language learning.

1. We have found that the resource cataloguing process set up in Lingu@net project can be extrapolated to the indexing of foreign language learning online resources in various contexts.

2. Looking at the linguistic audit materials created in IN-CLASS project we can safely surmise that a number of components can be transferred to other areas of language and intercultural competence evaluation.

3. TOOL Tipls project looks to develop a system of language conmpetence certification for vocational education. We have found that the instruments in use and the available frameworks in Europe can be successfully adapted to help elaborate similar certification systems for other languages and for other areas of study.

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STUDY ON INTEGRATED SYSTEM ORGANIZATION IN CEREAL PRODUCTION IN MICRO TG. BUJOR, THE PLATEAU COVURLUI, GALATI COUNTY

STUDIU PRIVIND ORGANIZAREA ÎN SISTEM INTEGRAT A PRODUCŢIEI CEREALELOR, ÎN MICROZONA TG. BUJOR, DIN PODIŞUL COVURLUIULUI, JUDEŢUL GALAŢI

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Abstract. *The area studied is located in the central and north-eastern county of Galati and includes the urban center of Tg. Bujor with neighboring municipalities Varlezi and Jorasti with associated villages, totaling an agricultural area of 18,850 hectares. Has specifically sought a separate territory in the sense that all agricultural land is located in Covurlui Plateau, a wide variety of soils, predominantly chernozems in various stages of degradation. The area is characterized by favorable climatic conditions for cereal grains. Share of arable land has 75.56% 17.92% followed by natural grassland, vineyards and orchards 5.68% 0.84%. The private sector represents 95.73% of agricultural area. Main effect is intended by integrating crop production is profitable growth, increasing economic efficiency, which is not only an economic system organized, large parcels of arable land, the application processes and culture-specific orientation livestock, providing a higher recovery of all resources.*

Key words: integrated system, organization, production, cereals, profits

Rezumat. *Zona luată în studiu, este situată în partea centrală şi de nord-est a judeţului Galaţi şi cuprinde centrul urban Tg. Bujor, cu comunele limitrofe Vârlezi şi Jorăşti, împreună cu satele aferente, totalizând o suprafaţă agricolă de 18.850 ha. Teritoriul cercetat prezintă un specific aparte, în sensul că, suprafaţa agricolă în totalitate, este situată în Podişul Covurluiului, cu soluri de o mare varietate, predominând cernoziomurile, în diferite stadii de degradare. Zona se caracterizează prin condiţii pedoclimatice favorabile pentru cultura cerealelor boabe. Terenul arabil deţine ponderea de 75,56%, urmat de păşunile naturale 17,92%, viile 5,68% şi livezile 0,84%. Sectorul privat reprezintă 95,73% din suprafaţa agricolă. În ceea ce priveşte structura culturilor, cerealele boabe ocupă ponderea de 63,68% din suprafaţa arabilă, din care porumbul boabe 34,68%, grâul 25,21%, orzul 2,25%, orzoaica 1,48% şi ovăzul 0,06%. Efectul principal care se urmăreşte prin integrarea producţiei de cereale este creşterea profitului, creşterea eficienţei economice, care nu se poate decât într-un sistem economic organizat, cu suprafaţa arabilă pe parcele mari, cu aplicarea proceselor tehnologice specifice fiecărei culturi şi orientarea către creşterea animalelor, care oferă o valorificare superioară a tuturor resurselor.*

Cuvinte cheie: organizarea, sistem integrat, producţiei, cereale, profit

MATERIAL AND METHOD

For the study were used official statistics from the Department of Agriculture and Sustainable Agricultural Centre Galati and Tg. Bujor, which operates the city's agricultural territory Tg. Bujor, Jorăşti and Vârlezi.

We used the classic methodology specific technical and economic analysis (Ciurea et al., 2005). Indicators used refer to the size and structure of agricultural land in the settlements made Tg. Bujor, Vârlezi and Jorăşti and structure of plant production industries, and average total production in 2009. For future development were identified opportunities to integrate activities of cereal production.

RESULTS AND DISCUSSIONS

Overview of the studied microregion

The area studied is located in the central-eastern and north-west of the county of Galati, and in the geo-morphological point of view Covurlui Plateau and covers administrative territories of three municipalities: Tg. Bujor (the urban center in 1968 with associated villages and Moscu Umbrăreşti) Jorăşti village (Lunca and Zarnesti as related villages) and Vârlezi commune with Crăieşti village.

The relief is generally monotonous, with long ridges and broad plateaus. A feature of this unit is geo-morphological duplication and consistent character of the river system which has north-south rivers as Chineja, Suhurlui, Geru and Mălina, separating the peaks extend, giving them part of the deal.

Climate zone sector belongs entirely temperate continental climate and geographical position due east in the country, taken in the study area falls within the realm of climate hill. The average annual temperature is of 10 degrees Celsius.

Generally summers are hot, average July temperature being 21 degrees. Instead winters are quite harsh, with an average interval between 160-200 days of frost and average January temperature of about -3 degrees Celsius. It should be noted that the transition from the warm season is suddenly cold and vice versa, because invasion of warm air masses from the southwest generally producing winter thaw and snow melt is a relatively short period of time.

Rainfall record low is between 475 and 500 mm / year.

Prevailing winds are from the north and north-east. Average wind speed is around 3m/sec value.

As regards solar radiation, it is 125 kcal/cm² /year and duration of sunshine is 2,000 hours per year.

As for pedology cernoziom area occupies the largest due to large spread of steppe. Its characteristics are high in humus content and the horizon (3 to 5.5%) which is rich in nitrogen and phosphorus, have high base saturation (90-100%), neutral or slightly alkaline reaction.

These soils provide favourable conditions for developing agricultural plants.

Types of farms

In the area of individual farms the study taken holds half the agricultural area of each administrative territory (table 1).

Table 1

Types of exploitations and agricultural area

Types of agricultural exploitations	Agricultural territory of the locality:					
	Vârlezi		Jorăşti		Tg. Bujor	
	S. ha	%	S. ha	%	S. ha	%
S.C. agricultural private	3565	45,48	1025	22,76	1316	20,22
Family associations	793	10,12	730	16,21	830	12,75
Individual households	3088	39,39	2413	53,57	3817	58,65
S.C. with state capital	10	0,13	0	0	458	7,04
Local council	382	4,88	336	7,46	87	1,34
TOTAL	7838	100,0	4504	100,0	6508	100,0

These smaller households to four hectares, without mechanical means and that in fact they provide little economic power. No other types of farms, except private agricultural companies have a legal personality development too large, which makes the overall economic efficiency of agriculture micro analysis is limited (Ciurea et al., 2005).

Without good organization, and system setting (family associations and agricultural companies) results by merging land and practice of modern production technologies can not speak for farm viability and efficiency.

Structure of categories of use

Of the total area of 18,850 hectares micro-region analyzed, farmland occupies most of respectively 75.56% (figure 1).

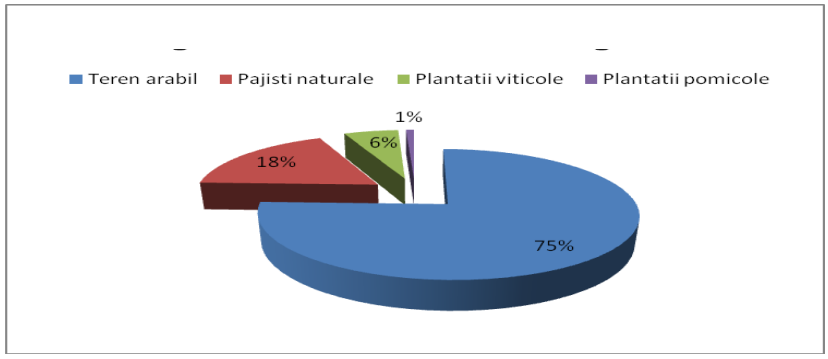

Fig. 1. Structure of categories of use

Other categories of land use have reduced except natural grassland, with 17.92%.

Crop structure

In micro-zone studied, the main grain crops are cereals (table 2).

Table 2

Crop structure

Specification	Total arable in the studied zone	%	Arable land of the locality		
			Vârlezi	Jorăşti	Tg.Bujor
TOTAL ARABLE	14.243	100,00	6.164	3.631	4.448
Cereal grains	9.072	63,68	3.791	2.270	3.010
Maize	4.939	34,68	1.536	1.495	1.908
Wheat	3.592	25,21	1.769	775	1.047
Barley	320	2,25	265	-	55
Two-row barley	219	1,48	212	-	-
Oats	9	0,06	9	-	-
Other cultures	4.199	29,49	2.048	939	1.212
Uncultivated land	973	6,83	325	422	226

Grain cereals occupying 63.68% of the surface of the wheat consumed 25.21% and 34.68% maize. Other cereal crops occupy very small areas, barley 2.25% 1.48% two-row barley and oat crop at the rate of 0.06%.

If we analyze the structure and cultures share certain types of grain farms, we find large area occupied by maize in individual farms, having intended to meet family needs, and agricultural companies are more oriented to cereal grains because of the integrated system of technology and their possibilities for integrated - table 3 (Ciurea et al., 2005).

Table 3

Cereal crop structure by type of farm and average production in 2009

Specification	Total	Agricultural individual households		Agricultural companies	
		S. ha	Kg/ha	S. ha	Kg/ha
TOTAL ARABLE	14.243	8.425		5.818	
Cereal grains	9.071	5.616		3.455	
Maize		4.289	3.280	650	3.770
Wheat		1.115	2.746	2.476	3.615
Barley		160	1.500	160	3.047
Two-row barley		52	2.500	160	3.340
Oats		-	-	9	1.555
Other cultures	4.199	1.836		2.363	
Uncultivated land	973	973		-	

Table of contents that were previously obtained average cereal production levels higher than commercial agricultural societies individual farms, which means that appropriate technology is practiced with all technological links in terms of limiting climatic factors.

Integrated Activities

The main purpose of the company S.C. Agrojor SRL of Jorăşti is cereal cultivation, the company was founded in 2004 by the European Agricultural Fund for Rural Development. Except for agriculture in 2004 when the company recorded losses in subsequent years and until now there has been a profit and the economic rate of return last year was 21%. The company is privately-owned stock and is engaged in vegetable production and marketing of agricultural products, mainly cereal grain products. The company owns an area of approximately 300 ha of agricultural land of which 10 hectares of natural grassland and 687 ha of arable land on lease, totalling 987 hectares.

The plot is merged, plots having area between 30 and 100 ha, thus creating the possibility of applying modern technologies.

The company has 9 employees, of which six men working on equipment and repair shop. Employees are the employment contract of indefinite duration, with activities throughout the year. Wages are paid to date and material basis for taking the production cycle 2009-2010 is provided. Thus in autumn 2009 were 457 hectares sown with wheat, 365 ha rape, and in spring 142 ha spring two-row barley.

Consumer culture has developed a wheat production of 3500 kg / ha and barley consumption from 3620 kg / ha.

This company has tractors, combines and farm equipment, reliable performance, high productivity with low specific consumption, which enables

works in optimal time, quality and production without lost motherland and loyalty.

This year, the unit has experienced difficulty turning cereal production for consumption due to the imbalance of demand versus supply in the market low.

Hence it is clear orientation livestock, which offers a higher recovery of all resources.

In conclusion, cereal crop production may not be profitable without the application of modern technologies on compact surfaces with partial recovery of production in the livestock sector.

CONCLUSIONS

1. Organizational structures are poorly developed, predominantly small holdings (1-4 ha.), with low mechanization and low economic efficiency.

2. Turning grain production is greater, through integrated activities (livestock and grain processing).

3. Ensuring optimum size of farms (lease and consolidation), representing a growth of inland area.

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COSTS OF PRODUCTS AND SERVICES BEE

COSTURILE PRODUSELOR ŞI SERVICIILOR APICOLE

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Abstract. *Researches conducted were intended to improve the methodology for quantification of specific economic efforts bee products and services. The need for this approach was drawn from socio-economic research group that showed the shortcomings of current diagnostic tools used as basis for decision making. In this respect, have improved processes determining production costs by expanding and adapting them to bee economy requirements.*
Key words: costs, services bee, bee products, methods of quantification

Rezumat. *Cercetările realizate au avut scopul de a îmbunătăţi metodologia de cuantificare a eforturilor economice specifice produselor şi serviciilor apicole. Necesitatea acestui demers a fost desprinsă din cercetările socio-economice de teren care au evidenţiat lipsurile instrumentelor actuale de diagnostic utilizate ca fundament în luarea deciziilor. În acest sens, au fost îmbunătăţite procedeele de determinarea a costurilor de producţie prin completarea şi adaptarea acestora la cerinţele economiei apicole.*
Cuvinte cheie: costuri, servicii apicole, produsele apicole, procedee de cuantificare

INTRODUCTION

The need for this research was identified after the initiation of the approach to develop technical guidelines for good practice in economic research project partnerships, PN II, "Development of viable models of farm bee European economic context."

A specific objective is to identify its optimal production structure based on the comparative economic efficiency products involves determining unit costs.

Known methods for determining the cost are not adapted to the technical and economic analysis in beekeeping because:

- do not show the influence of secondary income caused by construction of a particular product or service such as hives on the cost of direct payments by the purchasers authorized marketing of honey;
- do not allow proper allocation of costs to each product or service that is exclusively accomplished by the structure of income distribution.

MATERIAL AND METHOD

The first phase of the study was to identify methods for determining the cost of production which can be used in beekeeping economy and quality analysis results. (Barbu, 2000; Nica, 1996)

The second phase of the study was to adapt the known methods and their application in two bee farms.

Research methods used were the case study and economic and technical diagnosis.

RESULTS AND DISCUSSIONS

Production costs are all factors in terms of value and consumption by a company to obtain goods and services. Production costs of a firm will depend on the inputs they use. The multiple uses, the greater the cost. More specifically, the relationship depends on two elements:

• total factor productivity. The more than their physical productivity, the lower the required amount of these factors to produce a given level of output and thus lower the cost of that production. In other words, there is a direct link between output and marginal costs of production;

• price factors. The higher their price, the greater will be the cost of production.

To determine the profitability of beekeeping exploiters, regardless of their size, it is necessary to know the use of financial and human resources necessary to conduct business therein (Ştefan, 2006).

Production cost, cost per product or unit cost reflects the cost of production per unit of product incumbent (how to spend to get 1kg of honey).

Meet the situations for which the cost of products is higher than their selling price, but overall profit record bee farm. This is because some products or services have a cost higher than their price causing losses (Pânzaru, 2005).

So, the usefulness of determining the cost of production is given by comparing the sale price to determine which products are unprofitable and that eventually bring loss. In this situation you will give as unprofitable products and services and will actively develop

It is also necessary to know the cost of production to make decisions about how production and marketing services. For example, in some cases the cost of honey production may be higher than the selling price of honey in procurement (wholesale) but lower than the price of honey by selling directly to final consumer. Direct selling involves some additional costs to the cost of production so will add a cost of distribution. If the sum of two rates is still lower than direct sale prices when beekeepers will opt for this method of marketing. (2)

Determining the cost of production for bee products and services have some difficulties. For this reason have been given three situations in which different calculation methods are used:

1. In the event that made bee farm and selling a single product (ex honey) when determining the cost of production (Cp) is reduced to simple division method is to determine the ratio of total production costs (Cht) and total output (Qt).

$$Cp = \frac{Cht}{Qt} \quad (5)$$

2. Where the bee farm mainly produces and sells a product (ex. honey) and one or more products (ex. wax, pollen, clusters), it is necessary to use the remaining value method involves reducing the production costs of secondary production value (Vps)

$$Cp = \frac{Cht - Vps}{Qp} \quad (5)$$

For this method requires a clarification. In addition to income from secondary production, can also identify other revenue arising directly productive activities such as: subsidies, partial compensation for the affected production, etc.. These revenues will reduce the cost of production.

In this case it is necessary to supplement this method by replacing the formula for the value of secondary production (VPS) income arising from the production side (Vs). When calculating the relationship will take the form:

$$Cp = \frac{Cht - Vs}{Qp}$$

Holding that the subject of the first marketing case study honey and wax produced mainly as a byproduct. It sells wholesale honey production and get a subsidy of 10 Euro / bee family. Consequently, the main product cost will be reduced by the amount of secondary production and the subsidy.

Table 1

Determining the cost of production of honey

Specification	UM	V1	V2
Total expenditure	lei/fam	162,0	162,0
Home Production (honey)	kg/fam	28,0	28,0
Secondary production (wax)	kg/fam	0,3	0,3
Secondary production price	lei/kg	15,0	15,0
Direct Payments	lei/fam	0,0	10,0
Production cost	lei/kg	5,6	5,3

By using the appropriate method of hone cost is reduced to 5.6 lei / kg to 5.3 lei / kg as shown in table 1. So, the beekeeper will have a different starting point in marketing decision making in production.

Although it can be easily used, these two methods do not adapt well enough to analyze the costs of beekeeping as in most apiaries is performed several key products or more types of product.

3. It is therefore appropriate to use coefficients method assumes the existence of several key products and possibly secondary.

For its application is necessary to know the expenditure share for each main product, the total expenditure. The criterion for the distribution of expenditure that can be economically produced but may also consider other characteristics such as energy content, content of active substances, the necessary manpower has been consumed, etc..

Product share in total primary production (Ki) is determined by sales price and output produced for each product. It should be mentioned that these two indicators are characterized by high variability, which is why the unit cost will be calculated over this feature.

$$Ki = \frac{Qpi \times Pvi}{\sum_{i=1}^{n}(Qpi \times Pvi)} \times 100 \qquad (5)$$

where:

QPI - primary production that calculates the cost of production,

PVI - the selling price of the product for which calculates the cost of production;

$\sum_{i=1}^{n}(Qpi \times Pvi)$ - amount of income from marketing major products.

After determining the coefficient which expresses the share income from the sale of each product in total production is going to determine the actual cost of production for each product (Cpi).

$$Cp = \frac{(Cht - Vps) \times Ki}{Qi}$$

In this way one can determine the unit cost for any product or service beekeeping.

A major shortcoming of this method is that if we are to determine the economic efficiency of each product to determine the structure of production, these indicators will have the same value as can be seen from Table 2 variant V1.

This phenomenon occurs because this method is not carried out any differentiation by type of product specific costs although often recorded

separate charges for each product (Chsi). It is therefore indicated to improve this method by determining the cost of production based on the cost of completed joint expenses determined by the specific costs.

In this case, the relationship of the calculation will have the following form:

$$Cp = \frac{(Cht - Vs - \sum_{i=1}^{n} Chsi) \times Ki}{Qi} + \frac{Chsi}{Qi}$$

Variant V2 in table 2 uses this method of determining the cost of production for each main product. In this case, both production costs and different rates of return.

Table 2

Determining the cost of production for two main products - honey and pollen

Specification	UM	V1	V2
Total expenditure	lei/fam	184,0	76,0
Specific expenses honey	lei/fam	0,0	82,0
Pollen specific expenditure	lei/fam	0,0	26,0
Honey production	kg/fam	26,0	26,0
Pollen production	kg/fam	0,8	0,8
Wax production (secondary)	kg/fam	0,3	0,3
The price of honey	lei/kg	7,0	7,0
Price pollen	lei/kg	250,0	250,0
Secondary production price	lei/kg	15,0	15,0
Direct payments	lei/fam	10,0	10,0
Honey production cost	lei/kg	3,1	4,3
Pollen cost production	lei/kg	110,9	72,7
Honey unit profit	lei/kg	3,9	2,7
Pollen unit profit	lei/kg	139,1	177,3
Honey profit rate	%	125,4	63,5
Pollen profit rate	%	125,4	243,6

Consequently, the driver holding that the subject of the second case study will be able to decide to increase production of both products because both are profitable. If capital resources are limited or labor, will decide to increase production volume of pollen because it causes a higher return.

CONCLUSIONS

1. Adaptation is the remaining value method of achieving recognition of other income as the main product components to reduce production cost.

2. Determining the cost of production for several key products is done by dividing total expenditure in each product specific costs and overheads.

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ADAPTATION OF TECHNICAL-ECONOMIC ANALYSIS BASED ON THE OBJECTIVES BEEKEEPERS APIARIES

ADAPTAREA ANALIZEI TEHNICO-ECONOMICE A EXPLOATAŢIEI APICOLE PE BAZA OBIECTIVELOR APICULTORILOR

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Abstract. *Socio-economic research group emphasized the need to adapt the technical and economic analysis on the reasons for which manages beekeepers apiaries. It identifies four types of beekeepers as their objectives: beekeepers owners, entrepreneur's beekeepers, beekeepers - and beekeepers viable investors. It was therefore established their socio-economic profile as players in the national economy and identified ways to increase economic performance target.*
Key words: bee differentiated economy, economic objectives

Rezumat. *Cercetările socio-economice de teren au evidenţiat necesitatea adaptării analizei tehnico-economice la motivaţiile pentru care apicultorii administrează exploataţiile apicole. Au fost identificate patru tipuri de apicultori după obiectivele acestora: apicultori proprietari, apicultori întreprinzători, apicultori – investitori şi apicultori viabili. În consecinţă, s-a întocmit profilul socio-economic al acestora ca actori ai economiei naţionale şi au fost identificate căile de creştere a rezultatelor economice vizate*.
Cuvinte cheie: economie apicolă diferenţiată, obiective economice

INTRODUCTION

The theme emphasized in his works from diagnosis to initiation of the apiaries at which time it was noticed that a standard set of methods and tools is not applicable to all holdings. It follows that a differential diagnosis analysis characteristics in beekeepers. Dominant feature is the main objective of economic activity.

MATERIAL AND METHOD

The research method used in this work is the socio-economic interviewers on a sample basis (Caia, 2001).

The first phase was the sampling of its kind which is to divide the area in sectors covered by a characteristic differentiated. Romania was divided into six specific areas in terms of bee called bio-beekeeping bounded by the volume of resource bees. They are differentiated by type of terrain, altitude and longitude - essential factors for the volume and distribution of resource bees. After the share volume of the resource group in the honey bee national resource has been determined the number of counties that were part of the sample group. Thus, representing 21 counties have been identified.

Every county was required by the hives sampling herd size groups of bee colonies as follows: 0-50 families; 50-100 families, over 100 families of bees.

The quota sampling was done according to procedure involving two stages, first to build a reduced model consisting of the population covered in the survey and the second being to establish rates of subjects for each operator (Chelcea, 2001, Mărginean, 2000). Model is defined by size and weight of their hives within each group resulting in a sample size of 126 beehive.

The second phase consisted in carrying out the investigation which included interviewing technique, type of interview time, interview guide and the means by which it is made.

The interview guide was pre-tested in a pre-investigation by a small number of subjects aimed at discovering any discrepancies, questions, supplementing and adapting to the way in which it was received by the people interviewed and the extent to which gave the expected results.

The moment of realization of the survey was chosen because in this spring season so we know the final results in terms of production and sold in the previous calendar year and incurred losses of hives during the winter. At the same time period was necessary to avoid the beekeepers are out in pastoral, so April was considered optimal to achieve during the interview.

The materials used were the specific socio-economic research field: interview sheets, tables of population studied, maps, etc.

RESULTS AND DISCUSSIONS

This approach to bring a new element that is adapting the technical and economic analysis purposes depending on the particular need for beekeepers.

Basically it provides a technical analysis of economic adjustment to the principal objective of the beekeeper:

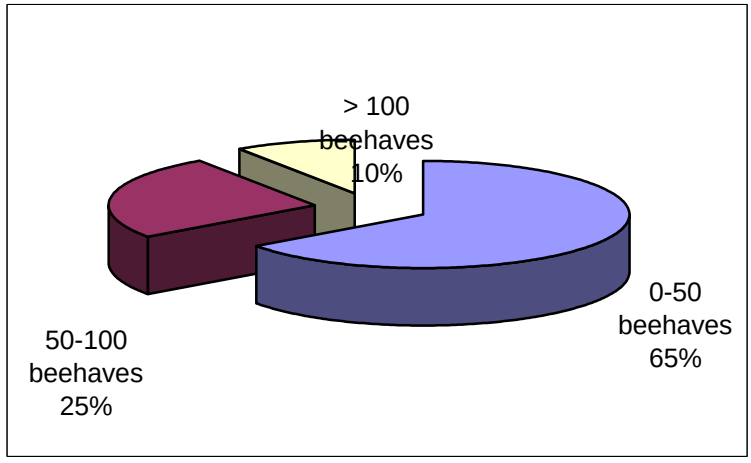

Fig. 1. Beekeepers owners by size structure

1. Some beekeepers have the resources they use in their own bee farm and labor force, land for the hearth of the apiary, capital, etc. They may be interested only in the amount of net income is determined though if gross profit it may be of reduced or loss. Simply, these beekeepers are not willing to

sell but to use available resources in their own activity and to ensure the welfare household in this way.

Even if he knows that such losses would acquire the conditions in which all factors of production this beekeeper continue to work in the same way because it wants to use their capital for other purposes and does not want to commit to selling its force work. Also, if you want to increase the volume of activity will not have sufficient own resources and losses. In this case you will have to restructure its business.

We call this type of beekeepers - owner's beekeepers. This type of beekeepers is represented best by those who have less than 50 families hive of bees as shown in Fig. 1.

2. Some beekeepers wishing to obtain a larger amount of profit even if the measures taken will lead to a reduction in building upon the resources.

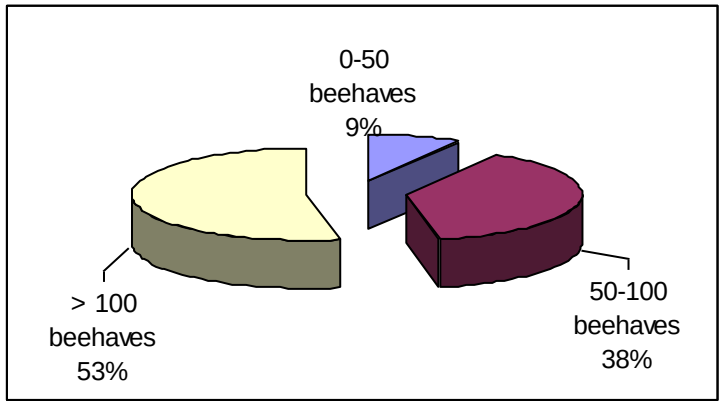

Fig. 2. Beekeepers entrepreneurs by size structure

For various reasons have often social than economic needs such as family income, the beekeeper will decide to obtain a higher return. It will not be concerned that the economic efficiency of farm income drops as long as the expected gain. The major risk is the de-capitalization of these beekeepers holding that rate of return is lower than inflation.

We call this type of beekeepers - entrepreneur's beekeepers.

3. On the other hand, meet people and legal entities, investors wishing to invest in the production of beekeeping. They are less interested in volume and net income more than the amount of money that produces each monetary unit consumed, the level of resources fruition.

These beekeepers have decided to take over or establish a bee farm because they considered attractive field for business or beekeeping had specific resources such as land area in an area with resources and relatively constant superior bees.

We call this type of beekeepers - investor's beekeepers and the largest share holding is owned by more than 100 families of bees, according to fig. 3.

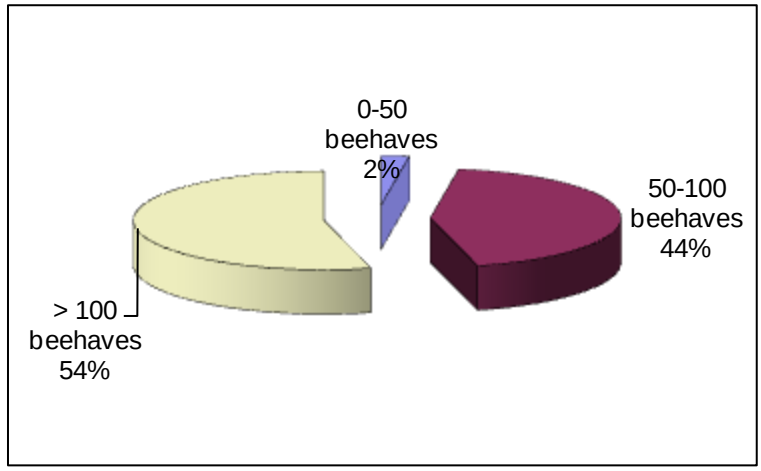

Fig. 3. Beekeepers investors by size structure

4. A final category of beekeepers are aimed at one time have bee farms viable despite the measures necessary to achieve this objective may result in reduced levels of resources fruition.

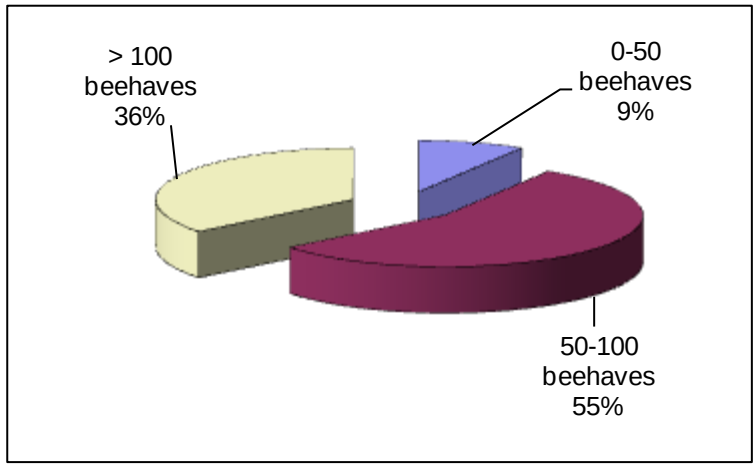

Fig. 4. Structura apicultorilor viabili după dimensiune

Situation reveals that this goal is related to the maturity level of the holding bee, beekeeper expectations in terms of welfare or the structure of business activities. Share their most important holdings is held with a number between 50 and 100 families of bees, according to fig. 4.

We call this type of beekeepers - viable beekeepers.

Beekeepers objectives may differ from one period to another: the establishment and the first part of farm development, beekeepers may be concerned about the increase in net income. Once the business grows, some beekeepers will want to use their resources more effectively and thus attracted

will seek to increase the gross profit rate and capital fruition. If these objectives are met and they are concerned about the increased safety activity and will focus on increasing farm viability. Analysis of data from field research led to the identification of features by type by beekeepers for their business.

Beekeepers behavior that is different actors as they perform work for influencing market bee products and beekeeping in general. For this reason it proves useful to their peculiarities:

Peculiarities owner's beekeepers are:

• main purpose of their disposable income is increasing;

• bee farm using its own resources in their possession;

• beekeeping in most cases is a complementary activity,

• have a concern for economic performance noticeably lower in comparison with other types of beekeepers;

• exercise less pressure on bee products market.

This may be an early stage in the development of the bee farm economic entity but in most cases remains at this level because it is represented by part-time bee busy bee: farmers, workers in other industries, employees, retirees, etc..

Peculiarities entrepreneur's beekeepers are:

• main purpose is to increase the volume of gross profit;

• use their own resources for little attracted resources (labor employed, loans, etc.)

• are concerned about the economic results achieved;

• conduct a primary economic analysis;

• seek to impose bee products market

• are concerned about the growth and development of bee farm which he operates;

• increased interest in modernization, development and scientific research;

Peculiarities investor's beekeepers are:

• their primary purpose is to raise the fruition of resources consumed;

• have committed capital resources and skilled labor

• are concerned with economic efficiency;

• a bee products market

• are concerned about the growth and development managed bee farm, bee

• integrate production with bee products chain - processing, packaging, marketing,

• leave this field if other branches are more attractive in terms of economic performance.

Peculiarities viable beekeepers are:

• the main purpose is to increase the safety level of the farm beekeeping

• choose strategies for maintaining activity levels;

• actors are real impact on the market and industry,
• reduced risk takers;
• is at an expected level of development.

CONCLUSIONS

1. After dominating the economic objective we have identified four types of beekeepers: owner's beekeepers, entrepreneur's beekeepers, beekeepers and beekeepers viable investors.

2. Each type of beekeepers has specific features and exercises a different impact on industry and market bee products.

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ASPECTS REGARDING THE FACTORS OF PRODUCTION AND THEIR USE WITHIN AN EXPLOITATION OF THE CENTRAL MOLDAVIAN PLATEAU

ASPECTE PRIVIND FACTORII DE PRODUCŢIE ŞI UTILIZAREA LOR ÎN CADRUL UNEI EXPLOATAŢII DIN PODIŞUL CENTRAL MOLDOVENESC

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Abstract. *In the speciality literature the production factors are divided into inputs: land, labor, capital and management. Starting from the idea that inputs are divided into four groups (land, labor, capital and management), we can say that the rational use of resources each group has so far only in combination with the other three, taking into account the modification of production structure and accomplishment of scientific and technical achievements. To analyze the factors of production and their use in agriculture we revealed key aspects of economic development - financial agricultural society with legal personality established according to Law no. 36/1991 on the Central Moldavian Plateau. We were analyzed the indicators of land use in the production, use of labor, of machinery and agricultural tractors and proposed a series of measures to make efficient the use of farm inputs which was part of this case study.*

Key words: land, labor, capital, management, exploitation, Central Moldavian Plateau

Rezumat. *În literatura de specialitate factorii de producţie sunt divizaţi în: pământul, munca, capitalul şi managementul. Plecând de la ideea, că factorii de producţie se împart în 4 grupe (pământ, munca, capitalul şi managementul), putem afirma că folosirea raţională a fiecărei grupe de resurse are loc numai în măsura combinării cu celelalte trei, ţinând cont de modificarea structurii producţiei şi realizările progresului tehnico-ştiinţific. Pentru a putea analiza factorii de producţie şi utilizarea lor în agricultură s-au evidenţiat principalele aspecte ale evoluţiei economico – financiare ale unei societăţi agricole cu personalitate juridică înfiinţată conform Legii nr. 36/1991 în Podişul Central Moldovenesc. Au fost analizaţi indicatorii utilizării pământului în procesul de producţie, ai utilizării forţei de muncă, ai maşinilor şi tractoarelor agricole, şi au fost propuse o serie de măsuri pentru eficentizarea utilizării factorilor de producţie în exploataţia agricolă care a facut parte din prezentul studiu de caz.*

Cuvinte cheie: pământ, munca, capital, management, exploataţie, Podişul Central Moldovenesc

INTRODUCTION

In the speciality literature the production factors are divided into inputs: land, labor, capital and management.

Earth is naturally considered as a factor. He is not the result of human activity. Also refers to natural factors and natural resources. Entrepreneurs agricultural land is the main means of production which has a number of specific features, namely: fertility.

Work as a production factor is represented by the physical and intellectual activity, oriented towards obtaining goods and services. This factor is characterized by the number of employees whose employment term is identical or sometimes is given by the total number of hours worked.

Capital as production factor is that all economic assets acquired, heterogeneous and reproducible use in production, distribution and marketing of goods and services.

According to specialists the fourth production factor is ***management*** or entrepreneurship. Was industrialization requires a different classification of production factors, still showing two factors: **informative and ecologic** called neofactors.

MATERIAL AND METHOD

For the presentation of the results obtained by the agricultural company "AGROSEED SA SCÂNTEIA was used economic statistics of records - financial unit and for their processing and interpretation there were used diagnostic analysis method, investigation and correlation.

RESULTS AND DISCUSSIONS

Starting from the idea that inputs are divided into four groups (land, labor, capital and management), we can say that the rational use of resources each group has so far only in combination with the other three, taking into account the change of the production structure and the achievements of the scientific and technical progress.

Management decisions are identified by the choices in resource allocation, allocation size, and investment, to ensure efficient use and sustainability of competitive margin (Brezuleanu S., 2009).

Links between the four categories of resources are interdependent. For example: the increase the productive capacity of the earth depends on the rational use of means of production, work and management decisions.

Agricultural holdings use factors of various kinds, in various amounts and effects may differ greatly between them, depending on a number of conditions, such as the allocation proportions that combine timing and application methods, quality and content in different active ingredients, etc. (Ciurea I,&collab, 2005)

The latter (expenditure control) seems to be more to reach the producer (entrepreneur). Allocation decisions and mixing conditions for applying the factors related to how that operates exclusively at managing the farm. It is true, however, that a certain action which diminishes the effects produced by a manufacturer active in the use of rational factors, can have their prices, having

him here, the less opportunities for maneuver (the identification of cheaper factors, price negotiation etc.).

To analyze the factors of production and their use in agriculture we will continue to highlight the main aspects of economic development - financial agricultural society with legal personality established according to Law no. 36/1991 on the Central Moldavian Plateau. **(**Brezuleanu, S. &colab 2008)

The agricultural society "AGROSEED SA SCÂNTEIA is an agricultural society with legal personality which was formed on February 14, 1994 under Law no. 36/1991, being a private agricultural company with variable capital and number of associates.

The company is active in the agricultural crop production, on an area of 399ha in 2007. 488.5 ha in 2008 and 540 ha in 2009, with a total of 32 employees with employment contract. In the diagnosis economic – financial analysis of the agricultural company first level, structure and evolution of production costs.

Calculation on the total activity indicators and the types of activities show that the expenses remained relatively constant compared with 2009, when revenues and expenditures rose steeply.

Table 1

General Situation Analysis of expenditure on AGROSEED SA SCÂNTEIA

Nr. crt.	Specification	2007		2008		2009	
		Lei	%	L ei	% in comparison with 2007	Lei	% in comparison with 2008
1.	Total expenditure of which:	46399	100.0	47611	102.6	71267	153.6
2.	Operating expenses	4.384.9	100.0	45402	103.5	68425	156.1
3.	Financial expenses	2549	100.0	2209	86.6	284.2	111.5
4.	Exceptional expenditure	0	-	0	-	0	-
5.	Total revenue of which:	50333	100.0	49755	98.8	8.435.7	167.6
6.	Operating income	48928	100.0	49405	100.1	8.243.3	168.4
7.	Financial income	1405	100.0	3502	24.9	192.3	136.9
8.	Exceptional income	0	-	0	-	0	-

Increase in total expenditure in 2009 showing the impact of inflation on prices first input. It is apparent that in the three years studied, the agricultural society has not made any expenditure or revenue windfalls.

The analysis of the general operating expenses was achieved through centralized data in table 2.

As shown in table 2, operating expenses increased each year as follows: in 2008 to 3.5% and 56% in 2009 compared to 2007.

Due to the specific of the agriculture, the material costs in 2009 have accounted for approximately 30% of total operating expenses, and the largest share their hold consumables (table 3).

Table 2

Dynamics of the general operating expenses

Nr. crt.	Specification	2007		2008		2009	
		lei	%	lei	% in comparison with 2007	lei	% in comparison with 2008
1.	Operating expenses Of which:	43849	100	45402	103.5	68425	156.0
2.	Current expenditure	13515	100	17956	132.8	23092	170.8
3.	Works. services	7029	100	3577	50.8	4353	61.9
4.	Taxes	1280	100	1306	101.9	1812	141.5
5.	Staff costs	4919	100	6896	140.2	9309	189.2
6.	Other operating expenses	15615	100	13380	85.7	2669	17.1
7.	Amortization expenses	762	100	966	126.8	966	126.7

Table 3

Material expenditure in the agricultural society "AGROSEED" SA SCÂNTEIA

Nr. crt.	Specification	2007		2008		2009	
		lei	%	lei	% in comparison with 2007	lei	% in comparison with 2008
1.	Current expenditure of which:	13515	100,0	17956	132,8	23092	170,8
2.	Materials	0	-	0	-	0	-
3.	Consumables	12919	100,0	17109	132,4	11287	87,3
4.	Energy, Water	101	100,0	128	126,7	101	100,1
5.	Other material expenses	494	100,0	719	145,4	603	122,1

We could notice the evolution of the fluctuating costs of consumables, which rose by around 32% in 2008, then declined to approximately 87% compared to 2007.

A proper appreciation of the development materials costs, and given their importance in operating expenses may be made only in economic terms - financial (Brezuleanu S., 2008).

Analyzing the evolution of total company revenue and the types of agricultural activities for each year analyzed and the dynamic is apparent that they exceed operating expenses in all three years, which lead to a positive operating result (table 4).

Table 4

Economic results of the agricultural society "AGROSEED" SA SCÂNTEIA

Nr. Crt.	Specification	2007		2008		2009	
		lei	%	lei	% in comparison with 2007	lei	% in comparison with 2008
1.	Operating income	48928	100	49405	100,9	82433	168,4
2.	Operating expenses	43849	100	45402	124,0	68425	156,0
3.	Profit + / loss -	+5078	100	+4003	+78,8	+14007	+275,8
4.	Financial income	1405	100	350	24,9	1923	136,9
5.	Financial expenses	2549	100	2209	86,6	2842	111,5
6.	Profit + /loss – financial	-1144	100	-1858	162,4	-918	80,3
7.	Current result of the zear	3934	100	2144	54,5	13089	332,7
8.	Total Income	50333	100	49755	98,8	84357	167,6
9.	Total expenditure	46399	100	47611	102,6	71267	153,6
10.	Net profit for the year	2950	100	1608	54,5	9816	332,6

It is noted that the work of operating profit in 2009 increased approximately 2.8 times over 2008.

Financial income values are lower than the financial expenses, which leads to losses in financial results and the loss rate decreased in 2009 compared to 2007 and from 2008.

Work. The company operates with a small number of permanent employees and job card, it is based on certain periods of the agricultural campaign, such as castrating maize on a large variety, but large enough for day laborers, the ending service contracts for periods well defined. Indicators used in the production of human factor:

- Value of labor productivity [W_{vm}](Fig.1):

W_{vm} = Production value / number of workers [lei/persoană]:

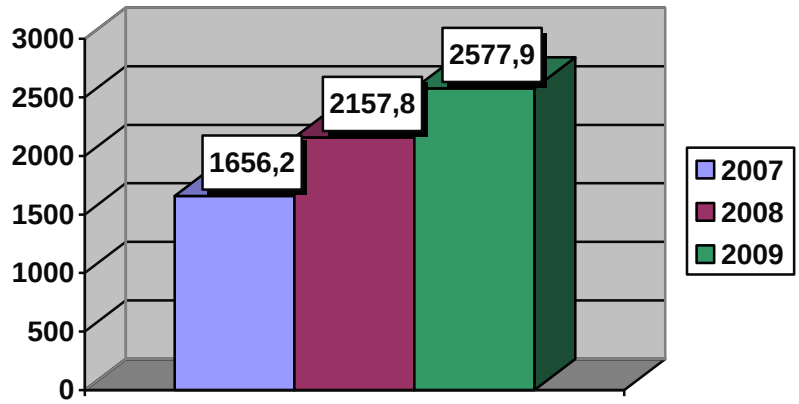

Fig.1. Value productivity of labour (Wvm)

In order to analyze the efficiency of capital use, we use data from the balance sheet of "AGROSEED" SA SCÂNTEIA, for the period 2007-2009.

- Financial rate of return on equity [$R_{f_{cp}}$](fig.3):

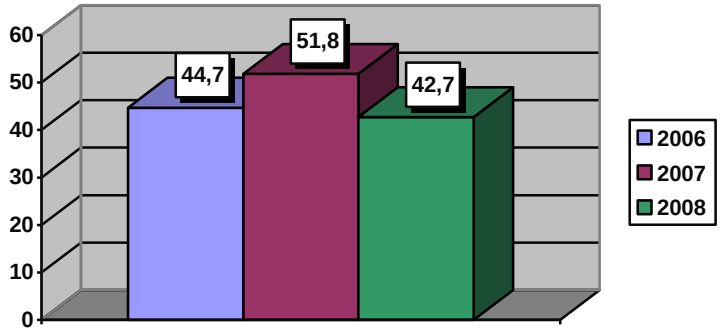

Fig.2. Rate of financial return on equity

CONCLUSIONS

1. Input use efficiency analysis allows highlighting the proposals on the impact factors of production to achieve economic and financial performance in the "AGROSEED" S. A. SCÂNTEIA.

2. Increased profitability of agricultural land through a series of measures: a combination of better reasoning inputs, better choice of suitable varieties of seed used weather forecasts expected the respective years, allocate land and turn their crops more efficiently, increasing yields of agricultural machinery, through fleet renewal by accessing funds europe, and by raising the qualifications of personnel involved in the work.

3. Objectives can be summarized in reaching a prompt response capacity to the market, but also continuous improvement of working conditions and safety of people and facilities, all of the protections imposed on a background of increasingly rigorous environment.-

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ROMANIA – REGIONAL CULTURAL PROFILE

ROMÂNIA – PROFIL CULTURAL REGIONAL

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Abstract. *Cultural specificity operation as a source of competitive advantage for firms whose managers are interested in this, is gaining higher and higher importance. Research on elements of cultural specificity and cultural differences extends, and the managers accept the fact that the influence of culture on attitudes, mentalities, values, positions with the individual action is important. In this article we present the results of such research, which aimed to examine regional cultural differences, on equivalent samples, with respondents from Oltenia, Ardeal and Moldavia, drawing in such subcultures a specific profile.*

Key words: culture**,** regional differences, management, competitive advantage

Rezumat. *Exploatarea specificităţii culturale, ca sursă de avantaj concurenţial pentru firmele a căror manageri sunt interesaţi de acest lucru, capătă o importanţă din ce în ce mai mare. Cercetarea elementelor de specificitate culturală şi a diferenţelor culturale ia amploare, iar managerii acceptă faptul că influenţa culturii asupra atitudinilor, mentalităţilor, valorilor, poziţiilor faţă de acţiune ale individului este importantă. În acest articol prezentăm rezultatele unei astfel de cercetări, care a avut drept scop analiza diferenţelor culturale regionale, pe eşantioane echivalente, cu respondenţi din Oltenia, Ardeal şi Moldavia, conturând la nivelul acestor subculturi un profil specific.*

Cuvinte cheie: cultură, diferenţe regionale, management, avantaj concurenţial

INTRODUCTION

Because of internationalization and globalization, many and many companies are concerned about maintaining and extending on new markets and maintaining or approaching specialists able to bring positive results. As a consequence of this reality, cultural and intercultural research become more and more important and they provide exploitable/valorising recommendations due to identification and analysis of cultural specificity elements and/or national/regional cultural differences.

In other words, individuals' "cultural inheritance" becomes a source of potential advantage. In this regard, the present article presents the Romanian regional cultural differences, emphasized in a research that represented the basis of the doctorate thesis "*Valorisation of Cultural Differences in the Romanian Companies Management*".

MATERIAL AND METHOD

The research methodology was a complex one, based on the recommendations made by specialists on the intercultural research field (Hofstede, 1996; Schwartz, 2003; Zaiţ, Spalanzani, 2006; Nicolescu, 2006; Moscovici, Buschini, 2007; Dupriez, Simons, 2000; Vanderlinden, 2007). Their major concern was to build up a methodological design that allows adjustments to the Romanian cultural specificity: using the pragmatic-interdisciplinary model, the holistic and synchronic dominant, the mixed approach (the ethic-emic one), the quantitative-qualitative approach, the inter-conditional among positive, interpretative and constructivist approaches, the inductive-deductive argument and triangulation as fundamental issue.

One of the stages, whose results we present in this article, consisted in the based-on-questionnaire inquiry; the inquiry was realized using pair samples, respecting the equivalence conditions. The inquiry included 562 respondents, students from the faculties from Oltenia, Ardeal and Moldavia, in the period of 4th – 16th of May 2009. 479 questionnaires were applied, and subsequently to ensuring the functional equivalence, a number of 398 questionnaires were validated (146 from Oltenia, 78 from Ardeal and 174 din Moldavia). The variables taken into consideration for ensuring the functional equivalence were: faculty, specializations, study year, age, sex, environment (rural/urban), number of years of education and employment status.

The considered regional cultural specificity dimensions (cultural differentiation criteria) were the following: *power distance*, *individualism-collectivism*, *gregarism-solidarity*, *gender equality, masculine values - feminine values*, *uncertainty avoidance, time orientation, constancy – flexibility*, *hedonism-constraint, action-sedentariness*. Some of these dimensions are superpose or interfere of those proposed by specialists in analysis of national cultural differences (Hofstede ş.a., 2008; House ş.a., 2004; Schwartz, 2003; Gelfand), but they were adapted to the national cultural specific. The author proposed two dimensions consequently to an inventory of the Romanian values, inventory that was elaborated upon the analysis of the papers/studies from the pre- and inter-war period, but also of those elaborated after 1989 (Drăghicescu, Ralea, Rădulescu-Motru, Blaga, Cioran, Ionescu, Toma, Catană&Catană, Voicu&Voicu, Şerbănescu, Luca etc.).

RESULTS AND DISCUSSIONS

Analysing the questionnaire's answers that referred to the integrable values in the above-mentioned cultural dimensions, the following regional cultural differences were resulted (table 1):

- the highest power distance is taken by Moldavia, followed by Oltenia at a distance of 1.9 points; Ardeal County is 3.55 points away from Moldavia and 2.57 points away from Oltenia;
- for individualism-collectivism the maximum medium difference appears between Moldavia and Ardeal (4.13 points), and the minimum difference between Moldavia and Oltenia is 2.82 points; between Oltenia and Ardeal the difference is 3.29 points; a medium individualism level is resulted slightly higher in Moldavia and Oltenia, comparative with Ardeal;

- for gregarism–solidarity dimension, Oltenia registers the highest score in favour of gregarism, having an appreciable distance from Ardeal (6.63 points) and 2.24 points more than Moldova; there is a 4.66 points difference between Moldova (placed on the second position) and Ardeal;
- for gender equity we notice high values for all regions; however, the first position is taken by Ardeal, situated at 0.6 points distance from Moldavia and 5.7 points difference from Oltenia; the distance from Moldavia and Oltenia is 5.1 points;
- regarding masculine values - feminine values dimension we noticed that the Romanian society mixes the feminine values (benevolence, understanding need, social isolation avoidance, intuition) with the masculine ones (need of success, of welfare, argument oriented, acceptance of competition); despite this, some slight emphasises of the masculine values appear for Moldavia and Ardeal, while Oltenia accentuates the feminine ones; 2.52 points is the distance between Moldavia and Ardeal, 4.22 points between Moldavia to Oltenia, and 3.67 points between Ardeal to Oltenia;
- uncertainty avoidance is increased in all regions, especially in Oltenia and Moldavia; the difference between Oltenia and Moldavia is 2.57 points, between Oltenia and Ardeal there are 4.11 points, and between Moldavia and Ardeal there are 3.78 points; to be remarked the situation in Ardeal where we did not obtained any integrated value of this dimension with maximum score.
- the score for time orientation dimension indicates that Ardeal obtained higher marks for the values related to long time orientation, in comparison with Moldavia and Oltenia; the difference between Ardeal and Moldavia is 3.62 points, there are 3.77 points between Ardeal and Oltenia, and a distance of 1.34 points between Moldavia and Oltenia; significant differences regarding the values of protestant types (economic spirit and perseverance) appear between Ardeal and the other two regions;
- for the constancy-flexibility dimension we remark an emphasis of values that indicates flexibility for all regions, but we also have differences between them: Moldavia has the highest score, at a distance of 1.24 points from Oltenia and 3.71 points from Ardeal; the difference between Oltenia and Ardeal is 2.62 points;
- regarding the hedonism-constraint dimension the results show that the people from Ardeal are more „hedonic" than the Moldavian or Oltenian ones, even if all the regions are rather „hedonic"; the distance between Ardeal and Moldavia is 2.89 points, the distance between Ardeal and Oltenia is 4.2 points; between Moldavia and Oltenia the distance is 3.15 points; the inhabitants of Oltenia are oriented especially to the „profane" and „expensive" hedonism and the people from Ardeal accentuate the spiritual hedonism spiritual, „cheaper" in general.
- action-sedentariness dimension points out that the Romanians are more action oriented, but there are some differences, as happened to the other dimensions: Moldova, with the highest score, is 1.99 points in front of Ardeal

and 3.05 points in front of Oltenia; the difference between Ardeal and Oltenia is 2.08 points.

Table 1

Absolute differences

No.	Absolute differences	Oltenia-Moldavia	Oltenia-Ardeal	Moldavia-Ardeal
1.	Power distance	1.90	2.57	3.55
2.	Individualism	2.82	3.29	4.13
3.	Gregarism	2.24	6.62	4.66
4.	Gender equality	5.10	5.70	0.60
5.	Masculine values	4.22	3.67	2.52
6.	Uncertainty avoidance	2.56	4.11	3.78
7.	Time orientation	1.33	3.77	3.62
8.	Flexibility	1.24	2.62	3.70
9.	Hedonism	3.15	4.20	2.89
10.	Action	3.05	2.08	1.99

Figure 1 presents the cultural differences, in a comparative manner.

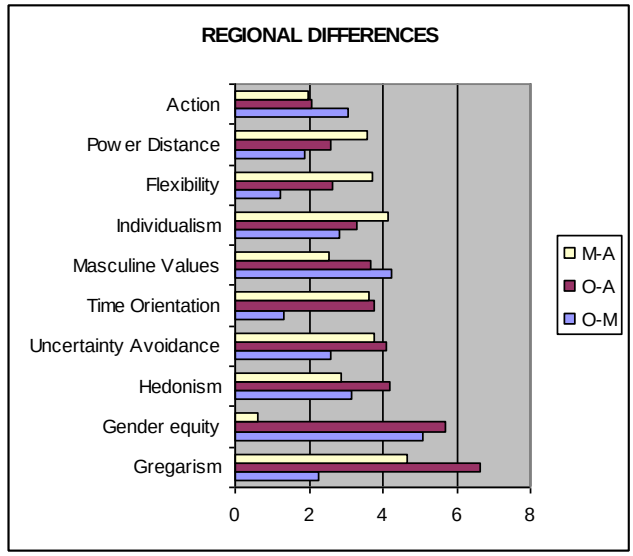

Fig. 1. Average of absolute differences on pair comparisons between samples
Legend: Moldavia-M, Ardeal-A, Oltenia-O

Noticing these differences, we emphasize the following:
a) regarding the *cultural proximity*, we notice that *for six out of ten dimensions of the regional culture, the minimum differences may be found when we compare the sample from Moldavia with the one from Oltenia* (*power distance, individualism-collectivism, gregarism-solidarity, uncertainty avoidance, time orientation constancy-flexibility*), therefore the two regions

are closer from the cultural point of view; *there is not a cultural dimension for which we may have a minimum distance between Oltenia and Ardeal,* therefore the highest difference is between these two regions.
b) regarding the *cultural distances, the most numerous dimensions for which we registered maximum differences are for the Oltenia - Ardeal comparison* (*gregarism-solidarity, gender equity, uncertainty avoidance, time orientation and hedonism-constraint*); *there are only two dimensions for which the distance are maximal in the case of Moldova - Oltenia comparison*: *masculine values-feminine values and action-sedentariness*.

Regarding the obtained results we make the following **notifications**:
- what we measured were perceptions of the individuals regarding attitudes, behaviours, action related positions, which means *values* (want is *wanted* for the people from a certain region). The real behaviour may be different by what they perceive themselves regarding the above mentioned issues. But, being familiarize with these perceptions, it is an advantage for the manager who may valorise the "given" situation, by anticipating the actions provided by the predispositions reflected on the unconsciousness level;
- the getting results are relevant at the level of this comparison – they can not be just undertaken while the cultural comparison elements are changed (because the equivalence conditions imposed by the intercultural comparison are not fulfilled any longer).

The obtained results consequently to this research stay at the basis of providing valorization recommendations of the regional differences / regional cultural specificity (see also the "*Valorization of Regional Cultural Specificity Elements*" article from the present tome), thus the companies that develop their activity in the Romanian business environment achieve positive effects.

CONCLUSIONS

1. The accomplished research pointed out the existence of regional cultural differences. Even if there is a common cultural fond, the one of the regional culture, the importance awarded to values is fluctuant, thus the individuals who belong to different regional sub-cultures have a distinct cultural profile.

2. Between Oltenia and Moldavia, there is a high cultural proximity, and the highest differences are noticeable between Ardeal and Oltenia (at the level of this research, that included the three above-mentioned regions).

3. Managers may exploit the achieved results in an intelligent manner; that means they may valorise, on one hand, the elements of cultural specificity (through a proper approach of the managerial processes) and, on the other hand, the cultural differences (through synergy and organizational training).

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VALORISING REGIONAL CULTURAL SPECIFICITY ELEMENTS

VALORIZAREA ELEMENTELOR DE SPECIFICITATE CULTURALĂ REGIONALĂ

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Abstract. *Human resources can be a source of competitive advantage for the organization. They have a potential to be valued as a whole - intellectual potential, skills, creative, professional, etc. - but we are interested in this article in the cultural one. It can it be exploited at regional level, through appropriate manager's actions (communication, decision making, organization, motivation, management style, etc.) and at interregional level through cultural synergy, appropriate distribution of tasks / based on needs motivation and even organizational learning. Concrete valorisation recommendations on several areas that have been studied (Oltenia, Moldavia and Transylvania) bring in specific regional cultural values, providing to managers, in a concrete manner, possible courses of action.*

Key words: culture**,** regional differences, management, valorisation

Rezumat. *Resursele umane pot constitui o sursă de avantaj concurenţial pentru organizaţie. Ele dispun de un anumit potential, care trebuie valorizat în ansamblul său - potenţial intelectual, aptitudinal, creator, profesional etc - însă, noi suntem interesaţi, în acest articol, de cel cultural. Acesta poate fi exploatat, la nivel regional, prin adecvarea acţiunilor managerului (de comunicare, luare a deciziilor, organizare, motivare, stil de management etc.), iar la nivel interregional prin sinergie culturală, distribuire adecvată a sarcinilor/motivare în funcţie de nevoi şi chiar învăţare organizaţională. Recomandări concrete de valorizare pe câteva regiuni care au făcut obiectul unei cercetari (Oltenia, Moldavia şi Ardeal) pun în valoare specificul cultural regional, oferind managerilor, într-o manieră concretă, posibile căi de acţiune.*

Cuvinte cheie: cultură, diferenţe regionale, management, valorizare

INTRODUCTION

Most of the intercultural studies emphasise conflicts incidence possibility due to cultural differences. The present paper retakes another argument, more profitable for the organization, the one of considering regional cultural differences as sources of potential advantage, which may be exploited through valorisation (we firstly take into account the manager's possibility to integrate aptitudes, abilities and different competences while a team is build up and tasks are appropriate distributed). All these individuals' characteristics depend on their education and grounding, but they refer to the cultural "inheritance" as well. It is important that the manager appreciate correctly the characteristics he needs of, and have the capacity to understand correctly the potential team members' profile.

Success supposes sensibility, trust and will for integration from the part of the manager, but first of all, acceptance of the fact that these regional cultural differences exist, even if they are not always evidently. Therefore, the team will gain because, using it its advantage these differences, it will develop richer interaction models, it will be more creative, it will identify more solutions, having the opportunity to choose the most favourable one. Valorising cultural differences takes also into account any other collaboration form among the individuals from different regions.

The valuing accents described by the regional cultural dimensions influence the management processes at the level of communication, decision taking and implementing, motivating, management (leadership) and organization (Hofstede, 1996; Prime,Usunier, 2004; Johns, 1998; Thery, 2002; Nica, Iftimescu, 2004; Ionescu, Toma, 2001; Sagiv, Schwartz, 2007). These are just some "areas" where the manager may act intelligently, using methods that do not neglect the influence of culture upon individuals.

Taking into account the above presented argument, we develop a research whose aim was to analyse the regional cultural differences in order to provide recommendations for their valorisation in the management of the Romanian companies.

The *objectives* were the following:

- inventorying and describing the variation sources, the cultural determinants;
- analyzing the regional cultural differences;
- developing a regional intercultural diagnostic on the basis of the regional cultural differences analysis;
- providing valorisation recommendations of the regional cultural differences in the management of the Romanian companies.

MATERIAL AND METHOD

This article was based on the results obtained following a questionnaire whose sample included respondents from three Romanian geographic areas: Oltenia, Ardeal and Moldavia, interviewed in the period of 4-16 May 2009. The sampling respected the equivalence principle, recommended by specialists in intercultural researches with pragmatic scope. The variables that ensured the functional equivalence were: faculty, specialization, study year, age, gender, environment (rural/urban), number of education years and employment/unemployment status. There was also ensured the equivalence of inquiry administration, data processing etc.

RESULTS AND DISCUSSIONS

According to the scores obtained as a result of data processing, half of the maximal differences, at the level of cultural dimensions, are noticed between Oltenia and Ardeal (figure 1): more solidarity, tolerance regarding roles interchangeability and long term orientation are more emphasised in Ardeal, and a more constraint and uncertainty avoidance are noticed in Oltenia. Other differences are noted between Moldavia and Ardeal (a more

pronounced individualism and more flexibility in Moldavia, and a lower power distance in Ardeal) and between Moldavia and Oltenia (the feminine values are more privileged in Oltenia and the action orientation is more emphasised in Moldavia).

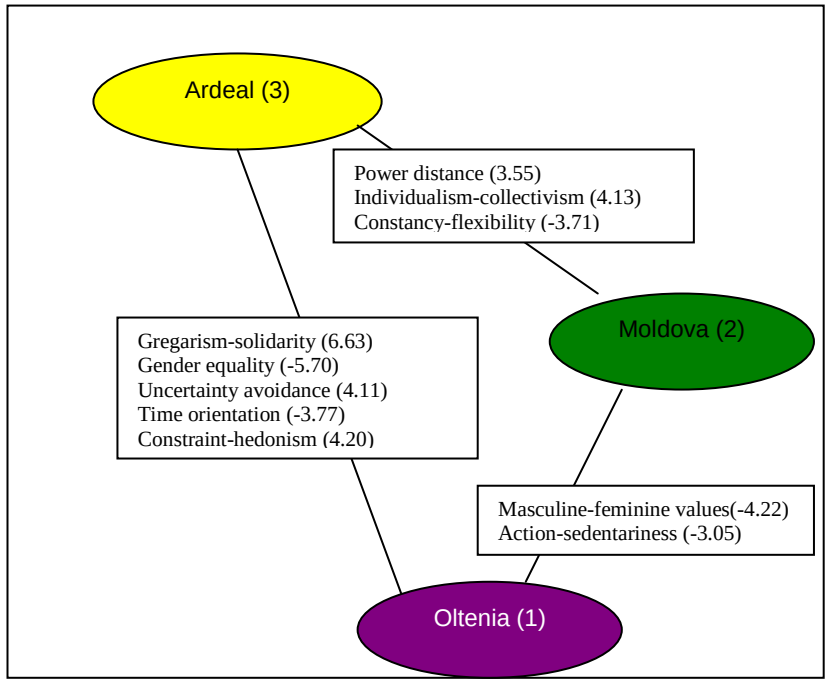

Fig. 1. Regional Differences

Note: (+) or (-) signs indicate the sense of the difference – e.g. for the gender equality, when we compare Oltenia, marked with (1), with Ardeal, marked with (3), the (-) sign indicates that Oltenia has a lower score than Ardeal.

Starting from these differences, we may provide some recommendations regarding the management of an inter-regional team:

- the gregar behaviours (with emphasis on segregation) may be considered through their positive aspect, the one of increasing the competitiveness among individuals and the need to prove what they are able to; therefore, when a manager wants, he distributes the tasks perceived with different importance to the people from Oltenia or Moldavia; this method may be used to activate a lethargic employee, moving his tasks towards another one, who becomes his "competitor"; if the manager wants to strengthen the solidarity spirit, he has to distribute the tasks equitably, therefore the employees perceive them with similar difficulty and importance level;

- the manager may grant a higher attention to task distribution in the case of Oltenians, because they accept on a lower degree than the people from Ardela and Moldavia the role interchangeability;

- the masculine values are more privileged in Moldavia, even in Ardeal, in comparison with Oltenia; therefore, the Moldavian and Ardeal inhabitants are rather involved in tasks that suppose competition situations or based on argument-intuition mixture decision, in opposition with the people from Oltenia; the individuals from Oltenia will be more involved in tasks that privilege less competitive social contacts and when they take decision autonomously;

- differences related to hedonism-constraint dimension may be exploited especially when motivation is the issue;

- the manager should take into account that the people from Ardeal are more inclined to conformism and commitment, respecting their promises, than the Moldavians or Oltenians, so he rather distributes to them tasks that require these kinds of behaviours; the Moldavians, oriented towards reaching their own interests, but more loyal to the employer, privileging more than others the masculine values as success and power, will be involved in managerial tasks (their flexibility is an another advantage, but in some situations their duplicity may be deceptive for the manager); power is what the Oltenians want, too, especially because their need of welfare is stronger, and the intern control is more powerful – they privilege collective interest and independency, so they may undertake management tasks in situations that rather require authoritative behaviours, but which aim advantages for everyone;

- the Oltenians and the Moldavians will be involved in less risky decisions and tasks because of an important uncertainty avoidance, while higher risk tasks will be delegated to the Ardeal inhabitants;

- to the Oltenians, who grant a great importance to the past, it will be delegated tasks that valorise the above mentioned orientation; appropriate tasks for the Moldavians are those which involve more diplomacy for some relationships salving that may be compromised due to some occurred problems and to the people from Ardeal should be distributed tasks that suppose long term efforts or tasks that would benefit consequently to their economical, thrifty spirit.

- at the level of an inter-regional team, managers may exploit Moldavians and Oltenians' flexibility and creativity, but also the more raised constancy of the people from Ardeal, in comparison with the two above mentioned ones; the tasks will be distributed being aware of these elements;

- the management functions may be assigned to the Moldavians and Oltenians if authoritative behaviours are required, in a formal environment, and to the Ardeal inhabitants if the job tasks suppose a manager-employee cooperation and informal relationships;

- routine activities or those that require a more reflective behaviour, but which suppose a lot of work are preferable to be assigned to the people from Ardeal (to whom a feedback will be provided because they perceive that their work is not acknowledged and many time they are discouraged), those that require a lot of work, over time work and creativity to the people from

Moldavia, and those that are related to efforts on shorter periods but they involve a certain creativity, to the people from Oltenia.

We emphasise that these recommendations have a high generality degree. They can not be taken into consideration simply like that, but only in correlation with professional and contextual characteristics, but being aware upon the mixture from a certain culture, through a synthetic approach. On the other hand, we have to take into account that "*the statements regarding the culture are not statements regarding individuals […] "the average person" from a country does not exist, there is only an average responding tendency within the members of the interviewed groups"* (Hofstede, 1996, pp.285-286). We will experience many individual variations; therefore the manager has to be preoccupied to know them. He has to be also interested in his own cultural features, for avoiding stereotypes and be somehow aware about his own cultural dominants, therefore his actions be positive ones.

CONCLUSIONS

Being familiar with the regional cultural differences may stay at the basis of the positive valorisation process within an organization. The guide marks provided by this article may help managers in:

1. valorising regional differences through cultural synergy, in other words through the valorisation of the employees' cultural potential, who, being brought in special formed situation, put in common what everyone has valuable (manners of thinking, attitudes, positions for action) for getting better organizational results;
2. assigning the right tasks to the right employee (being aware of the particularity that the regional culture brings);
3. motivation in accordance with the needs (being known that there is a close relationship between dominant cultural needs and values).

These guide marks allow the integration of the regional cultural differences and the avoidance of problems that occur due to misunderstandings and potential conflicts. Our aimed finality is to sensitize the managers regarding the possibility to develop a positive management of differences, in order to obtain better results at the level of the organization. We consider that the provided recommendations obtained on the basis of quantitative data and qualitative analysis may become operational through their actions.

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ANALYSIS DEMOGRAPHIC FACTORS CONTRIBUTING TO RURAL DEVELOPMENT OF COMMUNE TULNICI FROM VRANCEA DEPRESSION

ANALIZA FACTORILOR DEMOGRAFICI CARE CONTRIBUIE LA DEZVOLTAREA RURALĂ A COMUNEI TULNICI DIN DEPRESIUNEA VRANCEA

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Abstract. *The concept of population is used to talk about the existence of a community or about of a certain generation. Population has always been an indispensable factor in any business or economic progress, being seen in terms of quantity and quality. Because the ideas set demographic factors were analyzed from area Tulnici (during of years 2002 - 2009): population, age structure and sex, population density, evolution of population, birth rate, mortality, internal and external migration, the average life. Sources of information were fields applied from mayor Tulnici and other public institutions in Vrancea County and direct investigations in the field. Pyramid of age illustrated the phenomenon of population aging and age structure imbalances contribute to lower, naturally, of the population. If this phenomenon continues to be present, rural areas will reduce and will appear small and very small communes. To make a full analysis were analyzed existing human resources by highlighting the average number of employees, on the activities of the national economy.*

Key words: demographic factors, population, density, birth rate, mortality, the average life

Rezumat. *Noţiunea de populaţie este folosită pentru a vorbi despre existenţa unei comunităţi sau a unei anumite generaţii. Populaţia a reprezentat dintotdeauna un factor indispensabil oricărei activităţi sau progres economic, fiind privită din punct de vedere cantitativ cât şi calitativ. Datorită ideilor enunţate au fost analizaţi factorii demografici din comuna Tulnici (perioada anilor 2002 - 2009) şi anume: numărul populaţiei, structura pe vârste şi sexe, densitatea populaţiei, evoluţia populaţiei, natalitatea, mortalitatea, migraţia internă şi externă, durata medie de viaţă. Sursele de informare le-au constituit domeniile aplicate din cadrul primăriei comunei Tulnici şi a altor instituţii publice din judeţul Vrancea, precum şi investigaţiile directe de pe teren. Piramida vârstelor a ilustrat grafic fenomenul de îmbătrânire a populaţiei din comuna Tulnici. Fenomenul de îmbătrânire demografică a populaţiei şi dezechilibrele structurilor pe vârste contribuie la scăderea, pe cale naturală, a populaţiei. Dacă acest fenomen va continua să fie prezent, aşezările rurale se vor diminua şi vor apărea comune mici şi foarte mici. Pentru a face o analiză completă au fost analizate resursele umane existente prin evidenţierea numărul mediu al salariaţilor, pe activităţile economiei naţionale.*

Cuvinte cheie: factori demografici, numărul populaţiei, densitatea populaţiei, natalitatea, mortalitatea, durata medie de viaţă.

Ethno-historical studies show that the oldest attestation Tulnici villages dating back to 1507, provisions were included in the Royal Divan. Tulnici village is composed of the following villages: Tulnici, Coza, Lepşa and Gresu. Demographic factors were analyzed at the commune level, which is representative of the Vrancea Depression.

MATERIAL AND METHOD

Scientific approach was developed through consultation and use of literature, The Census population - March 18, 2002, the statistical data in official documents published by the National Institute of Statistics - Vrancea County Statistics and field investigations. It was analyzed the population structure of rural Tulnici on age and gender. It was used the comparison method and statistical analysis of data (Rusu Mihaela-Loredana, 2009).

RESULTS AND DISCUSSIONS

Area considered rural part of the Vrancea Depression. Tulnici village is beautiful and representative for the recovery and development of tourist potential of the Vrancea Depression. Analyzing fig. 2 shows that rural areas with the largest share of the area are: Nistoreşti - 22.21% (26,060 ha.) Tulnici - 19.37% (22,728 ha.) Nereju - 15.55% (18,246 ha.) and Paulesti - 14.78% (17,344 ha.).

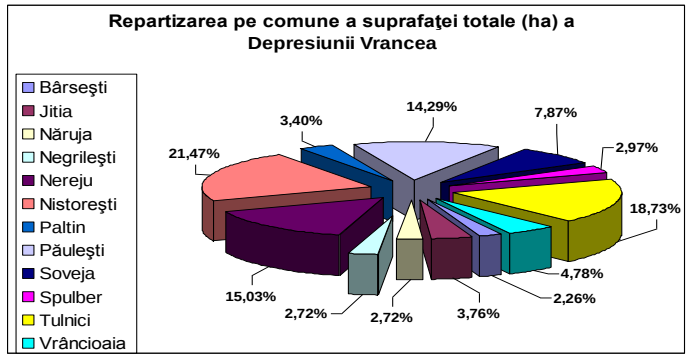

Fig. 1. Joint distribution by total area (ha) of Vrancea Depression

Analyzing the Vrancea Depression was found that from 2002 until 2007 there were changes in the administrative-territorial units. In 2003 it established joint administration Paulesti having 1088 ha and 17,344 ha in 2004 given, the village belonged Tulnici surface. Currently manages 22,728 hectares Tulnici village. Pointing to the importance of village Tulnici Vrancea Depression were analyzed demographic factors: *population, age structure and sex, population density, changes in population, birth rate, mortality, internal and external migration, life expectancy* (between the years 2002 to 2009).

The concept of population usually requires the existence of a community, a certain generation. Population has always been an indispensable factor in any activity or economic progress, as seen in terms of quantity and quality. On July 1, 2007 the village population was Tulnici 3909 inhabitants, of which 51.50% males and 48.50% women.

Table 1

Age and sex structure of population on July 1st, 2007of village Tulnici

Gender	0-19 years	20-59 years	60 years and over	% 0-19 years	% 20-59 years	% 60 years and over
male	495	1.125	393	52,88	53,29	45,59
female	441	986	469	47,12	46,71	54,41
Total	**936**	**2.111**	**862**	**100,00**	**100,00**	**100,00**

[Source: *Institutul Naţional de Statistică - Direcţia Judeţeană de Statistică Vrancea* – Processing dates from Fişa localităţii Tulnici]

On July 1, 2007 population structure was: the young population (0-19 years) - 23.95% of the total population (52.88% men; 47.12% women) adult population (20-59 years) - 54.00% of the total population (53.29% men; 45.59% women) and elderly (60 years and over) - 22.05% of the total population (45.59% men, 54 41% women). Found that male gender has a higher young adult population compared with the feminine, and the percentage of elderly and the percentage is lower, predominantly feminine.

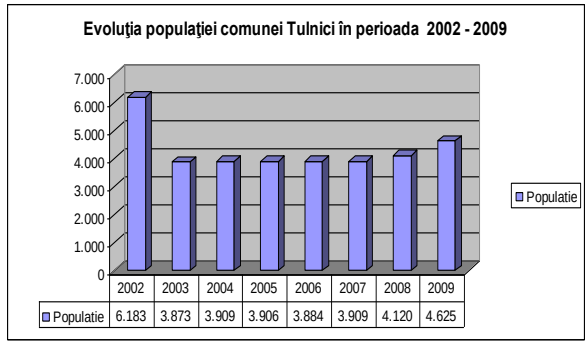

Fig. 2. Evolution of the population during the years 2002-2009

Analyzing the evolution Tulnici village population during the years 2002 - 2009 shows that it decreased by 17.12% in 2009 compared with 2002. Cause leading to a lower level of population has been driven by low birth rates and village administrative reorganization in the years 2003-2004.

Table 2

Natural movement of population of Tulnici common in 2009 compared with 2008

Year	Absolute data (year)					
	Born	**Deceased**	**Natural increase**	**Marriages**	**Divorces**	**Deceased under 1 year**
2008	55	60	-5	29	11	1
2009	49	65	-16	22	15	2
Year	**Rate (la 1000 de locuitori)**					
	Birth rate	**Deceased rate**	**Natural increase**	**Mariage rate**	**Divorce rate**	**Infant mortality***
2008	11,89	12,97	-1,08	6,27	2,38	18,18
2009	9,56	12,68	-3,12	4,29	2,93	40,82

* to 1000 born

[Source: *Institutul Naţional de Statistică - Direcţia Judeţeană de Statistică Vrancea – Fişele localităţilor*] – processing dates

According to table 2 shows that negative natural increase of population resulting in a deficit Tulnici village. It appears that natural growth in 2009 is -16 ‰, compared to 2008 when growth is -5 ‰, as in 2009 increased deaths and decreased number of live births.

Migration is an essential component of development processes is correlated with economic change, social structure and quality of life.

Table 3

Migration of Tulnici village during the years 2002 - 2009

Internal Migration	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Establishments in the locality	55	48	56	47	69	50	43	52
Departures from Local	76	46	55	51	54	56	49	60
Migration balance	-21	2	1	-4	15	-6	-6	-18
External Migration	2002	2003	2004	2005	2006	2007	2008	2009
Immigration	1	2	0	4	2	0	0	1
Immigrants	1	0	1	0	0	0	0	0
Migration balance	0	2	-1	4	2	0	0	1

[Source: *Institutul Naţional de Statistică - Direcţia Judeţeană de Statistică Vrancea* – Processing dates from Fişa localităţii Tulnici]

Analyzing table 3 it appears that internal migration migratory balance is negative in 2002, 2005, 2007, 2008, 2009, which shows that people migrated to urban migration and the migration balance exzerne is constant and positive. Only in 2004 was found a migratory balance = -1. According to research found that the population has migrated to: offer a job you want, better use of professional knowledge, etc., further education, military service, etc.

In fig. 2 developments can be seen in the village Tulnici migration in the period of 2002-2009. It is noted that both internal migration and external fluctuating quite the countryside looked.

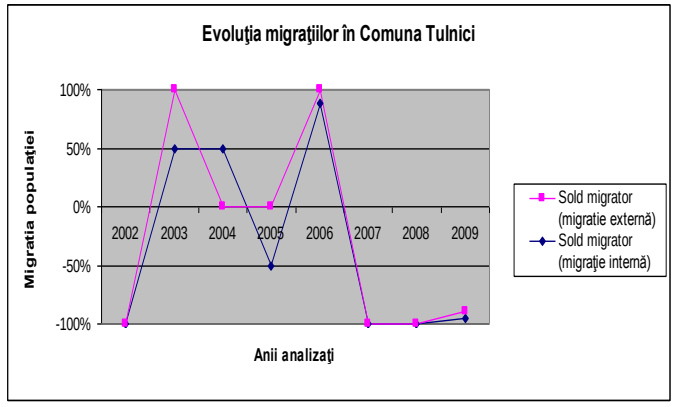

Fig. 3. Evolution of population movement during the years 2002-2009

To visualize the distribution by age and sex of the population age pyramid is used (including age groups from 0 to 100 years).

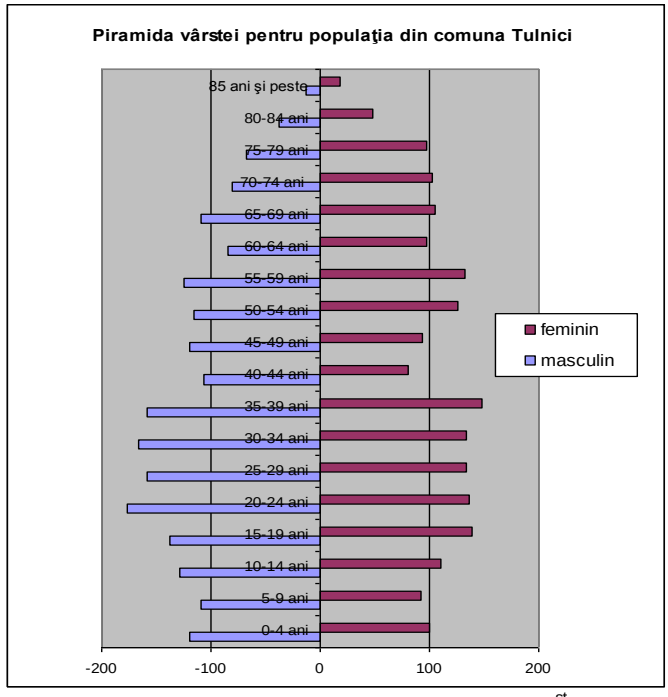

Fig. 4. Population Tulnici age pyramid of the July 1st, 2007

Population pyramid shown in fig. 3 graphically illustrates an aging population in the rural village Tulnici. Tulnici village population has the following configuration: young people (0-19 years) - 936 people, adults (20-59 years) - 2111 people, elderly (60 years and over) - 862 people.

Following research undertaken found that economic activities in the village Tulnici are: industry, electricity, gas and water, trade, transport and postal, government, education, health and social assistance (table 5).

Table 5

Employment in the Village Tulnici

Average number – employees

Economic Activities	2003	2005	2007	2009	% 2009/2002
Total employees	**53**	**49**	**46**	**40**	**75,47**
Industry	0	0	1	2	200,00
Electricity, gas and water	0	0	3	1	100,00
Trade	5	6	3	2	40,00
Transport and postal	3	0	1	2	66,66
Government	8	9	9	7	87,50
Education	36	33	27	25	69,44
Health and social assistance	1	1	1	1	100,00

[Source: *Institutul Naţional de Statistică - Direcţia Judeţeană de Statistică Vrancea* – Processing dates from Fişa localităţii Tulnici]

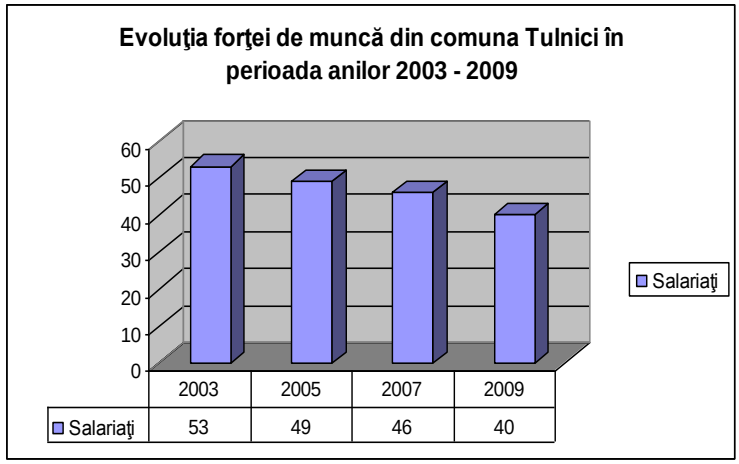

Fig. 5. Evolution Tulnici labor during the years 2003 - 2009

Analyzing fig. 4 it is observed that employment decreases from year to year. If in 2003 there were 53 employees in 2009 there were only 40 active employees.

CONCLUSIONS

1. Tulnici rural areas accounting for 19.37% (22,728 ha) of the total rural area of Vrancea Depression.

2. Evolution Tulnici village population between the years 2002 - 2009 shows that it decreased by 17.12% in year 2009 compared with 2002.

3. Population age pyramid graphic illustrates 07/01/2007 aging phenomenon in the rural village Tulnici.

4. Was found to develop rural areas can be carried out by attracting investors with a view to reducing the phenomenon of migration from rural to urban areas and creating new job opportunities for locals.

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THE MONOGRAPH OF COMMUNE TULNICI – RURAL SPACE WITH RELEVANT IMPORTANCE FOR RURAL DEVELOPMENT OF VRANCEA DEPRESSION

MONOGRAFIA COMUNEI TULNICI – SPAŢIU RURAL DE O IMPORTANŢĂ RELEVANTĂ PENTRU DEZVOLTAREA RURALĂ A DEPRESIUNII VRANCEA

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Abstract. *The research carried out proposes the analysis of the rural space of area Tulnici by the opportunities and threats of area. The aim of the scientific demarche is to identify factors contributing of the rural development of the area referred in view of complying with the demands imposed by the European Union. Information sources that have contributed to the research are: official statistical documents, Files of localities - Vrancea County Statistics, Summaries of localities - Vrancea County Council, feasibility studies and projects at the area level and direct investigations in the field. Tulnici area is leading by nature reserves and existing mineral water, which is a real wealth for rural tourism and agricultural tourism in Vrancea Depression. SWOT analysis used the scientific approach revealed that the area is predominantly agricultural, with an extremely important woodsy fund for national wealth. There is a low endowment of infrastructure, especially quality of communication channels and unreliable media.*

Key words: rural space, rural development, tourism potential, rural tourism, agricultural tourism, SWOT analysis

Rezumat. *Cercetarea întreprinsă îşi propune analiza spaţiului rural al comunei Tulnici, prin evidenţierea oportunităţilor şi ameninţărilor zonei. Scopul demersului ştiinţific constă în identificarea factorilor care contribuie la dezvoltarea rurală a zonei amintite pentru alinierea la cerinţele impuse de Uniunea Europeană. Sursele de informare care au contribuit la realizarea cercetării sunt: documente statistice oficiale, Fişele localităţilor – Direcţia Judeţeană de statistică Vrancea, Fişele de sinteză ale localităţilor – Consiliul Judeţean Vrancea, studii de fezabilitate şi proiecte realizate la nivelul comunei, precum şi investigaţiile directe de pe teren. Comuna Tulnici se remarcă prin rezervaţiile naturale şi a apelor minerale existente, care reprezintă o reală bogăţie pentru practicarea turismului rural şi a agroturismului în Depresiunea Vrancea. Analiza SWOT utilizată în demersul ştiinţific a relevat faptul că zona este predominant agricolă, cu un fond forestier foarte important pentru bogăţia naţională. Se menţine o slabă dotare a infrastructurii, în special, calitatea căilor de comunicaţii şi precaritatea mijloacelor media.*

Cuvinte cheie: spaţiul rural, dezvoltare rurală, potenţial turistic, turism rural, agroturism, analiza SWOT

INTRODUCTION

According to Law no. 351/2001 is a common „basic administrative territorial unit comprising rural population met by community interests and traditions, composed of one or more villages, depending on economic, social, cultural, geographic and demographic. Villages which are located in the government of the municipality are rural residence."

Tulnici village (villages components: Tulnici, Coza, Lepşa and Gresu) is located in the southwest of the Vrancea County, 65 km. The city of Focsani, in the Carpathian foothills of curvature in Tulnici - Bârseşti depression. It is bordered to the north - Soveja village and commune Bârseşti south - Nistoreşti village, east - Bârseşti shared and west - Covasna.

MATERIAL AND METHOD

Scientific approach was developed by collecting data in official documents (Summary sheet of the village Tulnici - existing in Vrancea County Council), official data from the National Institute of Historical Monuments (list of historical monuments in 2004 - Vrancea) and analysis field data. Article achieve was consulted and used the literature.

RESULTS AND DISCUSSIONS

Tulnici village is known by the natural resources they have (natural and mineral reserves):

- Tişiţa Gorge - which includes geological and logging the lower valley Tişiţa crossing a canyon really characterized by a distinct microrelief (rocky walls, shelves, beetle, gutters etc.);
- Lepşa-Zboina - reserve forest and flora;
- Waterfall Putna - geological and landscape, characterized by a spectacular series of marmite on cca.76 m long;
- important resources hunting (bear, chamois, deer, deer, wild boar) and fish - Patravaria Lepşa (nature reserve);
- existing hydrography: Putna river, brook Lepşa (mineral) Ciuta brook, brook Gresu (mineral) Tişiţa brook, brook Coza;
- 15 montain routes, marked: tourist route - starting Coza village, through sylvan pine forest - nature reserve - Galaciuc kids camp, the road continues along the former railway route on Putna river left, cross the tunnel Moceanu - Putna WaterFall;
- bioclimat tonight - facets incentive therapeutic;
- spectacular mountain scenery with deciduous and coniferous forests, gorges and canyons isolated rocks;
- existence in the area of approximately 500 holiday homes, 25 boarding houses, 7 hotels and motels.

Depression is known that the Vrancea area is an area of recreation and leisure. Vrancea Depression territory stands Soveja spa villages Nistoreşti, Naruja, Nereju Tulnici and are known for their ethno-folkloric tradition and treasures and monuments of religious art. Existing human objects are presented in table 1.

Table 1

Tourism potential anthropogenic existing in village Tulnici

	Anthropic goals
Tulnici	▪ Saint Ioan Botezatorul Church, located on the right bank of the river Coza, 1 km from the national road DN Focsani - Gresu (timing: in 1873)
	▪ Orthodox Church Wall Sfintii Voievoyzi (1809), rebuilt in 1899 - Tulnici village (in some cultural events are organized commemorative dates relating to the life and work of the researcher Ion Diaconu);
	▪ Wooden Church *Adormirea Maicii Domnului (1780) Vasile abbot founded together with Prince Constantine Mavrocordat, totally restored in 1930-1936;*
	▪ Lepşa Monastery - reinstated in 1990 (initially sec.al monastery of nuns in eighteenth century).

[Source: *Institutul Naţional al Monumentelor Istorice* – Procesiing dates from *Lista monumentelor istorice 2004 – Judeţul Vrancea*]

The analysis on rural infrastructure Tulnici found that it is poorly developed under EU standards but there are projects that will contribute to development, as shown in table 2.

Table 2

Common infrastructure Tulnici

Infrastructure	**Common Tulnici**
Existing infrastructure	▪ Lepşa village treatment plant ▪ Paving roads (7300 ml.) ▪ Asphalt on DJ 205 L - 1,00 km
Infrastructure in implementation	▪ Paying roads on DC 68 Coza - Alunu (3.000 ml.) ▪ Rehabilitation of national road DN 2L Lepşa – Soveja ▪ Rehabilitation of national road DN 2 D 118 km., which 98 km. on Vrancea
The proposed infrastructure	▪ Rehabilitation and expansion of water supply in the area Tulnici ▪ Water supply and sanitation Lepşa and Gresu ▪ Rehabilitation of roads ▪ Rehabilitation communal road Streiu ▪ County road upgrading DJ 205L, Grumaz (DJ 205D) – Tulnici - Negrilesti - Soveja (37,60 km.), commons: Vrâncioaia, Păuleşti, Tulnici, Negrileşti and Soveja

[Source: Procesiing dates from *Fişa de sinteză a comunei Tulnici* existing at Consiliul Judeţean, judeţul Vrancea]

Based on the analysis of existing and heritage tourism data collected in the field was carried out SWOT analysis of rural area Tulnici which is shown in tab.3.

Table 3

SWOT Analysis of Tulnici area

Strenghts	***Weaknesses***
▪ Agriculture: cultivation of agricultural land, livestock, fruit; ▪ Existence of forest fund important for national wealth; ▪ Many historical monuments of national importance; ▪ Existence of ethnographic and folklore treasury of great originality; ▪ The existence of mineral springs in SPAS resorts; ▪ Exploitation and processing of raw wood and locally finite; ▪ Potential of natural tourism: nature reserves, flora and fauna, landscape, sulphurous water, etc.. ▪ Attractive tourist area; ▪ Development of mountain tourism, rural tourism, agrotourism; ▪ Possibility of recovery of local traditions, county; ▪ Handicrafts (weaving, sewing different); ▪ Existence of economic activity; ▪ Reduced pollution in rural areas; ▪ Promoting traditional cuisine.	▪ Low skilled labor or unskilled; ▪ Underdeveloped rural infrastructure compared to urban infrastructure; ▪ Poor recovery of natural tourism potential due to poorly developed access routes; ▪ Decrease in foreign tourists because of underdeveloped infrastructure; ▪ The treatments have a high degree of wear and are not adapted to European standards; ▪ Lack of an organized system of indicators for objectives and tourist routes in the region; ▪ Activities of tourism marketing and destination management underdeveloped; ▪ Public transport to sights is poorly organized and promoted; ▪ Poor development of specific architectural monuments facilities; ▪ Poor recovery of recreational facilities; ▪ Low greening of areas within tourism.
Opportunities	***Threats***
▪ Development and modernization of villages; ▪ Develop and promote programs that are eligible for local and regional structural funding EAFRD; ▪ Restoring tourism values associated with cultural and historical heritage and tourism in their recovery; ▪ Looking to exploit the mountain throughout the year by hiking, riding, climbing, extreme sports, skiing; ▪ Increased international interest in cultural tourism, spa, ecotourism, agrotourism and rural tourism, adventure; ▪ Implementation of tourism infrastructure projects by local and county government; ▪ Tourism funding provided by EU structural funds.	▪ Weak competitiveness of companies in the area compared with those of EU member states; ▪ Increased soil erosion due to reduced opportunities for making land reclamation works; ▪ Reduced access to grants with loans grants (poor access to information). ▪ Underdeveloped transport infrastructure; ▪ Poorly developed infrastructure facilities in rural areas; ▪ Migration of young labor force in urban areas or abroad; ▪ Deterioration of rural depopulation of the rural heritage; ▪ Urbanization of rural population - loss of authenticity and local specificity; ▪ Adverse weather conditions, natural disasters.

SWOT Analysis highlights the strengths and weaknesses of the area studied, and the opportunities and threats to the countryside.

Geodynamic manifestations which occur in the village Tulnici currently characterized by landslides, floods, erosion of banks of water. Landslides occurred over time and affected homes, roads and power lines. Some landslides have been stabilized, but they can be reactivated after rainfall, such as those of July-August 2005. Inhabitants at risk for Tulnici are Coza the brook, the brook Lepşa, Streiu creek area. The degree of seismicity of the village Tulnici is 8 on the Richter scale.

Project „VRANCEA COUNTRY – destination of european excellence aims to promote the european level of local cultural values, tourism potential and unique and original items that tourists can find in each of the villages included in the analysis: Vidra Valley salt Naruja, Maple, Spulber, Nereju, Vrâncioaia, Bârsesti, Negrileşti and Tulnici.

Promoting an european level will ensure attracting tourists and investors in the said zone and development of several forms of tourism (by integrating the proposed area as a destination of excellence in international tourist route): ecotourism, cultural tourism, business, spa, tourism, ecumenical tourism and sports.

CONCLUSIONS

Based on the SWOT analysis can be proposed a series of measures and actions to improve quality of life in rural areas as:

1. *SMEs development* - there is a rather small number of local entrepreneurs and entrepreneurship is still below the European Union*;* entrepreneurs are not guarantees to obtain financing and therefore, many existing businesses are undercapitalized and have discontinuities in the flow of cash; related facilities management and technology are limited and there is a shortage of suitable premises for offices; in terms of demand, half of the rural population lives at subsistence level, leading to a reduced demand for goods and services for personal consumption.

2. *Attracting foreign investment* - foreign investors creating jobs, contributing to lower unemployment caused by restructuring of the economy, yet they provide a market for goods and services provided by Romanian SMEs.

3. *Tourism development* - sample area have great potential for tourism development at local niche (spa, tourism, cultural and religious tourism, rural tourism, etc..), But it requires a corresponding development of necessary infrastructure.

4. *ICT development* - expanding employment in services to less developed areas, providing public services in a more efficient, including vocational training.

5. *Development of agriculture and food industries* - agriculture inefficient is mainly practicing subsistence agriculture for own consumption, the market for process standardization and quality control can be achieved.

6. *Transport infrastructure and labor mobility* - internal transport network is poorly developed, which can seriously affect growth prospects, in no area highways, and county and municipal road network is generally underdeveloped and poor.

7. *Environmental infrastructure* - much of the environmental infrastructure does not meet EU standards.

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PROSPECTS FOR DEVELOPMENT OF EARLY POTATO PRODUCTION IN ROMANIA

PERSPECTIVE PRIVIND DEZVOLTAREA PRODUCŢIEI DE CARTOF TIMPURIU IN ROMANIA

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Abstract. *Production of early potato (Solanum tuberosum L.), is a traditional cultural practice in Romania, especially in the South and Vest region. This enables crop producers to obtain a high income, after a short period of time. The theme chosen for study is of great interest if we consider that far in our country are too few data on early potato crop efficiently and influence on physiological processes and productivity of potato culture. Concrete knowledge on the role of biological and physiological characteristics and indicators in increasing yields, could help increase the chances of creating crop genotypes with improved performance and yearly yields. In fact the early potato consumption, which means that crop as the harvesting period from the second half of May and continuing along the month of June. To increase early production at harvest must be respected potato cultivation technology generally and the early consumption.*

Key words: early potato, production, marketing, efficiency

Rezumat. *Producerea cartofului timpuriu (Solanum tuberosum L.), este o practică tradiţională cultural în România, in special in zona de Vest şi Sud. Acest lucru a culturilor permite producătorilor de a obţine un venit ridicat, după o perioadă scurtă de timp. Tema aleasă pentru studiu este de mare interes dacă avem în vedere faptul că până în prezent în ţara noastră sunt prea puţine date cu privire la eficenţa culturii de cartof timpuriu şi influenţa unor procese fiziologice asupra precocităţii şi productivităţii culturii de cartof. Îmbogăţirea cunoştinţelor privind rolul unor caracteristici şi indicatori biologici şi fiziologici în sporirea randamentelor, poate contribui la creşterea şanselor de creare a unor genotipuri cu performanţe îmbunătăţite şi recolte timpurii. De fapt prin cartof pentru consum timpuriu, se înţeleg acele culturi care au ca perioadă de recoltare începând cu a doua jumătate a lunii mai si continuând-se de-alungul lunii iunie. Pentru cresterea producţiei la recoltarile timpurii trebuie respectata cu strictete tehnologia de cultivare a cartofului, in general, si a celui pentru consum timpuriu.*

Cuvinte cheie*:* cartof timpuriu, producţie, marketing, eficienţă

MATERIAL AND METHOD

The research methodology used in this paper has considered the following aspects: • bibliographic study of national and international literature; • collecting factual information of the investigated area; • ordering, processing and presentation of results in summary form; • analysis and interpretation of results, conclusions and recommendations.

RESULTS AND DISCUSSIONS

The importance of the potato crop is given, on the one hand, the large area allocated to this crop in the world and in our country, and secondly by the quantity of potato tubers consumed by the population. The weight of the use of vegetables in the diet of the population is an indicator for assessing the standard of living of a people. For a human adult daily diet (3,000 calories) are needed such as food and animal 714g and 1225g of vegetables, which represents a total annual consumption of 110 – 148 kg vegetables. Average consumption of vegetables in countries U.E. is 121 kg/an/cap capita, while Romania, with an average consumption of 149kg/an/cap capita, is among the countries of the world's largest consumer of vegetable (Ciofu, 2003). The total consumption of 125 – 150 kg vegetables a year per capita potato consumption is included, which after Draica, 1999, quoted by Nicola, in 2007, reaching approximately 75 - 80kg/an.

Starting from this general analysis is proposed based on potato culture current premises in future projections, both in terms of production activity and the scientific research.

Potato cultivation advantages resulting from the fact that this culture leaves the field early, maintenance costs are lower and the culture finds favorable climate and soil conditions due to remaining water reserves in soil and cooler climate that spring.

Other advantages are:

- Reduce the period of vegetation in the open.
- Growing potatoes in optimal conditions - favorable to this crop.
- Getting a product for the early date.
- As a result - making the product affordable.

The need for research conducted on the potato crop is given low areas and low yields obtained in our country to this new culture. Average production in Romania is around 14.5 t / ha, which is - 3 3% of yields obtained frequently in western and northern countries – west of Europe and only February 1 to May 1% of potential biological production Variety used.

Analyzing the potato occupied areas in our country in recent years can be seen that the areas have decreased after 1989 and only since 2004, the area cultivated with potato has started to increase to 260,600 ha (average), ensuring full requirements Romania affordable consumer potato (table l).

The area planted for early consumption was 20 100 ha in 1989, fell to 10,300 hectares in 1997 and stabilized at 12 900 ha in 2008.

Decrease in areas planted with potatoes and early summer due mainly to low interest for this culture, determined on the application of Law 18 of the land, farm households have no mechanical means necessary for this culture and logistic system for the collection, transport, storage and disposal.

Another aspect to be mentioned is that it share of area under potato has fallen early and summer and autumn increased potato weight. This was due to destruction of irrigation systems in areas with low rainfall, stopping here is cultivated potato (areas suitable for potato crop in early summer and irrigated), with a preference for other crops, especially cereals. In this sense, we consider that in Romania, will significantly reduce

the area planted with potato in the coming years there will be focus and specialization of production, will remain on the market that may prove competitive with producers in the European Union or elsewhere. This will not decrease the total production of potatoes, but the concentration of production on larger areas, operated by fewer farmers and increasing productivity per hectare.

Table 1

Evolution of the potato growing areas in the period 1989 - 2008

Year	Total Thousands ha	Area (thousands ha)		%	From which:					
		State sector	Private sector		Early variety	%	summer variety	%	autumn variety	%
1989	351.4	26.4	325.0	92.5	20.1	5.7	46.2	12.1	288.7	82.2
1990	289.6	21.1	268.5	92.7	147.0	5.1	29.4	10.2	245.5	84.4
1991	234.9	17.5	217.4	92.5	9.6	4.1	30.6	8.8	204.7	87.1
1992	218.7	14.9	203.8	93.2	8.2	3.7	18.6	8.5	191.9	87.7
1993	249.0	18.5	230.5	92.6	9.8	3.9	23.1	9.3	216.1	86.8
1994	248.6	13.8	234.8	94.4	9.6	3.9	23.0	9.3	216.0	86.9
1995	244.3	9.5	234.8	96.1	10.2	4.2	22.4	9.2	211.7	86.6
1996	257.0	10.0	247.0	96.1	10.1	3.9	22.9	8.9	224.0	87.2
1997	253.2	9.6	243.6	96.2	10.3	4.1	21.7	8.5	221.2	87.4
2004	260.6	0	260.6	100	13.7	5.3	19.3	7.4	227.6	87.3
2005	261,3	0	261,3	100	13,1	5,0	21,3	8,1	226,9	86,9
2006	282,7	0	282,7	100	12,5	4,4	23,5	8,0	246,7	87,6
2007	276,1	0	276,1	100	11,8	4,3	23,9	8,2	240,4	87,4
2008	275,0	0	275,0	100	12,9	4,7	23,1	8,4	238,9	86,9

Source: MADR

There are great possibilities of the area occupied by potato decrease early especially since some areas have climatic conditions such as the light soil (sandy-clay) of N.-V. Transylvania S. Oltenia, Banat V., and Ilfov counties. Romania can become a producer of potatoes for consumption early (second half of May and June), both for domestic consumption, but mainly for export (both N -V Europe and Central Europe and N. East). It is true that traditional early potato producers face competition from producers in the Mediterranean (Italy, Spain, Portugal), which provides good quality potatoes at relatively low prices but using the technology works and minimum pedo-climatic benefits, Romania may become a country known in early potato production. There are other cheaper suppliers of early potatoes such as those in Morocco, Israel, Egypt and Cyprus which provides potatoes at prices 12-17% lower prices for local producers, but the quality of potatoes is weaker, especially because of the taste grown in sandy soil.

Regarding the consumption of potato early to say that is an important component for human consumption. In 2008, potato consumption and early summer is 15 kg / inhabitant, with no significant differences compared to the previous three years except in 2005 when it was higher.

Human consumption of potato winter, the largest quantity of potatoes consumed, because it's best to store over winter in the range of 70-80 kg / capita and price depending on the price of other food commodities.

Early potato consumption is lower, representing 12% - 14% of total production. In industrial potato consumption decreased in 2008 by two times compared with 1992, from 60,000 tons to 30,000 tons. For the year 2007 stood at 30,000 tons, but an increase over 2005 when industrial consumption was 10,000 tons. Potatoes are consumed as food industrialized flaked and extruded. After 1990 no longer used in the manufacture of alcohol or potato starch instead of being taken by the cereal with a much lower price, and finished products are much cheaper. In 2008 we are dealing with human consumption decreased by 4.4% compared to 2007, fresh potato consumption. Most human consumption is fresh potato, 81.7 kg / capita (average) and a very small proportion of industrialized potato. Early potato production growth in Romania is an important measure for improving this crop. From studies in different parts of the potato in our country and in Suceava County, showed that an important role they are very different varieties. Depending on the length of vegetation are consumed early potato varieties for consumption in summer, autumn and winter consumption and industrialization. As a result of potato growers to choose varieties according to potato culture. Given market demands for industrial potato, processing, consumption and early potato, many manufacturers have turned to the potato seed imports from the EU.

Table 2

Evolution of the potato growing areas in the period 1989 - 2008

Year	Total Thousands ha	Area (thousands ha)		%	From which:					
		State sector	Private sector		Early variety	%	summer variety	%	autumn variety	%
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1996	257.0	10.0	247.0	96.1	10.1	3.9	22.9	8.9	224.0	87.2
1997	253.2	9.6	243.6	96.2	10.3	4.1	21.7	8.5	221.2	87.4
2004	260.6	0	260.6	100	13.7	5.3	19.3	7.4	227.6	87.3
2005	261,3	0	261,3	100	13,1	5,0	21,3	8,1	226,9	86,9
2006	282,7	0	282,7	100	12,5	4,4	23,5	8,0	246,7	87,6
2007	276,1	0	276,1	100	11,8	4,3	23,9	8,2	240,4	87,4
2008	275,0	0	275,0	100	12,9	4,7	23,1	8,4	238,9	86,9

Source: MADR

Table 3

Evolution of the destinations and offer potato varieties in Suceava County

Nr. Crt.	Variety	Destination	UM	Years		
				2005	2006	2007
1	LAURA	Gross production	To	728,75	780,0	645,0
		Commercial production 85%	To	619,44	663,0	548,25
		From which: 20 % seeds	To	123,89	132,60	109,65
		consumption	To	495,55	530,40	438,60
2	COSMOS	Gross production	To	562,5	577,5	512,5
		Commercial production 85%	To	450,0	462,0	410,0
		From which: 20 % seeds	To	67,5	69,3	61,5
		consumption	To	382,5	392,7	348,5
3	MIRABELA	Gross production	To	744,0	754,5	1170,0
		Commercial production 85%	To	632,4	641,33	994,50
		From which: 20 % seeds	To	94,86	96,20	149,18
		consumption	To	537,54	545,13	845,32
4	REDSEC	Gross production	To	397,0	412,0	365,0
		Commercial production 85%	To	337,45	350,2	310,25
		From which: 20 % seeds	To	50,62	52,53	46,54
		consumption	To	286,83	297,67	263,71
5	DESIREE	Gross production	To	675,0	712,5	607,5
		Commercial production 85%	To	607,5	641,20	546,75
		From which: 20 % seeds	To	60,75	64,13	54,68
		consumption	To	546,75	577,07	492,07
6	SANTE	Gross production	To	700,0	724,0	603,0
		Commercial production 85%	To	630,0	651,6	542,7
		From which: 20 % seeds	To	126,0	130,32	108,54
		consumption	To	504,0	521,28	434,16
7	AGATA	Gross production	To	100,0	110,0	93,5
		Commercial production 85%	To	95,0	104,5	88,83
		From which: 20 % seeds	To	-	-	-
		consumption	To	95,0	104,5	88,83
8	ROSARA	Gross production	To	220,0	230,0	205,0
		Commercial production 85%	To	209,0	218,5	194,75
		From which: 20 % seeds	To	-	-	-
		consumption	To	209,0	218,5	194,75

From the table, it is apparent that commercial quantity is extracted from a rate of 15 to 20% of seed potato and the difference is the date for consumption, trading performance is best at present and Rosaria AGATA varieties because they are early potatoes with a uniformity much better growth and used in potato consumption in the market as "early vegetables (potatoes).

In 2008 the potato crop occupies a total area of 28,826 hectares in the Suceava County, 85% of the program that is 34,140 hectares. In this area, 624 hectares have been planted in farms viable, with opportunities and materials that could best meet technological links to produce the most potatoes. Also, the total area of potatoes planted, 80 hectares are early potatoes, potatoes are 1740 hectares and 27,006 hectares are summer winter potatoes.

CONCLUSIONS

In the context of current social and economic effects of global crisis manifests itself with greater intensity in one of the most important sectors of Romanian economy - agriculture. In a world faced with climate shocks, energy and food crisis, remains the most important potato crop and is expected to be a solution that would ensure global food security for the period following decades.

The need for research conducted on the potato crop is given the low level of production achieved in our country. Average production in Romania is around 14.5 t / ha, which is - 3 3% of yields obtained frequently in western and northern countries - western Europe and only February 1 to May 1% of potential biological production the varieties used.

Early potato consumption is lower, representing 12% - 14% of total production. In industrial potato consumption decreased in 2008 by two times compared with 1992, from 60,000 tons to 30,000 tons.

Early potato production growth in Romania is an important measure for improving this crop. The studies showed that they have an important role are very different varieties. Depending on the length of vegetation are consumed early potato varieties for consumption in summer, autumn and winter consumption and industrialization.

To increase production early harvest should be strictly respected potato cultivation technology in general, and the early consumption. Agro-technical measures are specific each end of the culture (early consumption, consumption, summer variety) and each variety under irrigation and differentiated within the same scope and variety.

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TRAINING OF SCHOOL MANAGERS EDUCATION IN MARKETING AND PUBLIC RELATIONS

FORMAREA CONTINUĂ A MANAGERILOR ŞCOLARI ÎN DOMENIUL MARKETINGULUI EDUCAŢIONAL ŞI AL RELAŢIILOR PUBLICE

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Abstract. *The decreased number students and other attractive offers from schools in the area is a real threat and can lead to endangering the very existence of an educational institution. Educational marketing is a novelty for the vast majority of Romanian schools, being currently applied in particular for large high schools, high school groups and universities to: promote the educational offer, attract students, but also to identify new specializations that are interesting among them and on the labour market. For many school managers, marketing is an unknown, and education can not change without their action to be articulated by professionalism that can be ensured only by a complex preparation. We believe that courses in educational marketing and public relations is a priority because it gives managers the opportunity to understand the importance of educational changes that occur and how they could affect the success or even the survival of their institution and, at the same time, they propose strategies while adapting to the educational environment.*

Key words: continuous training, school managers, educational marketing, educational products.

Rezumat. *Scăderea numărului de elevi şi ofertele atractive ale celorlalte şcoli din zonă reprezintă o ameninţare reală şi se poate ajunge până la a pune în pericol chiar existenţa unei instituţii de învăţământ. Marketingul educaţional reprezintă o noutate pentru marea majoritate a şcolilor româneşti, fiind aplicat în prezent în special de liceele foarte mari, grupuri şcolare mari şi în universităţi pentru: promovarea ofertei educaţionale, atragerea de elevi şi studenţi, dar şi pentru identificarea unor noi specializări ce au căutare în rândul acestora şi pe piaţa muncii. Pentru mulţi dintre managerii şcolari, marketingul reprezintă o necunoscută, iar educaţia nu se poate schimba fără acţiunea acestora care trebuie să fie una articulată prin profesionalism ce poate fi asigurat doar de o pregătire complexă. Considerăm că organizarea unor cursuri în domeniul marketingului educaţional şi al relaţiilor publice reprezintă o prioritate deoarece oferă managerilor educaţionali posibilitatea de a înţelege importanţa schimbărilor care se produc şi modul cum pot afecta succesul sau chiar supravieţuirea instituţiei şi în acelaşi timp le propune strategii de adaptare la mediul educaţional.*

Cuvinte cheie: formarea continuă, manageri şcolari, marketing educaţional, produse educaţionale.

INTRODUCTION

At present, within the educational system, lifelong learning has become a condition of relevance and competitiveness for school managers, due to

significant changes in Romanian education system, dynamics based on economic and social developments nationwide.

The reform strategy within the education domain was primarily expressed in the law changes that made reference to training managers from high schools, where training is regarded as a true condition for achieving all the aims of the reform.

The appearance of competition between schools both in pre-university and the university education resulted in new guidelines to attract customers (learners) and promoting the institution's image.

Today we can say that for any educational institution, educational needs analysis of the community, market research on services and educational products are top priorities.

MATERIAL AND METHOD

The first step towards training needs analysis of school managers education in marketing and public relations was to collect data from teachers in higher education participating in training activities, in school year 2008-2009.

Instruments were used for this purpose a questionnaire, analysis management plans, focus groups. Were also examined documents such as:

- institutional development plans of educational organizations in rural and urban Iasi;
- analysis of custom organizational goals at the level of education of the territory;
- trainees job descriptions (standards of occupational duties);
- comprehensive analysis of the community from which the learners (needs and problems of community integration institutions and educational policies in the Community strategy);

RESULTS AND DISCUSSIONS

For many school managers, marketing education is unknown and so we believe that courses in educational marketing and public relations is a priority for managers that provides an opportunity to understand the importance of changes that occur and how can affect the success or even to the education and proposes strategies while adapting to the educational environment (Constantin T, 2002).

Any intervention to optimize and reform the educational level is likely to succeed only if based on good knowledge of the facts, that the area to be subject to change. From this perspective, educational needs analysis of general / systemic, individual and become the priority in building a program / project for the educational development and training. (Brezuleanu Carmen, 2008)

Based on Deming's cycle, systematic analysis of ongoing training, represented in fig. 1 that involves some basic steps to follow:

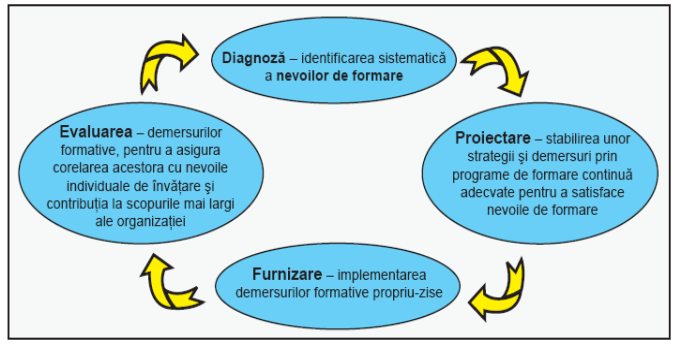

Fig. 1. A systematic analysis of ongoing training

The whole approach to research we conducted as a public policy analysis and respected all its steps: analysis of needs, strengths, weaknesses, opportunities, threats, we set the agenda of the training of school managers in marketing and educational public relations, namely: short-term proposals (up to three years), long-term proposals (up to 15/20 years), remedial / restriction,

Needs analysis

Strengths

-Training school managers is a priority of Romanian education reform policy;

-Availability of specialists, academics with expertise in this area;

-Existence of university centers that can provide optimum conditions for organizing these courses;

-Awareness of school managers training needs in various areas of reform and understanding their roles in the reform process;

-Availability of managers to attend training;

-Shift from "manager director" to "managing director" and "educational leadership directory.

-Establishment of marketing departments in schools that need people trained in this area

Weaknesses

- Lack of trainers in education marketing, at school education level;

- Overloaded program managers who do not leave much time for personal training;

-High costs do not allow access to all training programs in universities;

-Lack of marketing and public relations specialists in schools to coordinate promotional activities;

-Lack of objective analysis of the capacity of organizing ongoing training of school managers;

-Lack of applicative practical activities of training programs;

- Limited-access rural managers in this type of training;

- Insufficient financial resources, threatening the expansion of training.

Agenda school managers training program in educational marketing and public relations

Short-term proposals (up to three years)

❖ Politics must withdraw permanently from school life. School leadership to be promoted to people who have the necessary qualities to perform activities involved in the school office manager.

❖ Rethinking schools management system should result in "directory manager" to "managing director" and "educational leadership directory".

❖ Elimination of the contest for getting the job of school director and replaced with a test for the position, which it passes or not subjects for management functions.

Ensure the training of school managers in relation to European requirements.

Medium-term proposals (up to ten years)

✓ Strengthen the educational market training programs for managers of schools in educational marketing and public relations.

✓ Establishing a common responsibilities for all actors: managers, students, parents, community.

✓ Development alternative mechanisms for promoting specific training providers offer the school managers in marketing and public relations education (publications, exhibitions offers, website, etc.).

✓ Recognition and certification, according to Romanian legislation, of the internship training.

Long-term proposals (up to 15/20 years)

♦ Permanent employment of school managers in marketing and public relations education

Table 1

Agenda school managers training program in educational marketing

Proposals	Risks	Solutions	Resources
- school depoliticization	- change resistance	- consistent and responsible decision to become a public institution	- educational policies
- Permanent post on school managers	- competition disappears	- professionalizing school office director	- continuous programs for school managers
- Strengthening the educational market programs of training	- lack of objective analysis of those who organize the continuous training of managers	- multiplication those who offer continuing education	- ONG - private companies of training and consultancy
- Professional training of school managers in relation to European standards	- lack of international compatibility concerns - Disinterest	- means of financial support to the process of continuous training	- support training programs with different funding sources
- granting management compensation and other facilities for school principals in disadvantaged areas	- have no support-financial corporations	- favorable towards this categories of personal	- financial support

Training of school managers is an essential component of reform. The purpose of this component is to establish a core of trainers designed to contribute to the implementation of curricular innovations (Brezuleanu C, 2009).

Goals in training programs focused on the next general managerial skills, and other issues such as:

-Training experts to develop standards and curriculum;

-Labor-training for participation in professional development and curriculum standards;

-Establishment of active networks of social partnership;

-New role of schools in a competitive market economy.

Agenda

1. Establishment of postgraduate courses / MSc in marketing educational programs and public relations.

2. Training of specialists in the field of marketing education at school inspectorates and the Teachers' House.

3. Establishment of the School Inspectorate of marketing departments that will help managers of small schools to define strategies.

4. Establish in each school marketing departments to deal with the promotion of educational offer competitive environment analysis and establish strategies to promote the image of institutions.

5. The CCD-sized organization in every county of brief modules, trusted marketing and public relations.

6. The introduction of competitions for positions of director of a trial presentation of a marketing project for the institution to which the candidate wishes to lead.

7. Establish in each school of posts "Public Relations" to deal with organizing and managing the school has relationships with community, educational institutions and social partners.

8. By schools contracting specialized firms to conduct marketing projects and provide expert advice in this area and public relations.

Risks

- Managers are not aware of important areas for school development in a competitive environment and have knowledge and skills necessary to apply a policy of education marketing;

- The absence of such items / specialized departments within schools / CSI-sized;

- Large costs involved in organizing such training.

Opportunities

- The existence of training abroad in marketing and PR that can be accessed by teachers with scholarships;

- There can advise schools to universities in marketing and public relations;

- The possibility of organizing training centers at regional or national area;

- Romanian education system appeared competitive calls promoting marketing strategies to attract students;

Threats

- Lack of interest in training managers in marketing and public relations;
- Lack of coherent policies in schools education marketing;
- Gaps in legislation on the powers of managers in this area;
- Staff reduction policy promoted MER does not allow the establishment of departments / stations such as CSI's or school;

Remedial / restriction

- Change the law to establish the powers and duties of managers in this area
- Establish in schools and CSI sites of stations / departments to conduct marketing and public relations policies
- Set up exchange programs with schools in other European countries in this area
- Develop a training policy in the CSI in marketing educational sites

CONCLUSIONS

In order to optimize range of programs and educational services for educational training in marketing and public relations we propose:

- conducting periodic training of needs analysis of teachers with modern and reliable forms of research (questionnaires, research needs, polls, surveys, using statistical data locally, regionally and nationally);
- developing a network of trainers based on identified training needs;
- impact studies on programs and services to beneficiaries;
- proposal to accredit training programs;
- establish partnerships with schools to achieve training courses in marketing and public relations education;
- partnership development;
- organizing training activities and in more rural areas.

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GARDEN AS A CULTURAL TEXT

GRĂDINA CA TEXT CULTURAL

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Abstract. *The purpose of our research is to analyse the garden as a text. The texts are not only literary. They may be any physical structures meant to represent ideas from a semiotical point of view. In fact, the whole culture, considered as a text, is represented by a complex system of signs. The gardens are characterised by a high semiotical heterogeneity –many signs in passive state waiting to be discovered and interpreted. The high semiotic potential of the gardens may determine the interpreter (the visitor or the person who contemplates the garden) to take part in semiosis, the same way in which a book may attract the reader's attention, determining him to discover its significations. The investigation of the gardens as „texts" means to find out the answers to a series of questions. Which are the significations of this „text"? How and what does this „text" communicate? How are the various components of the garden organised in order to create a coherent whole? Which are the established thematic models? How does this „text" involve other „texts"? The concepts of space and text from the cultural semiotics, their different semiotical and communicative functions in culture and cultural tradition have been analysed in our paper.*

Key words: semiotics of culture, communication, text, sign system, artefact

Rezumat. *Obiectivul cercetării noastre vizează abordarea grădinii ca text. Textele nu sunt numai literare. Pot fi orice structuri fizice făcute să întruchipeze idei în sens semiotic. De fapt, întreaga cultură, ca text, este o reţea de semne. Grădinile posedă o eterogenitate semiotică ridicată –multe semne în stare pasivă care aşteaptă să fie descoperite şi interpretate. Potenţialul semiotic ridicat al grădinilor poate determina interpretul (pe vizitator sau pe cel ce contemplă o grădină) să participe la semioză, aşa cum o carte bine scrisă poate capta atenţia cititorului, provocându-l să-i descopere semnificaţiile.Examinarea grădinilor ca „text" necesită căutarea răspunsurilor la o serie de întrebări. Care sunt semnificaţiile acestui „text"? Cum şi ce comunică acest „text"? Cum sunt organizate diferitele elemente componente astfel încât să creeze un întreg coerent? Care sunt modelele tematice stabilite? Cum implică acest „text" alte „texte"? Conceptele de spaţiu şi de text din semiotica culturii, diversele funcţii semiotice şi comunicative ale acestora în cultură şi în tradiţia culturală au fost analizate în lucrarea noastră.*

Cuvinte cheie: semiotica culturii, comunicare, text, sistem de semne, artefact

INTRODUCTION

The study of culture is always intrinsically semiotic, since it is always about communication. Communication, be it inter-or intrasubjective, is always social. In this article we intend to examine the compositional arrangements of the famous Japanese garden Ryôan-ji Zen as it constitutes a distinctive medium of *communication* and a way for complex philosophical perceptions and religious ideals to become tangible in topographical *text* form. Genarally speaking, gardens are created by transforming principally unmodified environmental objects into *signs* and organizing these into *texts*.Texts represent social meanings that are materially encoded. While communication has generally been considered as essentially a linguistic phenomenon, in practice, communication involves 'inscription': meanings carried through different material forms that are brought together and organized in various combinations.Communication is executed through *sign systems* and *artefacts* that are frequently also the outcome of interactions. Therefore it would be natural to consider all disciplines studying *cultural phenomena* or human interactions as *semiotic*. No treatment of „culture" can, nowadays, escape the propositions of the Tartu-Moscow school of semiotics about the textual nature of cultural phenomena. According to this school, textual features can be recognised in almost all *spatial representations* (gardens included) both in terms of artefacts and mentifacts.

MATERIAL AND METHOD

In this article we intend to analyse the Japanese garden Ryôan-ji from a semiotic perspective – from the standpoint that considers the social dimensions of meaning systems – in terms of how *meaning* is organized and conveyed and how this garden constitutes a distinctive *medium of communication*. Ryôan-ji is a well-known Japanese garden composed principally of rock and gravel that employs a particular set of *representational resources* intended to project Zen sensibilities. In the case of the study of culture in quite different disciplines, cultural semiotics among them, we often meet the transfer of conventional methods that have been developed for a specific slot of culture, to other, sometimes considerably dissimilar and/or wider areas. „*Text*" has been such a methodological device for the semiotics of culture. Within cultural semiotics the *concept of text* has been defined and redefined many times. The diverse semiotic and communicative functions of text in culture and in cultural tradition – for example, as a container, a generator or a transmitter of information (e.g. Y.Lotman, 1981) – have made the position of the text relatively fluid on the semiotic metalevel as well. Indeed, even the very essence of text as an (artefactual) object is difficult to grasp.

Different *conceptions of the text* as a *cultural phenomenon* have usually been strongly coupled to particular conceptions of the relation between culture and its exterior. This relation is often treated as separation of the text from the non-text. A general culturo-semiotic viewpoint as represented by Y. Lotman, suggests „ [...] understanding of the text as any individual message the distinction of which (from the „non-text" or another text) is intuitively cognised with sufficient certainty". This implies that „ [...] the text possesses a beginning, an end and a

definite inner organisation" and this allows, along with other features, the creation of a typology necessary for an adequate deciphering of texts (Y. Lotman, 1974).

The three main features or aspects of the text, which have been described by Lotman using the terms „expressed", „bordered", and „structured" (Y.Lotman, 1974), come together by virtue of a general property of the different dimensions of the text: their confined or circumscibed nature. For the emergence of text into ontology, it has to be demarcated (see also Y.Lotman, 1970, cf. Merrell, 1982). Demarcation, in turn implies the creation of a unit that is self-reliant in its relation to the environment and describable through surroundings. Thus the text comes into being, or more correctly –is made to come into being – in the field of tension between at least two different spheres, or in the intersection between at least two systems of different semiotic structure. Indeed, it would otherwise not be semiotically intelligible: the existence of at least two different incongruent or asymetrical realms is needed for the emergence of a *semiotic structure*, because – as stated in one of the most widespread elementary and common-sense understanding of the sign –„ the sign stands for something that the given sign is not itself" (cf. C.S . Peirce's definition: „A sign, or representamen, is something which stands to somebody for something in some respect or capacity"; C.Peirce 2.228).

RESULTS AND DISCUSSIONS

The immanently *meaningful nature of space* is closely connected with the semiotic essence of human being, beginning, on the one hand, from the dependence of the physical well-being of an individual on her/his ability to handle the surrounding space and, on the other hand, from philosophical discussions on the true nature and aim of human existence so as connected with the movement of *semiotic structures* in *spatial configurations*.

Gardens are essentially created by demarcating a territory, and this begins a process of shaping the environment.The act of composition continues as elements are selected, purposefully combined and cohesively arranged. Different cultures and social groups draw on specific *sign-making materials* and *patterns of organization* and *use* these for very specific purposes.

Analysis of semiotic modes of communication have focused on systems of meaning as they emerge from, and express, Western cultural values (Hodge and Kress, 1988; O'Toole, 1994; Kress and Van Leeuwen, 1996). However, semiotic systems are in every case both culturally and historically specific. There is a need, therefore, to examine systems of meaning-making used by other cultures, both for what insights they provide about the discursive practices particular to those cultures and for what light this may shed on the complex processes of semiosis (Lemke, 1998).

In Ryôan-ji garden the combination of rocks and gravel suggests *mountains* and *flowing water* (or clouds), with the moss perhaps representing a grove of minuscule trees surrounding the mountain crags. This is the most common interpretation of Ryôan-ji since, after all, *sansui* (mountains and water) colligate in Japanese and Chinese thought, in literature and in the visual arts (Anesaki, 1963; Slawson, 1987). While there are *visual elements* which

clearly make *iconic* reference to mountains and rivers, the textual meanings conveyed in the Ryôan-ji garden are far more than a representation of 'landscape-in-miniature'. The central focus of the garden design is no one particular rock or rock configuration, but centres on the relational contrast between positive space - rock forms - and negative space - unoccupied area - (Mcgovern, Sean, 2004).

This contrast of figure and ground is pronounced. The rocks command attention when contrasted with the neutralized space of gravel. Gradations from light to dark are seen in the shadows of the rocks and in the lines etched in the gravel. Volume and depth are achieved through the use of flat tones of black and grey. Varying density is created with tonal transitions in the grey lines which further emphasize expansiveness and perspective. The dark and light create tonal contrasts in a way that is homologous to both *suiboku* ink landscape paintings and to written Japanese language. Line is a repeated compositional element and is used with minimal variations. Linear shapes are used as a cohesive device by visually unifying and connecting independent elements to create one cohesive and coherent unit.

This *linear motif* is conveyed in nearly every element of the garden (in its most inclusive sense). Each serves to reiterate this linear pattern by repeating horizontal lines in different thicknesses and textures. The alternating effect of line accentuates the essential flatness of the display and thereby contributes to the sense of volume of the negative (unoccupied) space. *Framing* is a key organizing principle and feature of the garden (Mcgovern, Sean, 2004). Without the wall, of course, not just the design but the significance of the garden itself would be altogether different. As explained earlier, the series of straight lines work to frame the precinct, emphasizing its rectangularity, flatness and geometrically distributed space.

According to Arnheim (1988), geometric shapes possess an inherent visual centre which encourages a visual dynamic.While square shapes (with their equal sides) support 'centricity', rectangular shapes emphasize 'eccentricity', with the apposing and unequal sides of the rectangular frame working in opposition to each other. Each cluster of rocks is additionally framed by a circular set of raked or 'scratched' lines. While the straight horizontal lines convey a sense of rigidly imposed order, the curving and circular lines intensify and concentrate and are utilized as a way of suggesting something 'incomplete', 'unresolved'. These dynamic lines suggest factors that are unsettled and accentuate the elements to which the viewer is asked to pay special attention.

The working relationship between line and rock provides an example of identical textual components, and their organized interrelationship is used to imply two nearly opposite meanings. In this text, the rocks can be seen as static and anchored – a quality of their inherent visual weight. But at the same time, they are dynamic – a quality of their shape and vectors. As suggested earlier, the rock and gravel design contains *visual elements* which make *iconic*

reference to mountains and rivers: the achromatic colour scheme is similar to that of ink on paper – black and white tonal contrasts which resemble the *suiboku* ink landscape paintings that are representative of the Zen tradition. But there is also a strong resemblance to the Zen tradition of calligraphy – the rocks on gravel suggest written characters on paper, both in the way they utilize similar black and white tonal contrasts and in the similar way in which the (positive) rock clusters are arranged on the (negative) space of gravel. These correspondences in appearance and configuration to the linguistic mode display the organizational patterns that are found in writing which Halliday (1994) calls 'constituency'.

Constituency is the configuration and arrangement of smaller items into larger units. In this case, the largest unit is the garden itself, which in turn consists of five cluster groups; this further breaks down into clustered arrangements of large and small rocks in the order of 5, 2, 3, 2, 3.

The organizing principles and constituency patterns of the rock clusters of the Ryôan-ji garden closely correspond to the organization of systems of written language. In both the arrangement of rock clusters and the arrangement of linguistic units, we see that space is designed and utilized to mark off one unit from the other: in the garden, small narrow spaces between rocks consolidate smaller elements into clusters. In the linguistic examples, shapes form characters – or letters, which in turn are combined into words – and space acts to designate sentences or phrases and to create pauses and stops.

Another similarity between the rock garden and written characters can be observed in the way the rock clusters are not simply set out in 'space'. Like written characters, movement is achieved by the repetition of regulated visual units. Rhythm is achieved by arranging the rocks in syncopated phrases of longs and shorts and varying heights and sizes, creating a sense of movement in time.

CONCLUSIONS

Inasmuch as all artefacts encompass a dimension of meaning, culture areas gain a purely semiotic aspect that has given rise to the description of them as *semiotic spaces*. Examining the Ryôan-ji garden as *text* sheds light on what was previously regarded as merely an aesthetic object and inevitably ineffable.

The Ryôan-ji garden is strongly multidimensional in its *semiotic organizing principles* and *communicative* purposes: the garden communicates using natural materials which were selected for their unique semiotic potentialities and allow the realization of particular *textual meanings*. It utilizes a restricted set of *semiotic materials* and modes to achieve precise *communicative* effects. Through their combination and collaboration, these semiotic materials and meaning making principles effectively convey an array of different meanings concurrently.

The Ryôan-ji garden acts as a textual exegesis: a way for complex philosophical perceptions and religious ideals to become tangible in topographical text form. This study also suggests that analysing how other gardens work as texts – not just other Japanese gardens, but the gardens of Europe, India, China and elsewhere – is a way of deepening our understanding of the extensive range of semiotic principles that different cultures draw on and utilize to convey meaning. More specifically, seeing gardens as *text* is a way of revealing the meaning-making principles that have shaped garden construction the world over, and thus provides a way to understand the relationship of garden design to the social, philosophical and cultural discourses and traditions which give it meaning.

All *sign systems* operate in physical and /or *semiotic space*, at the same time all space, be it physical or conceptual, is *semiotised* via *sign systems* at several levels of modelling. Culture is located in a certain physical environment, and artefacts are embedded in environment, shaping the later in unique ways that have given reason for the description of the planet in terms of culture areas.

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ECONOMIC DIMENSION VITICULTURE WORLDWIDE END IN ROMANIA

DIMENSIUNEA ECONOMICA A VITICULTURII LA NIVEL MONDIAL ŞI IN ROMÂNIA

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Abstract. *The research presented in this work had as objective the determination of capital and land used for growing production of primary technical results represented by the production of grapes and wine. The indicators used are designed to reflect the volume of consumption and development results and their multi. During 2000-2007 Romania has a share of 5.6% of the area of existing plantations in the European Union and 2.9% of plantations worldwide. Relative to world production and the European Union Romanian grape production accounting for 1.6% and 3.7%.*

Key words: vineyard area, production of grapes, wine production

Rezumat. *Cercetările prezentate în cadrul acestei lucrări au avut ca obiective determinarea capitalului funciar utilizat pentru producţia viticolă şi a rezultatelor tehnice primare reprezentate de producţia de struguri şi vin. Indicatorii utilizaţi au rolul de a reflecta volumul consumurilor şi rezultatelor obţinute cât şi evoluţia multianuală a acestora. În perioada 2000-2007 România deţinea o pondere de 5,6% din suprafaţa de plantaţii existentă la nivelul Uniunii Europene şi 2,9% din plantaţiile la nivel mondial. Raportată la producţia mondială şi cea a Uniunii Europene producţia românească de struguri are o pondere de 1,6% şi respectiv 3,7%.*

Cuvinte cheie: suprafaţa viticola, producţia de struguri, producţia de vin

INTRODUCTION

Knowledge of state and evolution of an economic phenomenon is a prerequisite for determining future events and strategies for determining economic units (Kotler, 1997).

Establishing measures of economic growth in grape production requires a detailed diagnosis of the evolution of the industry both nationally and internationally.

MATERIAL AND METHOD

Quantifying the level of development of viticulture was based on statistical interpretation processes using statistical information available in the FAOSTAT database (www. faostat).

The interpretation of economic statistics and mathematical models are essential in addressing the particularity of specific farm management (Sambotin, 1993).

Statistical indicators used were:

• the annual average area occupied by plantation of vines, the average production, average production and average total production of wine;

• share surface, production of grapes and wine production area and the Romanian grape and wine production to other specific areas determined the percentage ratio between the average indicators in Romania and other indicators of average areas;

• development indices that determine the average annual percentage ratio between the indicators and those of a year in year n;

• multi-annual development environment indicators determined as the arithmetic mean of indices The average annual trend;

• multi change or variability measured as a percentage ratio between the amplitude of the phenomenon and multi-media phenomenon. The amplitude is the difference between the maximum and minimum phenomenon investigated.

The period under review was limited by the available data in the database used and their relevance to the eight years 2000-2007.

RESULTS AND DISCUSSIONS

Vintage size is given by the area cultivated with vineyards and the results of their maintenance.

The data presented in table 1 shows that average global surface recorded in the period 2000-2007 is 7.389.100 ha with a range of 73.412 million hectares in 2000 to 74.977 in 2003. The average variability was 2.1%.

Table 1

The area occupied by vineyards in the period 2000-2007 (thousand ha)

Area	Year							
	2000	2001	2002	2003	2004	2005	2006	2007
World	7341,2	7406,9	7438,8	7497,7	7343,5	7345,4	7389,3	7349,7
Europe	4375,5	4335,6	4328,3	4306,5	4171,2	4129,0	4073,8	4028,6
UE	3920,2	3876,9	3871,8	3860,0	3737,9	3716,3	3667,3	3628,6
Romania	247,5	244,4	233,1	223,1	205,4	171,0	190,3	187,6

SOURCE: FAOSTAT - 2010

Average size of vineyards in Europe was 4.218.600 ha with variability of 8.2% and the European Union with 37.849 million hectares to 7.7% variability. In these two areas the maximum area was held in Europe in 2000 when there were 4.375.500 ha and 3.920,200 ha in the European Union.

Romania had a share of 5.6% of the existing plantations in the European Union, 5.0% of that in Europe and 2.9% of plantations worldwide. Multi-annual variation of cultivated area were significantly higher in other areas reaching 36.0%. This degradation is due to the gradual establishment of plantations returned and new plantations.

Evolution of area under vineyards in table 2 shows the global stagnation and a relatively steady decline for the other areas investigated

Table 2

Evolution of area under vineyards in the period 2000-2007 (%)

Area	Year								Average 2000-2007
	2000	2001	2002	2003	2004	2005	2006	2007	
World	-	0,9	0,4	0,8	-2,1	0,0	0,6	-0,5	0,0
Europe	-	-0,9	-0,2	-0,5	-3,1	-1,0	-1,3	-1,1	-1,0
UE	-	-1,1	-0,1	-0,3	-3,2	-0,6	-1,3	-1,1	-1,0
Romania	-	-1,3	-4,6	-4,3	-7,9	-16,8	11,3	-1,4	-3,1

SOURCE: FAOSTAT - 2010 (calculated data)

Thus, the average index of dynamic area under plantations in the world was void when Europe and the European Union has been an annual average decrease of 1.0% over the period studied.

In Romania, reducing the surface occupied by vineyards was more obvious than at other levels reaching an annual average of 3.1%.

The most significant reduction was recorded in 2005 when it was 16.8%. The data on the average grape production presented in table 3 produces a higher global production to other areas surveyed with an annual average of 8.796,6 kg / ha and a multi-annual variability of 10.4%

Table 3

Average grape production over the period 2000-2007 (kg/ha)

Area	Year							
	2000	2001	2002	2003	2004	2005	2006	2007
World	8825,5	8283,6	8319,1	8507	9200,6	9147,9	9113,3	8976,0
Europe	7444,9	6963,1	6620,7	6993,8	7776,4	7031,1	7213,5	6811,9
UE	7639,9	7208,5	6802,1	7088,8	7995,6	7211,2	7444,9	6916,1
Romania	5233,5	4589,6	4619,1	4832,3	5990,8	2958,6	4794,5	4653,9

SOURCE: FAOSTAT - 2010

In Europe and the European Union average values of production per unit area obtained were close, they stood at 7.106,9 kg / ha respectively 7.288,4 kg / ha with a variation of 16.3% and 16.4 %.

Table 4

Evolution of grape production in the period 2000-2007 average (%)

Area	Year								Average 2000-2007
	2000	2001	2002	2003	2004	2005	2006	2007	
World	-	-6,1	0,4	2,3	8,2	-0,6	-0,4	-1,5	0,3
Europe	-	-6,5	-4,9	5,6	11,2	-9,6	2,6	-5,6	-0,9
UE	-	-5,6	-5,6	4,2	12,8	-9,8	3,2	-7,1	-1,0
Romania	-	-12,3	0,6	4,6	24,0	-50,6	62,1	-2,9	3,2

SOURCE: FAOSTAT - 2010 (calculated data)

In Romania the average yield was investigated for the period of 4709,0 kg / ha, representing 63.9% of her average production in the European Union, 65.5% to 52.9% of Europe's production and average global production.

Changes in multi-reach 64.4%. The data presented in table 4 show a global average annual growth of 0.3% accompanied by a decrease of 0.9% and 1.0% recorded in Europe in the European Union.

In Romania there was a significant variability from year to year with increases of 62.1% and 24.0% in 2006 and 2004 and an average yield reduction of 50.6% in 2005. For the period studied, the average output growth was characterized by an average increase of 3.2% per year.

Table 5

Total production of grapes in the period 2000-2007 (thousand tons)

Area	Year							
	2000	2001	2002	2003	2004	2005	2006	2007
World	64790	61356	61884	63784	67565	67195	67341	65971
Europe	32576	30189	28657	30119	32437	29032	29386	27443
UE	29950	27947	26337	27363	29887	26799	27303	25096
Romania	1295	1122	1077	1078	1230	506	912	873

SOURCE: FAOSTAT - 2010 (calculated data)

Total production of grapes from the data revealed in table 5 indicate a global annual average of 64.985.800 tons and 29.979.900 in the European with variations of 9.6% and 17.1%. The European Union gained a total annual production of 27.585.200 tons with multi-variation of 17.6%. Romania has made 3.7% annually in the medium which reached 10.117 thousand tons annually.

Table 6

Evolution of total grape production in the 2000-2007 periods (%)

Area	Year								Average 2000-2007
	2000	2001	2002	2003	2004	2005	2006	2007	
World	-	-5,3	0,9	3,1	5,9	-0,5	0,2	-2,0	0,3
Europe	-	-7,3	-5,1	5,1	7,7	-10,5	1,2	-6,6	-1,9
UE	-	-6,7	-5,8	3,9	9,2	-10,3	1,9	-8,1	-2,0
Romania	-	-13,4	-4,0	0,1	14,1	-58,9	80,4	-4,3	1,8

SOURCE: FAOSTAT - 2010 (calculated data)

Reported world production and European production represent Romanian 1.6% and 3.4%. Romania's total production variability was 78.0% higher due to varying surfaces and production environments. Evolution of total grape production in the period 2000-2007 indicates an average annual growth of 0.3% to global values in Table 6.

In Europe and the European Union grape production fell by 1.9% and 2.0%. Total production of grapes produced in Romania registered as the production average annual growth marked by significant variations of up to 80.4% in 2006 and decreases to 58.9% in year 2005.

On average, Romania's total production of grapes increased by 14.0% over the period studied, and an index of 1.8% annually.

Table 7

Producţia totală de vin în perioada 2000-2007 (mii hl)

Area	Year							
	2000	2001	2002	2003	2004	2005	2006	2007
World	283949	270063	262031	268877	307910	281455	280040	264245
Europe	202520	185484	179451	182176	211105	181463	184981	171769
UE	191297	173176	166758	168739	195880	168349	172009	158268
Romania	5453	5463	5461	5457	7071	2602	5014	5289

SOURCE: FAOSTAT - 2010 (calculated data)

According to data taken from FAOSTAT gives presented in table 7, the total production of wine produced worldwide during 2000-2007 was on average 277.321.100 hl, 187.368,5 hl of which was obtained in Europe and 174.309.400 hl in the European Union. Romania has achieved annual average production of 5.226,2 hl representing 1.9% of world production, 2.8% and 3.0% of European production in the European Union.

Table 8

Evolution of total wine production in the 2000-2007 periods (%)

Area	Year								Average 2000-2007
	2000	2001	2002	2003	2004	2005	2006	2007	
World	-	-4,9	-3,0	2,6	14,5	-8,6	-0,5	-5,6	3,2
Europe	-	-8,4	-3,3	1,5	15,9	-14,0	1,9	-7,1	2,2
UE	-	-9,5	-3,7	1,2	16,1	-14,1	2,2	-8,0	2,5
Romania	-	0,2	0,0	-0,1	29,6	-63,2	92,7	5,5	1,5

SOURCE: FAOSTAT - 2010 (calculated data)

Total production of wine in the world according to data calculated in the period analyzed in Table 8 was hl and in Europe 277.321 hl of multi variations of 16.5%. In the European Union have produced 174.309.400 hl, with a range of multi Romania 21.6% of which occurred in 3.0%, 5.2262 million hl with a multi-annual variability of 85.5%. Compared to production worldwide and at European level in Romania there were 1.9% and 2.8% respectively.

CONCLUSIONS

1. Romania during 2000-2007 had an average plantation area of 212,800 hectares of vines representing 5.6% of the area planted with vines in the European Union, 5.0% for Europe and 2.9% of its area planted with vines in the world.

2. The average yearly grape production was 1.0117 million tons representing 3.7% of the European Union, 3.4% of Europe and 1.6% of world production.

3. The average yearly wine production in Romania was 5,226,200 hl representing 3.0% of wine produced in the European Union, 2.8% of European production and 1.9% of world production.

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THE GRAPES MARKET IN ROMANIA AND INTERNATIONALLY

PIAŢA STRUGURILOR ÎN ROMÂNIA ŞI PE PLAN INTERNAŢIONAL

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Abstract. *Research has sought to determine position relative to Romanian viticulture worldwide. Thus, it was done to determine the volume and the evolution of supply and demand of grapes and grape international trade. In the period 2000-2007 demand for grapes was 122.2 thousand t, the supply of 1.0117 thousands t, imports had a volume of 10,300 t and exports 790 t.*
Key words: demand for grapes, grape supply, international trade

Rezumat. *Cercetările au urmărit determinarea poziţiei viticulturii româneşti în raport cu viticultura pe plan internaţional. Astfel, s-a procedat la determinarea volumului şi a evoluţiei cererii şi ofertei de struguri cât şi a comerţului internaţional cu struguri .În perioada 2000-2007 cererea de struguri a fost de 122,2 mii t, oferta de 1011,7 mii t, importurile au avut un volum de 10300 t iar exporturile 790 t.*
Cuvinte cheie: cererea de struguri, oferta de struguri, comerţul internaţional

INTRODUCTION

Market analysis is the starting point, that the foundation of future decisions. This includes consumption analysis, supply analysis, price analysis, competitive analysis, trend analysis and change of company macroenvironment and microenvironment (Ştefan, 2007).

Wine production is an important area of activity for the Romanian economy given the importance of food, industrial, agro-technical, environmental, exports as a source of profit (Pânzaru, 2009).

MATERIAL AND METHOD

Quantifying the level of development of viticulture was based on statistical interpretation processes using statistical information available in the FAOSTAT database (www. faostat).

The interpretation of economic statistics and mathematical models are essential in addressing the particularity of specific farm management.

Statistical indicators used were: the application of grapes, grape individual consumption, the supply of grapes, grape import volume, export volume of grapes, grape import value, export value of grapes, grape prices.

RESULTS AND DISCUSSIONS

Analysis of the data presented in table 1 shows the worldwide demand 21,754,900 tons grapes on a series of six years - last year for which data are available in the database studied.

On the European continent grape request was 5.1826 million tons and the European Union request 3538.0 thousand tons of grapes in Romania amounts to 122 200 t, representing 3.5% of the demand of the European Union, 2 4% of the asking at the continental level and 0.6% of world demand.

Table 1

Grape Demand in 2000-2005 (thousand tons)

Area	Year						Average 2000-2005
	2000	2001	2002	2003	2004	2005	
World	21357,4	19887,0	21603,0	21896,8	21779,3	24006,1	21754,9
Europe	5651,9	4993,2	5056,7	5248,7	4792,6	5352,7	5182,6
UE	3887,5	3430,7	3589,0	3459,9	3142,4	3718,3	3538,0
Romania	145,7	108,3	127,2	115,0	126,9	110,0	122,2

SOURCE: FAOSTAT – 2010

Evolution of grape demand is expressed through a worldwide annual growth of 2.1%, a reduction of 0.6% Europe, 0.3% and 3.5% in the European Union in Romania.

Knowledge level and future demand for grape to evolving population is needed to determine the level of individual consul presented in table grapes. 2. Across the globe, the average individual consumption in the period under review was 3.5 kg / person / year with a variance of 13.8% and on this continent has a value of 7.1 kg / person / year, with a range of 16.9 %.

Table 2

Individual consumption of grapes in 2000-2005 (kg / person / year)

Area	Year						Average 2000-2005
	2000	2001	2002	2003	2004	2005	
World	3,5	3,3	3,5	3,5	3,4	3,7	3,5
Europe	7,8	6,9	6,9	7,2	6,6	7,3	7,1
UE	10,3	9,1	9,4	9,0	8,2	9,6	9,3
Romania	6,6	4,9	5,8	5,3	5,8	5,1	5,6

SOURCE: FAOSTAT – 2010

Personal consumption in the European Union amounted to 9.3 kg grapes per person per year, while in Romania to 9.3% with a range of 23.1% and 29.9% respectively.

This indicator has seen a significant reduction in the period under review particularly in Romania where there was a reduction of 3.1% during the reported period.

Also, the European Union and the continent has been a decrease of individual consumption by 0.7% although it increased worldwide by 1.1%.

Grape Imports during 2000-2007 was, according to the tab. 3, 2.952 million tons worldwide grape, this continent has averaged 1.706 million t and in the European Union of 1367 thousand tons, with a range of 3.9%, 47.7% and 30.2% respectively. In Romania the average quantity of grapes imported was 10.000 t with a variance of 157.5%.

Table 3

Oferta de struguri în perioada 2000-2007 (mii t)

Area	Year							
	2000	2001	2002	2003	2004	2005	2006	2007
World	64790	61356	61884	63784	67565	67195	67341	65971
Europe	32576	30189	28657	30119	32437	29032	29386	27443
UE	29950	27947	26337	27363	29887	26799	27303	25096
Romania	1295	1122	1077	1078	1230	506	912	873

SOURCE: FAOSTAT – 2010

Offer global grape presented in table 4 shows a multi-annual average of 64,985,800 tons and 29,979,900 in the European multi-annual variations of t with 9.6% and 17.1%. The European Union has been an annual supply of 27,585,200 tons with multi-variation of 17.6%. Romania has made this year reaching 3.7% of annual average level of 1.0117 million tons in global supply Reported Romanian and European grape supply was 1.6% and 3.4% respectively. Romania's total supply variability was 78.0% higher due to varying surfaces and production environments.

Table 4

Grape Imports during 2000-2007 (thousand tons)

Area	Year								Avera-ge 2000-2007
	2000	2001	2002	2003	2004	2005	2006	2007	
World	2612	2545	2582	2804	2941	3224	3364	3546	2952
Europe	1398	1443	1358	1565	1724	1930	2059	2171	1706
UE	1238	1246	1167	1308	1353	1482	1560	1580	1367
Romania	4	5	3	4	9	18	19	19	10

SOURCE: FAOSTAT – 2010

This indicator has registered an annual growth worldwide of 4.0%, 5.8% Europe, the European Union at 5.8% and 30.2% in Romania.

Imports of grapes worldwide has averaged 4026 million $, in 2277 million $ on the continent, the European Union in Romania and 1969 million $ approx. 5

million $ with a range of 76.2%, 101.4%, 90.4% and 397.3% respectively. The amount represents about grapes imported from Romania. 0.2% of European imports and approx. 0.1% of global imports.

Table 5

Import value of grapes in the period 2000-2007 (million $)

Area	Year								Average 2000-2007
	2000	2001	2002	2003	2004	2005	2006	2007	
World	2851	2905	3067	3684	4077	4619	5085	5920	4026
Europe	1386	1495	1578	2037	2299	2667	3062	3694	2277
UE	1251	1361	1435	1838	2012	2290	2535	3030	1969
Romania	1	1	1	1	2	5	7	19	4,7

SOURCE: FAOSTAT – 2010

Evolution of grape import value is expressed as an annual global growth of 9.8%, 13.4% from Europe, 12.0% and 63.3% in the European Union in Romania.

Analysis of the data presented in table. 6 shows a global quantity exported 3.229 million tons of grapes on the European continent to export was 1.039 million t and in the European Union exported 1.005 million tons of grapes in Romania amounts to approx. 1000 t, representing 0.1% of EU exports.

This indicator showed an annual increase of 46.4% worldwide, in Europe of 0.9%, a reduction of 0.1% in the European Union and in Romania registered 559.9% due to large variations from one year to another.

Table 6

Grape exports during 2000-2007 (thousand tons)

Area	Year								Average 2000-2007
	2000	2001	2002	2003	2004	2005	2006	2007	
World	2813	2747	2714	3121	3064	3506	3432	4431	3229
Europe	1058	1099	885	998	968	1170	1060	1073	1039
UE	1047	1091	873	969	937	1120	1012	988	1005
Romania	0	0	1	1	3	0	0	1	1

SOURCE: FAOSTAT - 2010

Grape export value during 2000-2007 was, according to the tab. 7, worldwide grape 3515 million $ of the continent it has averaged 1298 million $ and the European Union 1,289 million $ with a range of 97.4%, 74.4% and 72.8% respectively. In Romania the average quantity imported grape was 0.4 million $ with a variance of 391.4%.

Table 7

Valoarea exportului cu struguri în perioada 2000-2007 (mil $)

Area	Year								Average 2000-2007
	2000	2001	2002	2003	2004	2005	2006	2007	
World	2502	2493	2694	3135	3293	4111	3976	5916	3515
Europe	973	1019	908	1199	1237	1632	1542	1874	1298
UE	972	1018	906	1193	1230	1620	1529	1845	1289
Romania	0	0	0	0	1	0	0	1	0,4

SOURCE: FAOSTAT – 2010

Evolution of grape export value is expressed through a worldwide annual growth of 12.4%%, 9.6% from Europe, 9.4% and 669.1% in the European Union in Romania.

The average price of grapes in the period 2000-2007 was, according to the tab. 8, worldwide 700.5$ per tones of grapes, the continent he averaged 740.9$ per tones and the European Union 765.9$ per tones with a range of 49.1%, 71.4 % and 66.7% respectively. In Romania the average price of imported grapes was 531.4 $ / t with a variance of 87.8%.

Table 8

The price of grapes in the period 2000-2007 ($ / t)

Area	Year								Average 2000-2007
	2000	2001	2002	2003	2004	2005	2006	2007	
World	585,1	579,6	573,5	683,1	726,8	751,5	786,6	917,6	700,5
Europe	510,3	532,3	604,4	760,1	797,7	823,1	859,8	1039	740,9
UE	538,0	556,7	655,1	812,4	818,0	828,7	869,5	1048	765,9
Romania	330,1	345,7	413,4	539,8	475,4	669,3	681,0	796,8	531,4

SOURCE: FAOSTAT - 2010 (calculated data)

Evolution of grape price is expressed through a worldwide annual growth of 6.0%, 9.6% in Europe, 9.1% and 12.8% in the European Union in Romania.

CONCLUSIONS

1. The average grape global demand was 21.755.000 tons, the offer of 65.971 million tons of grapes, the average value of imports was 4.026 $ million and exports of 3.515 $ million. The average price of grapes has registered a value of 700,5 $/ t.

2. In Europe the average price of grapes has registered a value of 740.9$ per tons, average grape demand was 5.183 million tons, the supply of 2.998 million tons of grapes, the average value of imports was 2.277 million $, while exports of 12,988 million $. The average price of grapes has registered a value of 740,9 $ / t.

3. In the European Union average grape demand was 3.538 million tons, the offer of 27.585 million tons of grapes, the average value of imports was 1968 million $ and exports 1,289 million $. The average price of grapes has registered a value of 765.9 $ / t.

4. In Romania the average price of grapes has registered a value of 531.4 $/t, average grape demand was 122.200 tons, grape supply of 873 thousand tons, the average value of imports was 4.7 million $ and exports of 0.4 million $. The average price of grapes has registered a value of 531.4 $ / t.

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COOPERATION – SUSTAINABLE FORM OF MANAGING PRIVATE FOREST PATRIMONY

COOPERAREA – FORMĂ VIABILĂ DE GESTIONARE A PATRIMONIULUI PRIVAT FORESTIER

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Abstract: *Following application of property laws (Law no. 18/1991 and Law nr.1/2000) much of the state forest heritage in Romania passed to private property. The new owners either of ignorance or greediness did not ensure an appropriate management of the forest, which led to massive uncontrolled deforestation without regeneration measures. This has resulted in ecological imbalances in many areas, especially mountainous, with medium and long term negative economic and social repercussions. The analysis of the experience of forest management in common till 1949, especially in Transylvania, but in other areas where there was a cooperative-type organizational structure, called "composesorate" in Transylvania or "parish" in other areas, can be a starting point to reorganize these properties. In the paper it is presented the organization and management of the Poiana Sarata former "composesorate" from the mountainous area of the Bacau county, which operated between 1823 and 1949, with an area of over 3500 meters. The good organization, the democratic and transparent leadership assured a high economic efficiency. The re-setting up of these structures, whose operating principles are valid even today, would be beneficial for human communities with forest properties.*

Key words: cooperation, forest, management, community, efficiency

Rezumat. *În urma aplicării Legilor proprietăţii (Legea nr. 18/1991 şi Legea nr.1/2000) mare parte a patrimoniului forestier de stat din România a trecut în proprietate privată. Noii proprietari din neştiinţă sau din lăcomie nu au asigurat o gestionare corespunzătoare a pădurilor redobândite, fapt care a dus la defrişări masive necontrolate fără măsuri de regenerare. Acest fapt a generat, în multe zone, în special montane, dezechilibre ecologice, cu repercursiuni economice şi sociale negative, pe termen mediu şi lung. Analiza experienţei gospodăririi în comun a pădurilor până în anul 1949, în special în Transilvania, dar şi în alte zone în care au existat structuri organizatorice de tip cooperativ, numite „composesorate" în Transilvania sau „obşti" în alte zone, poate constitui o bază de pornire pentru reorganizarea acestor proprietăţi. În lucrare este prezentat modul de organizare şi conducere a fostului „composesorat" Poiana Sărată din zona montană a judeţului Bacău, care a funcţionat între anii 1823-1949., având o suprafaţă de peste 3500 ha. Buna organizare, conducerea democratică şi transparentă îi asigurau o eficienţă economică ridicată. Reînfiinţarea acestor structuri a căror principii de funcţionare sunt valabile şi astăzi ar fi benefică pentru comunităţile umane cu proprietăţi silvice.*

Cuvinte cheie: cooperare, pădure, management, comunitate, eficienţă

MATERIAL AND METHOD

At the completion of the study were the current regulations, but also those from the interwar period on cooperation and forest management in Romania. To substantiate the necessity of the cooperation actions in the forest domain we studied the experience of the people sharing the Romanian territory in the forest and grassland form communities.

For example, we present here the system of forest organization, leadership and management of Poiana Sarata village, the former Trei Scaune county which was operating a forest "congregation" entitled *Poiana Sarata Composesorate*. There is a status of organization. This status has been updated since 1932, based on the Forest Code published in 1923 and Regulation of "Law for the needs to meet normal firewood and construction", published in 1925.

RESULTS AND DISCUSSIONS

The cooperation in modern thinking, is that collaborative process, bonding force individuals or businesses in different industries.

More than in other economic sectors, the cooperation in the private forest heritage, due to the country peculiarities, is the only form of economic exploitation of forest products (timber, game, berries, sources of pleasure, etc.).

The forest heritage must be protected and properly managed. Most European countries have a policy that preserve the forest available sources to protect domestic industry and wood processing. Whatever the ownership of land with woody vegetation, forests - whether state owned or private property that are - are subject to forest and considered by law, public national good.

Currently, due to property laws (Law 18/1991 and Law 1/2000), much of the forest patrimony of the State passed into private ownership. Part of the new owners, inexperienced and means for protecting and higher recovery of these forests have fallen prey, in many cases, some speculators were buying with low prices and moved to action by clearing of significant areas. This has resulted in many areas of the country, especially mountainous ecological imbalances, with negative economic and social medium and long term repercussions.

The analysis of the organization and operation of joint forest by the year 1949 (the year the property was carried out nationalization of all forest), especially in Transylvania, but in other areas where there were cooperative organizational structure type called "*Composesorate* in Transylvania or "communities "in other areas, can be a starting point for organizing and managing these properties.

This paper aims to present the organization and management of the former Poiana Sarata "*Composesorate*", Trei Scaune County (from the current mountain area of Bacau County), established in 1823, at the same time with the village.

The Composesorate worked until 1949, with a surface, in the interwar period of 3382 hectares.

The good organization, democratic and transparent leadership, way of exploiting forest products, wood in particular, have provided a high economic efficiency. The reinstatement of these structures in the counties with forest heritage of Moldova, whose operating principles are largely valid today, would be beneficial for human communities with forest properties.

Poiana Sarata is a village belonging to Oituz commune, and is located in the western province of Bacau, in its mountainous area.

The study refers to the situation in 1932, when it was updated the status of the Composesorates.

On the date mentioned above Poiana Sarata Composesorate held 4834 yokes (2782 hectares) and 1043 yokes forest (600 ha) meadow, all being operated in a cooperative system.

In the village there were a number of owners, with higher surface areas who exploited them in the private system. The number of individuals with a nominal title, who formed the congregation, called "composesori" was 452. This number is added to two institutions: the church and school, with above-average land areas. Persons included in Composesorate, mostly heads of households were, with no partition of property between their members. Average area which was owned by a composesor was of 10.64 yokes (6.12 hectares).

We present in figure 1 the structure of composesors according to the size of the area held.

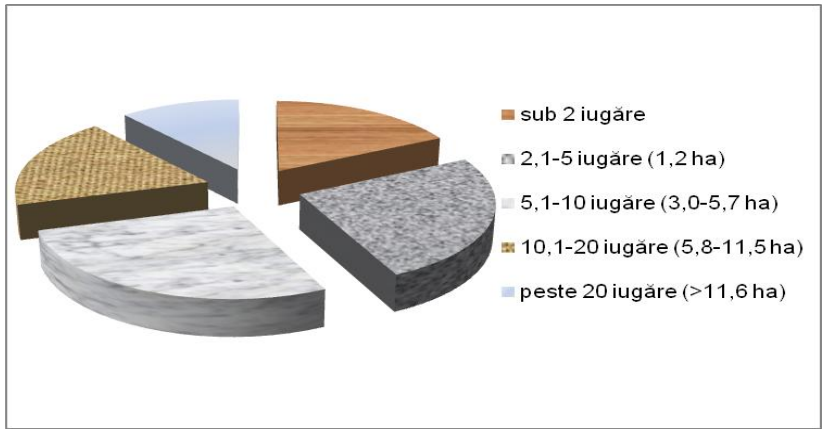

Fig. 1. Structure of Composesors by land owned

From the presented structure it is clear that more than half of composesors (53%) had areas ranging from 1.3 ha to 5.7 ha. Only 11.2% of families had larger areas of 10 ha and the number of holding areas over 30 ha was low.

This shows the balance between forest owners, with no polarization of the owners, which strengthened the democratic spirit of the cooperative structure type.

The statistics data show that only two people had areas of 50-60 hectares.

This type of cooperative system based on sound strictly principles, was particularly appreciated by people and it lasted 126 years without interruption, until the mid twentieth century when forests were nationalized.

At the basis of this perenniality stood this system of organization and leadership based on simple democracy, but with maximum efficiency (fig. 2).

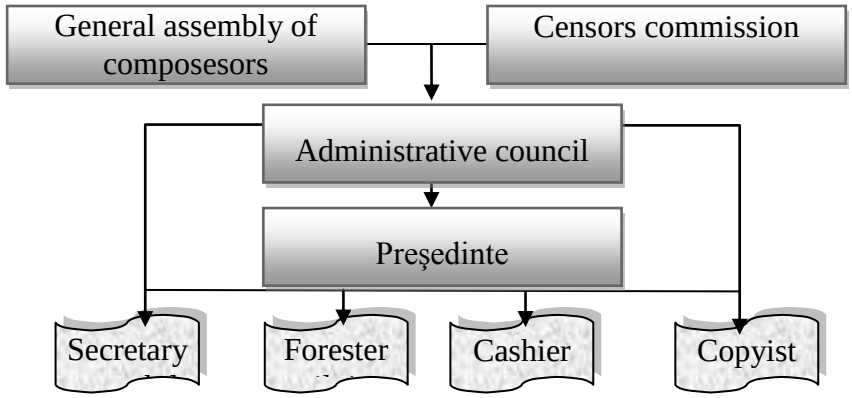

Fig. 2. Structure of Composesorate management

On the organization and functioning of the composesorate sat its status, called "Property", which included six chapters with 30 articles.

The first chapter contains four articles. The first article presented the concept and content of the phrase “Composesorate”. It shows that it is "gang" of “moşneni” (composesors) in "joint property" in the ownership of the land surface (forest and agricultural land) and on other property in common property (buildings, machinery, tools, animals employment etc.). Further, in Article 2, there are passed the properties of the composesorate, both in hectares and yokes on separate categories of use, forest and arable land and other inventory assets.

Article 3 contains the name of the composesors and the size of properties they possess (in yokes and hectares). This article is accompanied by the rights of the “moşneni”, like "shares" of today, the first and last name of the composesors are entered, if the person is an adult and the number of rights (shares) held by them on which they vote. The higher the area held by a composesor, the greater the rights in decision making and hence the revenue sharing.

In the last article of this chapter there are contained the obligations of the composesors (to participate in the maintenance of common property, not to execute cuts without authorization) and penalties for violations (payment of damages or loss of rights to annual income etc.).

Chapter 2 includes 13 items and refers to the organization and management of the composesorate. The General Assembly is the supreme leading forum of Composesors. It meets once a year in January, in a session and, if necessary, arrange meetings and extraordinary emergencies such as fires or possession violations occur.

The general meetings had subjects for discussion such as: choosing managers (3-5 people and the president) for a period of five years may be re-eligible, election auditing committee (three people) review and approval of the board of directors' annual report, discussion and approval of the budget revenue and expenditure, changes of status, conducting sale, purchase or allotment of land, determining the rate of timber to be exploited, dividing the net profit. It shows the end of the article, how to vote, directly or by proxy. Minors had the right to vote from the age of 14 years.

Voting is by acclamation (as the ancient Greeks), and if there is doubt, the vote is passed to persons.

Chapters 3 and 4 contain provisions on the rights and obligations of directors, the President and other staff.

Of those obligations we mention the effective management of congregation property, lease of land of stone quarries, the hunting and fishing, hiring qualified staff, afforestation and maintenance work, etc.

The President shall have some special obligations: to represent the composesorate in public actions, monitoring income and expenditure budget, accounting control.

The final chapter, 5, containing aspects of qualified personnel: secretary, accountant, cashier, forester, copyist.

If there we litigations in court they appealed to a lawyer whom they paid for the services.

The budget revenues were related to sale quantities of timber, leasing of land for grazing, hunting and fishing and other income.

The costs were represented by administrators and staff payment, expenses with forest replanting and maintenance, payment of taxes.

The obtained profit was allocated according to the general assembly's decisions, some form of dividends, and another for development (land purchases), etc.

Among villagers, few were those who exploited the forest areas in the private system. The fact that over 95% of inhabitants were members of the composesorate shows the superiority of this type of cooperative form of exploitation (the joint property).

CONCLUSIONS

1. Since ancient times until the modern era (since 1949), residents of communities in Transylvania exploited the forests in the cooperative system (the joint property) as an organizational structure called Composesorate.

2. The organization and operation of Composesorate based on a statute that contained democratic principles, assuring high economic efficiency. Its sustainability for hundreds of years show the superiority of this form of forest management.

3. Resurrecting the cooperation in areas of private forest properties would eliminate a number of irregularities in forest management and ensure effective economic operation.

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PLANNING AND RECRUITMENT OF HUMAN RESOURCES IN THE APIA (AGENCY FOR PAYMENTS AND INTERVENTIONS IN AGRICULTURE)

PLANIFICAREA ŞI RECRUTAREA RESURSELOR UMANE IN CADRUL APIA (AGENŢIA DE PLĂŢI ŞI INTERVENŢII ÎN AGRICULTURĂ)

IORDĂCHESCU E.
Agency for Payments and Interventions in Agriculture Suceava

Abstract. *For any successful organization, human resources is the kernel around which revolve all other resources (material, financial, information) and issues concerning the recruitment, selection, training, development, evaluation, reward and motivation are the main directions of research of human resource management of any organization. This paper seeks to examine issues related to recruitment, selection and hiring of human resources in the APIA Suceava. Thus, the work includes issues related to human resources planning process, the production stages of the recruitment process, recruitment sources, problems with the process of sorting the various methods of recruitment and the end of the paper we addressed the issue of evaluating the effectiveness and efficiency of recruitment. What is to be noted is the need to develop planning and in particular to establish recruitment plan in the APIA Suceava. The most recommended for use, that the interview and selection tests, are highlighted in this work.*

Key words: planning, recruitment, human resources, APIA

Rezumat. *Pentru orice organizaţie de succes, resursele umane reprezintă nucleul în jurul cărora gravitează toate celelalte resurse (materiale, financiare, informaţionale), iar problemele privind recrutarea, selecţia, instruirea, perfecţionarea, evaluarea, recompensarea şi motivarea constituie principalele direcţii de cercetare a managementului resurselor umane a oricărei organizaţii. Prezenta lucrare, îşi propune să analizeze probleme legate de recrutarea, selecţia şi angajarea resurselor umane în cadrul APIA Suceava. Astfel, lucrarea cuprinde probleme legate de procesul de planificare a resurselor umane, în cadrul APIA Suceava, prezentarea etapelor procesului de recrutare, sursele de recrutare, probleme legate de procesul de triere, diverse metode de recrutare iar la sfărşitul lucrarii am abordat problema evaluării eficacităţii şi eficienţei recrutării. Ceea ce se doreşte reţinut este necesitatea elaborării unei planificări şi în particular stabilirea unui plan de recrutare în cadrul APIA Suceava. Metodele cele mai recomandate a fi utilizate, respectiv interviul şi testele de selecţie, sunt evidenţiate în acestă lucrare.*

Cuvinte cheie: planificare, recrutare, resurse umane, APIA.

INTRODUCTION

Analysis of the Human Resources Agency has the APIA cell changes that occur as a result of regulations imposed by the EU and how this transition will be made to its rules and laws, since it is strongly influenced by the quality

management practices. We say that a new type of management practice at the new public agency is one of the main lines of action to improve the market economy.

Fundamental attributes of such management are: variety, flexibility, dynamism, creativity and efficiency. Thus, while political change, it feels a nine trend in public administration both at central and local level as a tendency to move to new forms of governance, EU, which has revolutionized the entire administrative structure in Romania (Ciurea I.V., 1999; Ciurea I.V., Brezuleanu S., Ungureanu G., 2005).

This reform, however, could not be successfully implemented until the end, on the grounds that old mentality was very deeply rooted in civil servants who fulfill their service obligations only doing favors different political groups in order to remain comfortable armchairs.

MATERIAL AND METHOD

The methodology that was used for processing information gathered in the paper, presenting results and drawing conclusions, have based methods and the sociological and economic study of the APIA-Suceava, agricultural statistics, economic evidence, economic experiment, analysis and synthesis.

The most recommended to be used, that the interview and selection tests are shown in this paper.

RESULTS AND DISCUSSIONS

Directorate for Human Resources Management is the agency specialized structure which performs the duties, tasks and responsibilities in human resources, training, professional training, organization and personnel management for the central and district branches of the agency and has mainly the following functions:

- setting overall strategy for coordination of human resources and personnel management for the central and district branches of the agency;
- coordinates programs and develops proposals that meet the requirements of European integration in the field of selection, recruitment and hiring, payroll, personnel training and training district headquarters and branch;
- carry out related activities for the management of Community grants financial assistance, financial and legislative.

Direction is comprised of the following departments: Department Administration Payroll and public functions and in turn includes the Human Resources Department, Personnel and Training Service. The priorities for the next period Personnel Training Service is responsible for:

- Identify alternative resources for financing training activities for employees APIA;
- Creating own training center for employees;
- Establish a platform for e-learning and discussion forum; to foster interdepartmental communication.
- Service determining remuneration and Civil Administration shall:

- Member nominal developed organizational structure and headquarters personnel, organizational framework and personnel for Member named county centers and centralized states functions, which require the approval of the Director General of the Agency; Ensure preparation, update, maintain and track records of professional civil servants;
- Base, together with economic direction, personnel costs needs to develop a draft state budget and revised budget;
- Prepare and edit, in collaboration with departments of the Agency structure, organization and operation Regulation and Rules for Structure and Regulation of organizational and operational framework for district centers;
- Contrasemnare coordinates the development and evaluation reports in relation to individual job performance and job requirements in accordance with applicable law;
- Coordinates the development of job descriptions of staff in the central and district centers of the Agency;
- Developed, centralized plan for the occupation of public offices and send it to the Ministry of Agriculture and Rural Development;
- Liaises with the National Agency of Civil Servants and cooperate with it to solve problems that arise in the application of specific regulations for civil servants;
- Provide data and participate in projects for structural development;
- Develop documentation approving individual awards within funds established by applicable regulations and subject to approval by the Agency head;
- establish, maintain complete books and work for employees in the central and district centers and manages the Agency's register of employees filing.
- Prepare draft decisions on the appointment/release, termination, modification or suspension ratio of service/work, establishing the rights of labor, and draft decisions on punishment for employees in the central and district centers of the Agency;
- Develop programming documentation leaves and seeks how to perform or reprogramming of these holidays,
- Provide evidence of declarations of assets and interests of officials of the central and district centers of Agency;
- Shall, periodically or whenever appropriate, statistical reports them to the institutions concerned;
- Provides recruitment and selection, development documentation for obtaining permits under the regulations in force on the organization of competitions for the vacancy. Recruitment is a natural step in the development of human resources strategy and planning. It is a basic step to ensure staff, very important step that requires special techniques, quality recruitment firm conditional on future performance.

Thus, recruitment is a process of searching, identifying, locating and attracting potential candidates from which to select the most competitive and best serve the needs and interests of the organization. However, recruitment is a public process by which the offer becomes known to those concerned and is a two-way communication: the organization - the candidate and the candidate – organization.

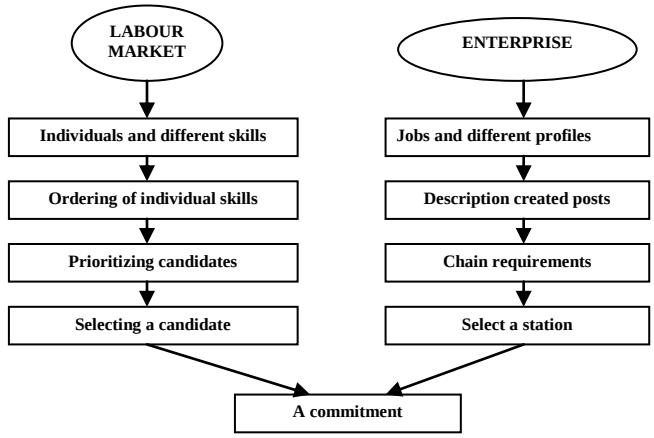

Fig. 1. Human resource planning

Tabelul 1

Characterization of human resources recruitment methods

Methods	Caracteristics
Advertisement	- Attract applicants apreaciază that can perform specified activities
	- An unsatisfactory response can not be analyzed
	- The results are influenced by the media
	- provide few details about the item
	- to achieve the goal depends on a large number of readers without work or who, although they service
	- and want to change it, considering that occupy vacant position described.
Looking for	- Concerns directly, most competent candidates
	- Use a specification precise, detailed and complex
	- Results are not affected by irrelevant factors
	- Applicants, being objective can be assessed properly
	- Predetermined criteria creates a mutual trust in the client and candidate decisions.

Methods	Caracteristics
Knowledge Network	- It is known only to people, using an emotional statement, appraisals can be subjective
	- the results are influenced by the subjectivity
	- Addresses of persons who are not interested in filling job
	- Coverage of potential candidates is limited
	- Time spent on recruitment is high.
Use of advisers	- Ensure good recruitment when advisers are competent
	- - Counselors use actually advertising method.
File with potential employees	- Ensures that information is rapidly recruiting clear, complete, honest, explained
	- The information contained does not constitute sources of error or intrepretări
Marketing Activitiies	- Consider recruitment as a marketing activity, and can identify persons who meet the job requirements
	- Attracting people to ensure that job
	- Allow highlighting the quality requirements necessary job

There are several ways to obtain a clear vision of performance criteria required for a job. The most effective being to hold a meeting (known as the panel of experts;) to people within the organization who have responsibilities far greater than those posed by the post in question and / or persons who need to increase their efficiency, the results of this post.

During the meeting, performance criteria, is placed in the context of the organization and main results will be investigating what job requires and how those results will affect other items. These results; are reported not only the productivity but also quality standards and behavior.

Once established aspects of performance valued by the organization, the selection process will consist not only in finding people able to secure a position, they must be able to achieve higher levels of performance:

- **The structure** for the Agency for Payments and Intervention for Agriculture - Suceava accessed include: - Service Examinations aid application service over grant applications by farmers, applicants for financial support under the legal provisions, to record and verify them solcitare records subject to approval;
- **Service Integrated Administration and Control System** (IACS) is responsible for creating the database to register Farms, the identification of agricultural parcels, the creation of the Land Parcel Identification System;
- **Office IT Aministrativ,** Archives: activity in two phases: accounting and information technology;
- Controls Field Service, Inspection: provides field and remote sensing control sample of farms that have applied for grant support SAPS, respectively for additional financial support from the state budget funded.

CONCLUSIONS

Recruitment is a natural step in the process of developing the strategy and human resources planning. It is a basic step to ensure staff, very important step that requires special techniques, quality recruitment conditioning the future performance of APIA. The book aims to be a true guide to highlight aspects of APIA Suceava on recruitment, selection, efficiency and improve the quality of human resources through a detailed analysis perspectivel.

Implementing an effective management system in government acquires major facets, since it will lead to the professionalization of public administration activities, the changing values and mode of action of the public staff, the development of managerial concepts characteristic of modern government.

In this context the work was performed a comprehensive analysis, the integrity, human resource management in public administration in Romania, a result which highlighted the problems and made concrete proposals on the implementation and development of reasoned public service.

Improving human resources planning and recruitment within the APIA APIA Suceava requires the following:

- increase transparency in the recruitment of human resources by informing and involving the wider civil society;
- extended citizens access to information about employment in Apia, through the Internet;
- organization more effective spaces for public relations services;
- constantly updating the Web page of the agency with relevant and useful information, future employee must provide answers / solutions to effective requirements/customer needs quickly and in a courteous manner;

Organizations that candidates selected in this way, not only the chance to achieve its goals, but also to dominate the type of environmental stimulus, which may lead to increased job satisfaction for employees.

Being solved key criteria of the job, the next stage of the selection process will be to identify the personal qualities required of new owners, qualities which enable them to achieve performance levels that the organization needs.

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EVALUATION OF THE POLLUTION DEGREE BY NITRATES AND NITRITES IN SOME ORGANIC VEGETABLE CROPS FROM IASI COUNTY

EVALUAREA GRADULUI DE POLUARE CU NITRAŢI ŞI NITRIŢI LA UNELE CULTURI LEGUMICOLE ECOLOGICE DIN JUDEŢUL IAŞI

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Abstract: *The present study has proposed to establish the extent to which some vegetable crops are contaminated by nitrates and nitrites. Research has been conducted in 2008-2009, in two vegetable farms in the area of Târgu Frumos, operated in the conventional system, and in the experimental field of UASVM Iasi, operated as organic one. The results revealed that in the two types of land (organic and conventional), the degree of pollution is not significant. In conventional crops, the nitrate content ranged between 5579.47mg/kg and 213.66mg/kg; in the organic crops, it had a range between 573.93mg/kg and 19.33mg/kg. Nitrites were generally undetectable quantities*

Key words: pollution, vegetable crops, nitrates and nitrites.

Rezumat: *Studiul de faţă şi-a propus să stabilească măsura în care unele culturi legumicole prezintă contaminări cu nitraţi şi nitriţi. Cercetările au fost realizate în perioada 2008-2009, în două ferme legumicole din localitatea Târgu Frumos, exploatate în sistem convenţional, şi în câmpul experimental al USAMV Iaşi, exploatate în sistem ecologic. Rezultatele au scos în evidenţă faptul că în cele două tipuri de terenuri (ecologic şi convenţional), gradul de poluare nu este semnificativ. În culturile convenţionale, conţinutul de nitraţi a variat între 5579.47mg/kg şi 213.66mg/kg, iar în culturile ecologice, acesta a avut valori cuprinse între 573.93mg/kg şi 19.33mg/kg. Nitriţii au fost în general, în cantităţi nedetectabile.*

Cuvinte cheie:poluare, culturile legumicole, nitraţi şi nitriţi

INTRODUCTION

Excess of fertilization on agriculture leads to soil disturbance and accumulation in soil and groundwater of minerals that affect humans and animals and kill bacteria binding atmospheric nitrogen **(**Stoian L., 2005**)**.

Pollution by nitrates and nitrites of soil and vegetables crop, is a risk factor for agriculture. Nitrates accumulate in agricultural production grown on land where their quantity is increased. Pollution sources are fertilizers, soil minerals and organic rich in nitrogen.

Danger presents itself not nitrates (NO3), but nitrites (NO2) derived from them, and salts of nitric acid, the digestive tract of man and animals.

The main purpose of the present study is to outline and determine to what extent are polluted by nitrates and nitrites in vegetable crops of the two gravins systems, ecological and conventional.

MATERIAL AND METHOD

The research was organized in "V, Adamachi" organic farm from University of Agricultural Sciences and Veterinary Medicine Iasi (UASVM Iasi) and two farms in Tg. Frumos, which applies to conventional agriculture in 2008-2009. Soil pollution assessment was conducted based on analysis of soil and vegetable products.

Sampling of soil and plants to completion for this study were made compared to the two types of land in conventional and organic system during 2008-2009.

Establishment of vegetable crops was carried out as recommended literature (Stoian, 2005; Stan şi Munteanu, 2001, Stan şi colab. 2003).

In organic farm of the UASVM Iaşi, study was conducted in six vegetable species: tomato, cucumber, eggplant, pepper, cabbage and onion (polytunnels and field crops) and the conventional system Tg. Frumos (Maxim and Vavilov) to the following crops: tomato, cucumber, pepper, cauliflower, pepper and celery.

Analyses were performed in the Environmental Chemistry Laboratory of the Institute of Public Health Science, by colorimetric method, according to standards.

RESULTS AND DISCUSSIONS

Preliminary results obtained from vegetable crops on nitrate and nitrite content in the samples analyzed (soil, plants) are presented in tables 1 and 2. These data allow us to see that some of the values that express the content is much lower than the maximum limits (MRL) specified in the literature (Cumpătă Simona-Diana, Beceanu Dumitru, 2006).

a. Results from organic vegetable farm "Adamachi V.".

Nitrate content in soil samples analyzed ranged from a messenger to another, thus: polytunnels maximum occurred in (S2-P2-Cross) grown tomatoes, where the nitrate content was 573.93 mg / kg body weight.

Table 1

Nitrates content in soil samples collected from organic farm (mg / kg)

Code sample	Place harvesting	Sampling location	Nitrates (MgNO3/kg dry soil)
S72	soil / tomatoes, sun S2_P2 Eco	turns / 0-20 cm	573.93
S73	soil / cucumber, sun S2, P1-Eco	turns / 0-20 cm	19.33
S74	soil / plants - peppers, sun S3, P3-Eco	turns / 0-20 cm	65.93
S75	cabbage field, P5-Eco	turns / 0-20 cm	214.02
S76	tomato + pepper, field P6	turns / 0-20 cm	266.03
S77	onion field P4-Eco	turns / 0-20 cm	256.37

The soil in the polytunnels Eco P1-S2-grown cucumbers, there was a minimum of nitrate which was 19.33 mg / kg and in soil from the polytunnels S3-P3-Eco grown pepper and eggplant, it was 65.33 mg / kg. Nitrate content in soil from the field on different plots cultivated with vegetables ranged between 214.02 mg / kg (cabbage) and 266.03 mg / kg (onion).

Analyzing the content of nitrates in plant products in eco-farm „V. Adamachi" Iaşi that in all samples analyzed for nitrate and nitrite content was undetectable (table 2).

Table 2

Nitrate content in products samples collected from V Adamachi Iaşi organic farms (mg / kg)

Code sample	Place harvest	Harvesting date	Plant samples	Sampling location	$NaNO_2$ [mg/kg]	KNO_3 [mg/kg]
V46	farm Adamachi	23.07.2009	tomatoes	polytunnels	nd	nd
V47	farm Adamachi	23.07.2009	cucumber	polytunnels	nd	nd
V48	farm Adamachi	23.07.2009	eggplant	polytunnels	nd	nd
V49	farm Adamachi	23.07.2009	cabbage	polytunnels	nd	nd
V50	farm Adamachi	23.07.2009	tomatoes	field	nd	nd
V51	farm Adamachi	23.07.2009	onion	field	nd	nd

* nd= not detectable

b. Results form familial association Tg. Frumos

Measurements of nitrate content in soil samples collected from polytunnels in Tg. Frumos, familiar from the two associations (Maxim and Vavilov), are presented in table 3 (Munteanu N., 2009). Nitrate content varied from one soil to another and from one association to another family. In general, the nitrate content in these soils was higher than in organic farms. Thus, Maxim association, higher than maximum level of 4500 mg/kg nitrate content in soil samples grown tomatoes (variety Veneţia) was 5579.47 mg/kg (per row/0-20 cm) and 5471.61 mg/kg (between row/0-20 cm) .

Nitrate accumulation in plants is explained by an absorption in excess of usage, with the assistance of the following factors: genetic order (different varieties), the order climate (light intensity and temperature), agronomic order (type and amount of nitrogen fertilizers used balance between different components of fertilization (Clemansa Tofan, 2001).

Nitrate accumulation in plants is explained by an absorption in excess of usage, with the assistance of the following factors: genetic order (different varieties), the order climate (light intensity and temperature), agronomic order

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Table 3

Nitrate content in soil samples collected from Tg. Frumos, farms before conversion (mg / kg)

Code sample	Place harvesting	Sampling location	Nitrates mgNO3/kg dry soil
0	1	2	3
S28	ground solar/tomato variety Venetia	turns / 0-20 cm	5579.47
S29	ground solar / tomato variety Venetia	fixed row / 0-20cm	5471.61
S30	ground solar / tomato variety soi Izmir	turns / 0-20 cm	5400.52
S31	ground solar / tomato variety Izmir	fixed row / 0-20 cm	356.65
S32	ground solar / tomato variety Balett	turns / 0-20 cm	1269.07
S33	ground solar / tomato variety Balett	fixed row / 0-20 cm	398.43
S34	ground solar / cucumber	turns / 0-20 cm	780.44
S35	ground solar / cucumber	fixed row / 0-20 cm	250.66
S36	ground solar / pepper	turns / 0-20 cm	1720.50
S37	ground solar / pepper	fixed row / 0-20 cm	236.94
S38	ground / field cucumber Merengue	turns / 0-20 cm	213.66
S39	ground / field cucumber Merengue	fixed row / 0-20 cm	254.40
S40	ground / field cauliflower Fremont	turns / 0-20 cm	722.45
S41	ground / field cauliflower Fremont	fixed row / 0-20 cm	232.78
S42	ground / field celery	turns / 0-20 cm	1037.95
S43	ground / field celery	fixed row / 0-20 cm	412.82
S44	ground / field pepper Romatica	turns / 0-20 cm	854.42
S45	ground / field pepper Romatica	fixed row / 0-20 cm	2667.1
S46	ground / field pepper Bianca	turns / 0-20 cm	902.33
S47	ground / field pepper Bianca	fixed row / 0-20 cm	3203.48
S48	ground / field pepper Whitny	turns / 0-20 cm	1028.15
S49	ground / field pepper Whitny	fixed row / 0-20 cm	2073.15
S50	ground / field pepper Vedrana	turns / 0-20 cm	1009.44
S51	ground / field pepper Vedrana	fixed row / 0-20 cm	1382.17
S52	ground / field pepper Fidelio	turns / 0-20 cm	1728.59
S53	ground / field pepper Fidelio	fixed row / 0-20 cm	1513.95
S54	ground / field cucumbers Amurg	turns / 0-20 cm	789.05
S55	ground / field cucumbers Amurg	fixed row / 0-20 cm	1655.4
S56	ground / field tomatoes Ballet	turns / 0-20 cm	1184.77
S57	ground / field tomatoes Ballet	fixed row / 0-20 cm	1689.94

Table 4 show the nitrate content of vegetable samples collected from farms before conversion Tg.Frumos familiar from the two associations in the study.

Table 4

Nitrate content in plant samples collected from farms before conversion (mg/kg)

Code sampe	Place harvest	Harvesting date	Plant samples	$NaNO_2$ [mg/kg]	KNO_3 [mg/kg]
0	1	2	3	4	5
V11	Tg. Frumos	9.07.2009	tomato variety Venetia,	nd	nd
V12	Tg. Frumos	9.07.2009	tomato variety Izmir	nd	nd
V13	Tg. Frumos	9.07.2009	tomato variety Balett	nd	nd
V14	Tg. Frumos	9.07.2009	cucumber / solar	nd	4.41
V15	Tg. Frumos	9.07.2009	pepper / solar	nd	nd
V16	Tg. Frumos	9.07.2009	pepper - leaf	nd	40.81
V17	Tg. Frumos	9.07.2009	cucumber Merengue + Mandi	nd	13.48
V18	Tg. Frumos	9.07.2009	cauliflower - leaf, field Fremont	nd	nd
V19	Tg. Frumos	9.07.2009	celery - leaves, field	nd	72.33
V20	Tg. Frumos	9.07.2009	pepper Romatica	nd	nd
V21	Tg. Frumos	9.07.2009	pepper Romatica - Leaves	nd	115.66
V22	Tg. Frumos	9.07.2009	pepper Bianca	nd	nd
V23	Tg. Frumos	9.07.2009	- sweet Bianca - leaves	nd	146.5
V24	Tg. Frumos	9.07.2009	pepper Whitny	nd	nd
V25	Tg. Frumos	9.07.2009	Whitny peppers - leaves	nd	58.6
V26	Tg. Frumos	9.07.2009	pepper Vedrana	nd	nd
V27	Tg. Frumos	9.07.2009	Vedrana peppers - leaves	nd	43.95
V28	Tg. Frumos	9.07.2009	pepper Fidelio	nd	nd
V29	Tg. Frumos	9.07.2009	Fidelio peppers - leaves	nd	190.45
V30	Tg. Frumos	9.07.2009	cucumber Amurg	nd	nd
V31	Tg. Frumos	9.07.2009	cucumber Amurg leaves	nd	43.95
V32	Tg. Frumos	9.07.2009	tomatoes Ballet	nd	nd
V33	Tg. Frumos	9.07.2009	tomatoes Ballet - leaves	nd	13.2

In all samples analyzed for nitrite content was undetectable. Nitrate content in vegetable samples analyzed from these farms was within acceptable limits. Plant samples at these variations were observed between nitrate content of leaf samples of such plant nitrate content in the product.

CONCLUSIONS

1. Most soil samples and plant products do not have pollution by nitrates and nitrites.

2. Nitrate content in organic farm ranged 573.93mg/kg at USAMV and 19.33mg/kg, falling within acceptable limits for organic production.

3. At Tg. Frumos, have been determined the highest concentrations of nitrates in the soil, up to about 5579.47 mg/100 g, in terms of production and intensivization big those numbers are not harmful to vegetable crops and is a potential risk factor.

4. Nitrate content of vegetable products has been zero or negligible values (unknown) environmental operating conditions, and vegetable crops under the conventional system this content reaches up to about 190.45 mg/kg dry soil, placing is within acceptable limits.

5. Nitrite contents were generally undetectable quantities.

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STUDY OF SOME AGROTEHNOLOGICAL CHARACTERISTICS OF CORNSALAD (*VALERIANELLA OLITORIA* MAENCH) IN PROTECTED CULTURE CONDITIONS

STUDIUL UNOR PARTICULARITĂŢI AGROTEHNOLOGICE LA FETICĂ (*VALERIANELLA OLITORIA* MAENCH) ÎN CULTURA PROTEJATĂ

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Abstract. *The groupe of leafy vegetables are consumed raw, usual in salads, ensuring the full use of vitamins and clorophyll, which have important antianemic and plastic properties. Cornsalad (Valerianella olitoria Maench sin Valerianella locusta* L.*) is a member of this group of leafy vegetables, which in our country is used for consumtion from the spontaneous flora. The experience was conducted in greenhouse belonging to the Vegetable Growing Department of University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, in the spring culture in 2009. Were studied the agrobiologic behavior of three varieties of cornsalad like D'Olanda, Volhart and Elan. As experimental factors was used: at first variety, the second factor was the number of seeds/poot and the number of poots/linear meter. Statistical interpretations of obtained results was done by analysis of polyfactorial variance.*

Key words: lamb's lettuce, cornsalad, leafy vegetables

Rezumat. *Legumele din grupa verdeţurilor se consumă crude, în salate, asigurând utilizarea integrală a vitaminelor şi a clorofilei, care are importante proprietăţi antianemice şi plastice. Printre aceste verdeţuri se numără şi fetica (Valerianella olitoria Maench sin Valerianella locusta L.) care la noi în ţară se foloseşte pentru consum din flora spontană. Experienţa s-a realizat în sera-solar a Catedrei de Legumicultură în cadrul USAMV Cluj, în anul 2009, în cultura de primăvară. S-a studiat comportarea agrobiologică a trei soiuri de fetică: D'Olanda, Volhart şi Elan. Ca factori experimentali s-a folosit soiul, numărul seminţelor/alveolă şi numărul alveolelor/metru liniar. Interpretarea statistică a rezultatelor obţinute s-a realizat prin analiza varianţei polifactoriale.*

Cuvinte cheie: fetică, verdeţuri

INTRODUCTION

Cornsalad derived from the spontaneous flora, which is found in Europe, North Africa and Western Asia. A vegetable plant is known in Europe and Asia, which spread in culture was achieved in the early twentieth

centuries. Originating in the temperate zone of Europe, was first described in 1699.

In France was cultivated for centuries but in England it was considered a toxic weed, until XIX century (Chaux, Foury, 1994; Rodica Sima, 2007).

In our country is less known and cultivated and for consumption is harvested from spontaneous flora (Ciofu et all., 2003).

Cornsalad is an annual herbaceous plant. The root is pivoting and grow in the surface soil, the vast majority of roots penetrating up to 20-25 cm deep. The leaves are trapped on a short stalk, that can be found in the axillary buds formed side rosettes with small leaves that determine the plant bush aspect (Vákár Andrea Elisabeta, 2002).

Cornsalad have reduced requirements from growth factors, adapting easy to the different variations of soil types and climate conditions.

MATHERIAL AND METHOD

The experience took place in the unheated greenhouse in the endovment of Vegetable Growing Department at University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca in the spring culture. The experimental factors are:

Factor A – variety, with three graduation:

a_1= D'Olanda

a_2= Volhart

a_3= Elan

Factor B – number of (seeds) plants/poots with three graduation:

b_1= 3 seeds

b_2= 5 seeds

b_3= 7 seeds

Factor C – plant density (number of poots/liniar meter) with two graduation:

c_1= 10 poots/lm

c_2= 15 poots/lm

By combining the three experimental factors was resulted 18 variants, that were placed in the form of randomized blocks in three repetitions.

The crop establishment was achieved with plant seedlings, which were obtained in alveolar trays, poots (42 wafers) on 02.13.2009. Has been studied the plants development, the final planting was made on 03.24.2009. Plant harvesting was carried out from 20.04.2009 to 05.05.2009. Biometric measurements were conducted to determine growth capacity, number of leaves, leaf rosette diameter, plant weight and plant height and measurements on the production.

RESULTS AND DISCUSSIONS

The obtained results show that the varieties have the same behaviour, decreases in leaf number variants with higher density, thereby influencing plant and weight (table 1).

From the three varieties remarkable is D'Olanda variety and Elan, whose makes an average weight of 30.99 and 30.60 g., variants with higher density (7 seeds and 15 poots/lm). It was found that the variety Elan, also has a better growth, regardless of number of seeds and respectively plant density.

Table 1

Plant growth and development

Variant		Number of plants/poots	Number of poots/lm	Average number of leaves/plant	Average weight / of plants (g)
Variety					
V1	D'Olanda	3	10	28	20.57
V2	D'Olanda	3	15	30	24.11
V3	D'Olanda	5	10	26	36.81
V4	D'Olanda	5	15	20	22.49
V5	D'Olanda	7	10	22	39.88
V6	D'Olanda	7	15	18	30.99
V7	Volhart	3	10	34	25.81
V8	Volhart	3	15	32	20.59
V9	Volhart	5	10	30	26.09
V10	Volhart	5	15	28	21.64
V11	Volhart	7	10	22	24.84
V12	Volhart	7	15	20	19.13
V13	Elan	3	10	32	32.90
V14	Elan	3	15	32	21.22
V15	Elan	5	10	30	35.01
V16	Elan	5	15	26	30.76
V17	Elan	7	10	26	33.81
V18	Elan	7	15	22	30.60

Production data was interpreted statistically by analysis of variance. Were studied the influence of factors; variety (table 2), number of plants/lm (table 3) and number of poots/lm (table 4). From data presented in table 2, it appears that production was between 1.78 kg/m^2 to 2.56 kg/m^2 at variety D'Olanda and Volhart, without significant variation of production. From the data presented it appears that the production obtained is influenced more by number of plants/poot and number of poots/lm.

Table 2

Variety influence on production

Variant / Variety	Production kg/m^2	Production %	Difference compared with the control kg/m^2	Significance of difference
D'Olanda	1.78	100.0	0.00	-
Volhart	2.56	143.8	0.78	-
Elan	2.52	141.8	0.74	-

LSD 5% 0.95 kg/m^2 LSD 1% 1.57 kg/m^2 LSD 0.1% 1.93 kg/m^2

Table 3

The influence of number of plants/pot on production

Variant Number of plants/poots	Production kg/m^2	Production %	Difference compared with the control kg/m^2	Significance of difference
3	1.71	100.0	0.00	-
5	2.29	134.5	0.59	***
7	2.85	167.3	1.15	***

LSD 5% 0.27 kg/m^2 LSD 1% 0.38 kg/m^2 LSD 0.1% 0.54 kg/m^2

The number of plants/poot is crucial, and a greater number of plants provide a higher output from 34.5 % to 67.3 % from control of experience. The large number of poots/lm positively affects the obtained production by achieving a production increase of 25.1 % (table 4).

Table 4

The influence of number of pots/lm on production

Variant Number of poots/lm	Production kg/m^2	%	Difference compared with the control kg/m^2	Significance of difference
10	2.03	100.0	0.00	
15	2.54	125.1	0.51	***

LSD 5% 0.12 kg/m^2 LSD 1% 0.17 kg/m^2 LSD 0.1% 0.23 kg/m^2

Interaction between factors is another way to study in detail the effects of factors on cornsalad culture (table 5, 6, 7, 8).

Table 5

Variety and number of plants/poot influence on production

Variant Variety	Number plants/poot	Production kg/m^2	%	Difference compared with the control kg/m^2	Significance of difference
D'Olanda	3	1.41	100.0	0.00	-
Volhart	3	1.68	119.3	0.27	-
Elan	3	2.03	143.9	0.62	-
D'Olanda	5	1.66	117.7	0.25	-
Volhart	5	2.81	199.2	1.40	*
Elan	5	2.42	171.6	1.01	-
D'Olanda	7	2.27	160.9	0.86	-
Volhart	7	3.18	225.5	1.77	**
Elan	7	3.11	220.5	1.70	**

LSD 5% 1.02 kg/m^2 LSD 1% 1.64 kg/m^2 LSD 0.1% 1.96 kg/m^2

In the case of interaction between variety and number of plants/poot, Volhart and Elan with the highest number of plants/poot (7 plants/poot) recorded the largest increase of production, by 125.5 % and 120.5 % from control of experience (table 5). Concerning the influence of variety and number of poots/lm the achieved production was positively significant for higher density.

Table 6

Variety and number of poots/lm influence on production

Variant Variety	Number of poots/lm	Production kg/m^2	%	Difference compared with the control kg/m^2	Significance of difference
D'Olanda	10	1.64	100.0	0.00	-
Volhart	10	1.91	116.0	0.27	*
Elan	10	2.27	138.4	0.63	***
D'Olanda	15	2.84	173.1	1.20	***
Volhart	15	2.17	132.3	0.53	***
Elan	15	2.87	175.0	1.23	***

LSD 5% 0.21 kg/m^2 LSD 1% 0.29 kg/m^2 LSD 0,1% 0.40 kg/m^2

Table 7

The influence of number plants/poot and number poots/lm on production

Variant		Production		Difference compared with the control kg/m^2	Significance of difference
Nr. pl/ poot	Nr.poots /lm	kg/m^2	%		
3	10	1.54	100.0	0.00	-
5	10	2.01	130.1	0.46	**
7	10	2.54	164.6	1.00	***
3	15	1.87	121.4	0.33	-
5	15	2.58	167.5	1.04	***
7	15	3.17	205.8	1.63	***

LSD 5% 0.31 kg/m^2 LSD 1% 0.43 kg/m^2 LSD 0.1% 0.61 kg/m^2

In this case of interaction, number of plants/poot and number of poots/lm results that a large number of seeds and plants, the highest density, ensure significant positive differences on production relative with the control of experience.

Table 8.

The influence of variety with number of plants/poot and number of poots/lm on production

Variant			Production		Difference compared with the control kg/m^2	Significance of difference
Variety	Nr.plants/ poot	Nr. poots/lm	kg/m^2	%		
D'Olanda	3	10	1.20	100.0	0.00	-
Volhart	3	10	1.61	133.8	0.41	-
Elan	3	10	1.81	150.7	0.61	-
D'Olanda	3	15	1.61	134.1	0.41	-
Volhart	3	15	1.75	145.8	0.55	-
Elan	3	15	2.24	186.6	1.04	-
D'Olanda	5	10	1.56	130.0	0.36	-
Volhart	5	10	2.57	214.1	1.37	*
Elan	5	10	1.89	157.5	0.69	-
D'Olanda	5	15	1.75	145.8	0.55	-
Volhart	5	15	3.04	253.3	1.84	**
Elan	5	15	2.95	245.8	1.75	**
D'Olanda	7	10	2.16	180.0	0.96	-
Volhart	7	10	2.64	220.0	1.44	*
Elan	7	10	2.81	234.1	1.61	*
D'Olanda	7	15	2.37	197.5	1.17	*
Volhart	7	15	3.72	310.0	2.52	***
Elan	7	15	3.40	283.3	2.20	***

LSD 5% 1.05 kg/m^2 LSD 1% 1.67 kg/m^2 LSD 0.1% 2.06 kg/m^2

The obtained results show that a large number of plants/poot and a greater number of poots/lm consistently differentiate significant positiv from the control of experience.

CONCLUSIONS

1. Cornsalad culture lends itself to high density.

2. By increasing density, provides a more efficient use of land.

3. By addition of the number of seeds/poot, from three to seven seeds/poot, provides a better production without decreasing quality of the obtained product.

4. Towars the reaction of varieties, Elan was noted the highest production, 3.40 kg/m^2.

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STUDY OF SOME LETTUCE (*LACTUCA SATIVA* L.) CULTIVARS IN COVERED CROP CONDITIONS

STUDIUL UNOR CULTIVARURI DE SALATĂ (*LACTUCA SATIVA* L.) ÎN CULTURĂ PROTEJATĂ

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Abstract. *Experience was conducted in the unheated greenhouse in the endowment of Vegetable Growing Department at USAMV Cluj. Were studied eight cultivars of lettuce (Allegiance, Gentiliana, Lobi, Clarion, Crufia, Sprinter, Roderick, Limax) that were planted in spring (March-April). The research goal was to determine which of cultivars have a better behaviour in the specific Cluj area, which is less favorable for the early crops of vegetables. The average plant weight at harvest was situated between 353.0 and 474.0 g achieved by Lobi and Limax The average yield at harvest was 46 t/ha, the highest recorded value was obtained by Limax, 54,77 t/ha.*

Key words: garden salad, cultivar, protected culture

Rezumat. *Experienţa s-a realizat în cadrul USAMV Cluj, în sera - solar aflată în dotarea catedrei de Legumicultură. S-au studiat opt cultivare de salată (Allegiance, Gentiliana, Lobi, Clarion, Crufia, Sprinter, Roderick, Limax) care au fost plantate primăvara (martie-aprilie). Scopul cercetărilor a fost de a determina care cultivare s-au comportat mai bine în condiţiile climatice specifice de la Cluj, mai puţin favorabile pentru culturile timpurii de legume. Greutatea medie a plantelor la recoltare a fost cuprinsă între 353.0 şi 474.0 g, înregistrată la Lobi şi Limax. Producţia medie a fost de 46 t/ha, cea mai mare valoare înregistrată fiind la Limax, 54,77 t/ha.*

Cuvinte cheie: salată, cultivar, cultură protejată

INTRODUCTION

Lettuce is a cultivated plant and one of the first vegetables of spring, rich in vitamins and minerals. Has been grown from antiquty and appreciated due to therapeuthic and emollient properties (J. Valnet, 1986). Lettuce is the most consumed vegetable, worldwide is widespread in the culture of economically developed countries. In our country is grown in all areas, at spring and autumn in fields, and during winter in greenhouses.

Lettuce heads and leaves contain 94 % to 95 % water, 1.3 to 1.6 gram proteins, vitamins like B_1, B_2 (8 to 25 mg), P, E, carotene (1 to 3 mg) and minerals: potassium 260 mg, iron 1.2 to 1.7 mg, calcium, phosporus 40 mg, magnesium 25 mg per 100 gram reported fresh product (Stan N. et all., 2003, Apahidean Al.S., Maria Apahidean, 2004, Indrea D. et all, 2009).

Since lettuce had an impressive number of varieties, is necesary to study their comparative cultures to see wchich performs better under certain conditions of this region.

MATHERIAL AND METHOD

The experience took place in the unheated greenhouse in the endovment of Vegetable Growing Department at University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca in the spring culture.

Were studied eight varieties of lettuce. The seeds were sown in 02.09.2009 into nutrient cubes, and the autpicking was performed at 02.25.2009. The planting was done on 03.23.2009 in three repetitions, with a density of 115.000 plants/ha. After planting were applied ordinary maintance, specific for protected lettuce crops.

The studied factor is the cultivar, with eight graduations.

a_1 = Allegiance
a_2 = Gentilina
a_3 = Lobi
a_4 = Clarion
a_5 = Crufia
a_6 = Sprinter
a_7 = Roderick
a_8= Limax

During the growing season, biometric measurements were conducted to determine the ability to increase the number of leaves in rosette, leaves rosette diameter, plant height and plant weight.

RESULTS AND DISCUSSIONS

From observation on plant growth shows that plant height varies from one variety to another, the values being lower at Roderick (16.8 cm) and greatest hight were 34.4 cm at the Crufia variety.

The diameter of leaves rosette showed similar values, which is between 30.1 cm and 33.0 cm. The average number of leaves/plant ranged from 18.1 to 33.6 at varieties Lobi and Roderick.

The average plant weight at harvest was over 340 g. the maximum weight was registrated at Limax.

Table 1

Development of lettuce plants

Variant	Plant height (cm)	Leaves rosette diameter (cm)	Average number of leaves/plant	Average weight of plants(g)
Allegiance	18.8	32.0	30.3	393.0
Gentilina	25.2	31.0	22.2	347.8
Lobi	20.4	30.6	18.1	353.0
Clarion	20.6	31.7	23.7	403.2
Crufia	34.4	31.1	24.5	405.0
Sprinter	21.6	32.6	30.0	437.4
Roderick	16.8	30.1	33.6	387.8
Limax	22.8	33.0	32.1	474.0

Experimental production in culture was calculated to ha by reporting areas. Production data were interpreted statistically by analysis of variance and are presented in table 2 and 3.

Table 2

The influence of cultivar on production compared with the control Allegiance

Variant	Production		Diference compared with the control t/ha	Significance of difference
	t/ha	%		
Allegiance	45.41	100.0	0.00	-
Gentilina	38.19	84.1	-7.22	-
Lobi	40.78	89.8	-4.63	-
Clarion	46.74	102.9	1.33	-
Crufia	46.80	103.1	1.39	-
Sprinter	50.55	111.3	5.14	-
Roderick	44.81	98.7	0.60	-
Limax	54.77	120.6	9.36	**
LSD 5%			6.25 t/ha	
LSD 1%			8.67 t/ha	
LSD 0.1%			12.04 t/ha	

Table 3

The influence of cultivar on production compared with the average of experience

Variant	Production		Diference compared with the control t/ha	Significance of difference
	t/ha	%		
Allegiance	45.41	98.7	0.59	-
Gentilina	38.19	83.0	-7.81	-
Lobi	40.78	88.6	-5.22	-
Clarion	46.74	101.6	0.74	-
Crufia	46.80	101.7	0.80	-
Sprinter	50.55	109.8	4.54	-
Roderick	44.81	97.4	-1.19	-
Limax	54.77	119.0	8.77	**
Average	46.00	100.0	0.00	-
LSD 5%			5.15 t/ha	
LSD 1%			7.13 t/ha	
LSD 0.1%			9.91 t/ha	

The data presented in table 2 shows that compared with the control (considered Allegiance variety) that has achieved production of 45.41 t/ha, varieties like Clarion, Crufia, Sprinter and Limax had recorded production increases from 2.9 to 20.6 %. The largest production of 54.72 t/ha made Limax variety, the difference in production from the control being separately significant.

Compared with the average of experience (table 3) it appears that the varieties Clarion, Crufia, Sprinter and Limax have achieved higher output with 1.6 % to 19.0 %. Variety Limax made a difference in production of 8.77 t/ha, distinct significantly.

CONCLUSIONS

1. The studied varieties showed different levels of height, leaves rosette diameter, number of leaves/plant, the plants average weight.

2. The average weight of plants was recorded by Limax variety, 474.0 g.

3. The average yield/ha ranged between 38.19 t/ha and 54.77 t/ha.

4. Sprinter and Limax variety achieved a production over 50 t/ha, which recommend them for expansion in protected culture, for specific climatic conditions of Plateau of Transylvania.

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GENETIC TRAITS OF APRICOT ADAPTABILITY

CARACTERISTICI GENETICE ALE ADAPTABILITĂŢII CAISULUI

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Abstract. *From complexity of elements that give an insight into apricot adaptability, are presenting in this paper the results of the characteristics and traits of flowering, of resistance or susceptibility of apricot phenotypes, preserved in the collection (655 phenotypes), of the parents and of the descendants,(9000 hybrids), at low temperatures during winter and fluctuations of temperature in late winter and spring, and their reaction to the attack of stable pathogens.*

Key words: apricot, phenotype, resistance, susceptibility, low temperatures, pathogens.

Rezumat. *Din complexitatea elementelor care dau o imagine asupra adaptabilităţii caisului, sunt prezentatate în lucrare rezultate cu privire la caracteristici şi însuşiri ale înfloriri, ale rezistenţei sau sensibilităţii fenotipurilor de cais prezervate în colecţie (655 fenotipuri), a genitorilor şi a descendenţilor (9000 hibrizi) la temperaturile scăzute din timpul iernii şi la fluctuaţiile de temperatură de la sfârşitul iernii şi din primăvară, precum şi comportarea acestora la atacul agenţilor patogeni stabili.*

Cuvinte cheie: cais, fenotip, rezistenţă, sensibilitate, temperaturi scăzute, agenţi patogeni

INTRODUCTION

Knowledge about genetics apricots are low compared with simple genetic organisms such as *Drosophila*, or *Arabidopsis* sp.

This is due to the sexual cycle and predominance of the diploid phase, and to space and time needed for growth and development of F2 families.

Nevertheless, develop deeper knowledge of the peculiarities of this fruit growing species which has little ecological plasticity, but required the world, mainly due of the nutritional quality and therapeutic of fruit, can be achieved mainly based on genetic studies, technically possible because of floral biology, which allows controlled hybridization and self-fertilization

In this paper are summarized research results on inheritance of physiological traits, such as flowering, ripening fruit, photosynthesis, respiration, and traits of resistance to winter frost, reaction to attack of the main pathogens, as elements of apricot adaptability.

MATERIAL AND METHOD

Biological material for study on induced variability, of different genetic mechanisms and for the selection of new phenotypes was obtained by intra-and interspecific hybridization, self-fertilization, backros, physical and chemical mutagenesis (Bălan Viorica, 1999).

By the hybridization were obtained 9000 intraspecific hybrids and 1100 interspecific hybrids.

There were obtained 15-82 C1 progeny by self-fertilization of apricot phenotypes: Comandor, Olimp, Selena, Sulina, Litoral.

By the physical mutagenesis, using mutagenic agent 60 Co 3000R, resulted 140 mutant Comandor V2. By the backcross resulted 120 descendants.

To be highlighted inheritance of physiological traits and resistance traits to cold and wintering were determined free and bound water content, and carbohydrate content, in the rest phase and the phase of vegetation, cryo-sensitivity of malate dehydrogenase and peroxidase in the buds naturally exposed to frosts in winter and the death rate of flower buds (Bălan Viorica, 1999; Guerriero R. et all. 2006).

Parents were selected for disease resistance and studied heredity of characteristics of resistance to the attack pathogens *Monilinia laxa* (Aderh et Ruhl) Honey (Nicotra A. et all., 2006), *Stigmina carpophila* (lev) M. B.Ellis, and *Cytospora cincta* Sacc., *Pseudomonas siringae p.v.siringae* van Hall (Bălan Viorica, 1999), and *Plum pox virus*, particularly (Audergon J.M. et all., 1988; Karayannis I. et all., 2006; Krska B. et all., 2006).

RESULTS AND DISCUSSIONS

Flowering and fruit maturity onset phase

By controlled hybridization resulting F1 progeny which are outside the range of variation of the parental phenotypes reflecting transgressive inheritance of flowering trait.

Differences between F1 progeny from the same parents, alternative use that as a mother and father, showed cytoplasmic heredity, in this case being mentioned standard phenotypes Comandor and Excelsior. Normal pollen tube germination, showed the ability of each of the two phenotypes to be a good partner as father also (fig. 1).

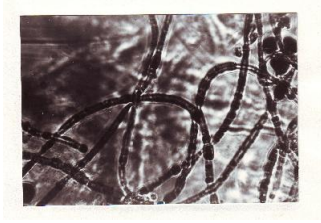
a   b

Fig. 1. Pollen tubes to phenotypes Comandor (a) and Excelsior (b)

In what concerns the heredity of fruit ripening, have revealed three cases: *transgressive (7%),* to very early (5 June 25), in type of the combination**:** ♀ late maturing x ♂semiearly maturingin ♀Comandor × ♂Dacia; *dominant* for the early maturation of the father genitor, in the combination of ♀late maturation (August)

× ♂very early maturation (June) in ♀Comandor × ♂77.3.52 BV; and *intermediary*, in the combination of ♀average maturation × ♂late maturation in ♀Comandor × ♂Excelsior and ♀Excelsior × ♂Comandor.

The photosynthesis-respiration balance, both during the intensive growth of the shootlets and fruit, 15 May-15 June, and during the inactive phase (quiescence), pointed to the normal metabolism of the accumulated organic matter available for the vital activities, which reflected the physiological adaptation of the phenotypes selected as genitors, as well as their descendants, in the areas under study, i.e. the Romanian Plain.

Frost and wintering resistance (-18^{0}C), and temperature fluctuations in February March (-16^{0}C+16^{0}C), of flower buds, was transmitted to progeny transgressively, be observed more resistant progeny than parents,, but also by 10-25% more susceptible descendants than the genitors, e.g. in ♀Comandor × ♂Excelsior,♀Excelsior × ♂Goldrich.

The starch content of the annual shootlets varied widely, as the variation coefficient s% ranged between 21.7 in the F1 ♀Comandor × ♂Excelsior descendants, and 78.9 in the F1 ♀Comandor × ♂77.3.52BV descendants in their dormant stage, and between 45.5 and 60.7 in their vegetation period. The variation limits of the starch amount were recorded in December-February, between 0.17-4.32 mg/100 g dry matter in the F1 ♀Comandor × ♂Dacia descendants, and 0.30-6.0 in the F1 ♀Comandor× ♂77.3.52.BV descendants, whereas in April-May the variations were 0.30-1.45 mg/100 g in the former, and 0.39-6.10 in the latter.

The soluble carbon hydrate content varied widely, recording higher values than starch, i.e. 1.35-13.85 mg glucose/100 g dry matter, compared with 0.17-4.32 mg starch/100 g in the F1 ♀Comandor × ♂Dacia descendants in December-February, and 4.36-11.95 mg glucose/100 g, compared with 0.30-1.45 mg starch/100 g in April-May.

The correlation between the starch-carbon hydrate rapport and the frost resistance of the flowering buds was observed in the F1 ♀Excelsior × ♂Goldrich descendants, where 8% recorded losses of only 20-30%, while the starch amount was 1.54 mg/100 g higher than the amount of soluble carbon hydrates.

The bound water content was higher in the hybrid descendants F1 than in their parents, e.g. 0.4-5.5 mg/100 g dry matter in the descendants F1 of ♀Comandor × ♂Dacia, 0.3-3.50 mg/100 g in the genitor ♀Comandor, and 0.26-4.1 mg/100 g in the genitor ♂Dacia. The heterosis of the bound water content was determined in the descendants F1, compared with their parents.

The free water-bound water balance varied inversely, as the bound water level was higher than the free water level in the dormant stage and lower in the vegetation period.

The cytoplasmic and mitochondrial malate dehydrogenase had evident lower activity in the dead buds, compared with the living buds, in the genitors 'Comandor' and 77.3.52 BV, which emphasised their cryosusceptibility.

However, peroxidase manifested cryoresistance, as the peroxidasic isosimic spectrum indicated no differences reflecting cryoinactivation, both in the living and the dead buds.

Peroxidase cryoresistance and malate dehydrogenase cryosusceptibility were employed as control indicators for cryoresistance variation in the descendants F1.

Behaviour under the attack of the main diseases

The results show that the consecutive three-year absence of treatments and the conditions provided by the Bucharest area, where *Monilinia laxa* Aderh *et*. Ruhl Honey and *Stigmina carpophila* M. B. Ellisse may produce over 70-80% damage, created favourable conditions for screening. Thus, out of 1600 descendants of 64 genomic families resulted from dialelic breeding between geographically distant partners, complex hybridisation, and backcrossing, only 13 descendants of nine genomic families were selected according to their field resistance to the two pathogens. The degree of attack (DA%) of the 13 descendants was limited to 2.5-7.5 in *Monilinia laxa*, and 1.8-7.5 in *Stigmina carpophila*.'Marculesti 19' was the maternal genitor in three of the nine genomic families, and 'Re Umberto' was the maternal genitor in five families and the paternal genitor in one of the selected families

The selected elites were retested by artificial inoculation under glasshouse conditions, and no difference was observed, compared with their behavior under natural infection conditions. The selection 83.15.23 (♀Re Umberto × ♂Timpurii de Chişinău/Early of Chişinău) was also resistant to inoculation based on fragments of *Cytospora cincta* colonies whereas selections 83.29.4 B1 and 83.29.3 B1 (♀Mr.19 × ♂CR5-180) showed average resistance. The selection 83.29.4B1 was highly resistant to pathogens and temperature fluctuations, and produced top-quality fruit; therefore, it was homologated in 1984 under the name of 'Dacia', and was protected by a patent. The phenotypes that resisted the attack of stable pathogens were the basis for the genetic study of resistance to diseases, as well as genitors in the genetic breeding programme for apricot trees. The study of the F1 descendants resultant from ♀resistant ('Dacia', 83. showed high variability to the attack of the pathogens under study. The transgressive heredity of the reaction to the pathogenic action of the fungus *Stigmina carpophila* was determined in the following descendants F1: ♀Comandor × ♂Excelsior, ♀Excelsior × ♂Goldrich, ♀Excelsior × ♂Comandor, ♀Comandor × ♂Excelsior, ♀Early Orange × ♂Don Gaetano, (Table 1).

The hybrid descendants F1 ♀Excelsior × ♂Goldrich, ♀Comandor × ♂Dacia, of the ♀susceptible × ♂resistant type, and ♀Comandor × ♂77.3.52.BV of the ♀susceptible × ♂average resistant type, reacted to *Cytospora cincta* Sacc., manifested heterosis under conditions of inoculation with the virulent strains C36 and C41.

The 60 CO physical mutagenesis, in a rate of 3000R, induced resistance to the fungus *Stigmina carpophila* in 33% of the total mutants V2 Comandor.

Table 1

F1 hybrid generation reaction to the action of pathogenic fungi *Stigmina carpophila* (lev) M. B.Ellis, *Cytospora cincta sacc* and of the bacteria *Pseudomonas siringae p.v.siringae* van Hall

Parents/Descendants	*Stigmina carpophila*	*Cytospora cincta*	*Pseudomonas siringae p.v.siringae*
♀Excelsior	S	MR	I
♂Goldrich	S	MR	I
♀Excelsior x ♂Goldrich	I	MR	R
♀Comandor	S	S	I
♂Excelsior	S	MR	I
♀Comandor x ♂Excelsior	MR	R	I
♀Excelsior	S	MR	I
♂Comandor	S	S	I
♀Excelsior x ♂Comandor	S	MR	I
♀Comandor	S	S	I
♂ Dacia	I	MR	I
♀Comandor x ♂ ♂Dacia	S	R	I
♀Comandor	S	S	I
♂77.3.52.B V	S	S	I
♀Comandor X ♂77.3.52.B V	S	R	I

Explanation Table 1: S-sensitive. I-intermediate, MR-middle rezistant, R-rezistant

CONCLUSIONS

1 By controlled hybridization resulting F1 progeny which are outside the range of variation of the parental phenotypes reflecting transgressive inheritance of flowering trait

2. Have revealed three cases of the fruit ripening heredity: *transgressive (7%),* to very early (5 June 25), in type of the combination ♀ late maturing x ♂semiearly maturing, dominant for the early maturation of the father genitor, in the combination of ♀ late maturation (August) × ♂ very early maturation (June); and intermediary, in the combination of ♀ average maturation × ♂ late maturation.

3. The correlation between the starch-carbon hydrate rapport and the frost resistance of the flowering buds was observed, in the F_1 ♀ Excelsior x ♂ Goldrich descendants.

4. Peroxidase cryoresistance and malate dehydrogenase cryosusceptibility were employed as control indicators for cryoresistance variation in the descendants F1.

5. The heterosis of the bound water content was determined in the descendants F1, compared with their parents

6. The transgressive heredity of the reaction to the pathogenic action of the fungus *Stigmina carpophila* was determined in the F1: ♀Comandor × ♂Excelsior, ♀Excelsior × ♂Goldrich, ♀Excelsior × ♂Comandor, ♀Comandor × ♂Excelsior, ♀Early Orange × ♂Don Gaetano descendants.

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MORPHOLOGICAL AND BIOCHEMICAL ASPECTS OF ROOTSTOCK-SCION INTERACTION AT PEAR FRUIT TREE SPECIE DUE TO INCREASING OF BUDDING HEIGHT

ASPECTE MORFOLOGICE ŞI BIOCHIMICE ALE INTERACŢIUNII ALTOI PORTALTOI LA SPECIA PĂR, ÎN CONDIŢIILE MODIFICĂRII ÎNĂLŢIMII DE ALTOIRE

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Abstract. *The influence of budding height (10, 20 and 40 cm) on bud survival and performance of maiden trees was investigated in experiments conducted in NE of Romania in 2006-2009. Pear rootstocks Pyrus sativa and Cydonia oblonga, were tested with cv. Untoasă Hardy. Neither rootstock nor budding height affected bud take. Buds on Pyrus sativa survived the winter better than Cydonia oblonga. There were significant differences in scions length, trunk cross sectional area and leaf area during all growth periods. Height of grafting had an important effect on the accumulation of sugars and dry matter. Trees budded at 40 cm had a bigger dry matter content when Cydonia oblonga was used as rootstock.*

Key words: rootstock, scion, budding height, trunk cross sectional area, leaf area, sugars, dry matter

Rezumat. *Lucrarea de faţă urmăreşte studierea influenţei înălţimii de altoire (10 cm, 20 cm şi 40 cm) asupra creşterii şi dezvoltării pomilor în pepinieră, în condiţiile pedoclimatice din NE României în perioada 2006-2009. Soiul de păr Untoasă Hardy a fost altoit pe portaltoii Pyrus sativa şi Cydonia oblonga. Nu a fost semnalată o influenţă semnificativă a portaltoiului sau a înălţimii de altoire asupra prinderii la altoire. Mugurii grefaţi pe Pyrus sativa au înregistrat un procent mai mare de rezistenţă peste iarnă comparative cu cei altoiţi pe Cydonia oblonga. S-au remarcat diferenţe semnificative în ceea ce priveşte lungimea altoiului, a secţiunii transversale a trunchiului şi a suprafeţei foliare a pomilor pe parcursul perioadei de vegetaţie. Înălţimea de altoire a influenţat în mod semnificativ acumularea de glucide şi substanţă uscată. Pomii altoiţi la 40 cm au avut un conţinut mai mare de substanţă uscată în cazul altoirii pe Cydonia oblonga.*

Cuvinte cheie: portaltoi, înalţime de altoire, secţiune tansversală a trunchiului, suprafaţa foliara, substanţă uscată

INTRODUCTION

The objective of our research was to study the effect of budding height of different pear rootstocks on the quality parameters of planting material produced under NE of Romania environmental conditions.

MATERIAL AND METHOD

The trial was performed at the S.D.E. "V. Adamachi" nursery in 2006-2009. Pear rootstocks *Pyrus sativa and Cydonia oblonga* were budded with pear cv. Untoasă Hardy in early August. Rootstocks were planted at a spacing of 0.9 x 0.2 m and budded at the height of 10, 20 and 40 cm (control variant being represented by grafting at 10 cm). The following spring, rootstocks were cut just above the bud and bud survival was measured. During and at the end of the vegetative period, tree height (cm), length of scion shoot (cm), trunk cross sectional area and leaf area were determined. Leave's dry matter content and sugars contained were analyzed. The trial consisted of three replicates with 50 trees in each. Variance analysis of main quality traits was done. Dry matter content was obtained after drying 4 hours fresh material at 105 ^{o}C and weighting at analytical balance. Soluble sugars content was determinate from leaves, by Schorll method and reported at dry substance.

RESULTS AND DISCUSSIONS

There was no significant effect of rootstock and budding height on bud healing in the autumn. Significant differences among rootstocks and budding height were observed when bud survival was evaluated in the following spring.

Irrespective of budding height, the highest percentage of live buds was found on vigorous rootstock (up to 90%) and the worse bud survival was recorded *Cydonia oblonga* (tab. 1).

Table 1

Aspects concerning grafting success and bud over-wintering at pear fruit trees grafted at 10 cm, 20 cm and 40 cm

Scion/ Rootstock	Height of grafting	Grafting success (%)	Bud overwintering (%)
Untoasă Hardy/ *Pyrus sativa*	V1 = 10 cm	89.85 (Mt)	95.16 (Mt)
	V2 = 20 cm	87.82	90.55 (00)
	V3 = 40 cm	82.25 (0)	88.55 (000)
DL 5% (mm)		3.5	0.44
DL1%(mm)		6.96	0.87
DL 0,1% (mm)		12.15	0.57
Untoasă Hardy/ *Cydonia oblonga*	V1 = 10 cm	87.77 (Mt)	93.36 (Mt)
	V2 = 20 cm	85.51	88.84 (000)
	V3 = 40 cm	81.53 (0)	84.83 (000)
DL 5% (mm)		2.5	0.50
DL1% (mm)		4.97	0.99
DL 0,1% (mm)		8.68	0.74

In the next year, a visible influence of the grafting height on shoots growing has been observed beyond the beginning of the summer, when variants engrafted at 10 cm recorded bigger values of the shoot's length comparing with variants engrafted at 20 and 40 cm. an important influence of the rootstock on the scion has been also recorded, engraftment on *Pyrus sativa* leading to a pronounced shoot's growing comparing with engraftment on *Cydonia oblonga.* (tab. 2).

Table 2

Average length of scion shoot ant total length of pear fruit tree, during the growing season (2007-2009)

Scion / Rootstock	Average of scion's length (cm)			Total fruit tree's length (cm)			Limit differences (cm)		
	V1	V2	V3	V1	V2	V3	DL 5%	DL 1%	DL 0,1%
	JUNE								
Untoasă Hardy/ *Pyrus sativa*	39.66 (Mt)	31.10 (0)	25.62 (000)	49.66 (Mt)	51.10 (xxx)	65.62 (xxx)	1.41	2.78	3.71
Untoasă Hardy/ *Cydonia oblonga*	34.87 (Mt)	25.64 (00)	18.30 (000)	44.87 (Mt)	45.64 (xx)	58.30 (xxx)	1.91	3.77	5.03
	JULY								
Untoasă Hardy/ *Pyrus sativa*	97.52 (Mt)	84.00 (0)	80.35 (00)	107.52 (Mt)	104.00	120.35 (x)	1.96	3.87	5.16
Untoasă Hardy/ *Cydonia oblonga*	80.13 (Mt)	74.68	64.50 (00)	90.13 (Mt)	94.68	104.50 (x)	2.46	4.86	6.48
	AUGUST								
Untoasă Hardy/ *Pyrus sativa*	115.55 (Mt)	112.65	107.50	125.55 (Mt)	132.65	147.50 (xxx)	2.08	4.11	5.48
Untoasă Hardy/ *Cydonia oblonga*	109.50 (Mt)	96.60 (00)	85.75 (000)	119.50 (Mt)	116.60	125.75	2.33	4.60	6.14
	SEPTEMBER								
Untoasă Hardy/ *Pyrus sativa*	143.10 (Mt)	132.85 (0)	128.20 (00)	153.10 (Mt)	152.85	168.20	3.23	6.39	8.51
Untoasă Hardy/ *Cydonia oblonga*	130.40 (Mt)	122.28	108.44 (00)	140.40 (Mt)	142.28	148.44	2.68	5.30	7.06

Irrespective of rootstock used, along with budding height increasing, it has been observed, a decreasing of scion's length with 10.14% in case of grafting on *Pyrus sativa* and a reduction with 16.8% when *Cydonia oblonga* was used as rootstock. This reduction seems to confirm the hypothesis according to which the limitation of the scion's growth depends mostly on the vigor of the used rootstocks (E.A. Mielke, L. Smith, 2002).

Trunk cross sectional area is a synthetic coefficient of the tree's vigor, which was calculate using tree's trunk diameter measured at 50 cm from above the soil level. A visible influence of the rootstock and grafting height has been observed. Trees grafted on invigorating rootstock recorded bigger values of the trunk cross sectional area than those which were grafting on devigorating rootstock (tab. 3).

Table 3

Trunk cross sectional area at pear fruit tree grafted at 10 cm, 20 cm and 40 cm

Scion / Rootstock		Trunk diameter (mm)	Trunk cross sectional area (mm^2)	Limit differences (mm)		
				DL 5%	DL1%	DL 0,1%
Untoasă hardy/ *Pyrus sativa*	V1 = 10 cm	7.95 (Mt)	4.96 (Mt)	0,85	1,68	2,24
	V2 = 20 cm	8.43	5.58 (x)			
	V3 = 40 cm	10.06 (x)	7.94 (xxx)			
Untoasă Hardy/ *Cydonia oblonga*	V1 = 10 cm	7.97 (Mt)	4.99 (Mt)	1,41	2,79	3,72
	V2 = 20 cm	7.38	4.28 (0)			
	V3 = 40 cm	7.35	4.24 (0)			

Also it has been observed a general tendency of T.C.S.A. increasing when height of grafting was increased from 10 to 20 and 40 cm, when *Pyrus sativa* was

used as rootstock. Determinations made under this experience have shown a tendency to increase T.C.S.A. when *Pyrus sativa* was used as rootstock, but in case of grafting on *Cydonia oblonga* the general trend of T.C.S.A. is to decrease with increasing height of grafting. Similar results were obtained by other researchers concluded that although the first year after grafting T.S.C.A. showed an increasing trend, in the next years the values of this indicator decrease showing in this way the trees vigor reduction (E.A. Mielke and L. Smith, 2002).

The degree of trees branching grew at 20cm and 40 cm grafted variants comparing with control variant (grafted at 10 cm), and also it has been observed a reduction of the leaves number/tree, in a grater percent when quince was used as rootstock (tab. 4).

Table 4

Aspects concerning of fruit tree leaf area at pear fruit tree

Scion / Rootstock		Pitch number of features / tree	Pitch number of leaves /tree	Average area of one leaf (cm^2)	Fruit tree leaf area (cm^2)
Untoasă Hardy / *Pyrus sativa*	(V1)	1.07 (Mt)	123.00 (Mt)	15.16 (Mt)	1864.11 (Mt)
	(V2)	1.10	102.50	17.54 (xxx)	1798.06
	(V3)	1.75 (xxx)	96.00 (0)	17.05 (xx)	1637.18 (0)
DL 5%		0,48	1,18	0,28	
DL 1%		0,95	2,33	0,55	
DL 0,1%		1,26	3,11	0,74	
Untoasă Hardy /*Cydonia oblonga*	(V1)	0.10 (Mt)	177.60 (Mt)	16.35 (Mt)	2904.36 (Mt)
	(V2)	0.14	153.00 (0)	15.76	2411.86 (00)
	(V3)	0.16 (x)	134.20 (00)	17.61 (x)	2363.52 (00)
DL 5%		0,52	2,11	0,24	
DL 1%		1,02	4,17	0,47	
DL 0,1%		1,36	5,57	0,63	

In all studied variants height grafting leaded to a reduction of the trees leaf area in a bigger percent on quince grafted variants. Trees vigor reduction, especially in case of devigorating rootstock utilization, is explained by the majority of researchers by decreasing rootstock hydraulic conductivity, reason for which we proposed to verify if height budding is o not connected with a hydraulic deficit at the level of foliar apparatus by determining the leaves solids content.

At he higher budded variants, it has been determined an increasing of the dry matter content, higher values of this indicator being determined in case of grafting on *Cydonia oblonga* (tab.5).

During the period June – September dry mater content increased relatively uniform at all studied variants.

This case seems to confirm the theory of hydraulic conductivity limitation, according to which devigorating rootstocks determines a height dry matter accumulation comparing with invigoratind rootstocks utilization, fact also argued by the higher values of this indicator determined at the variants grafted on quince.

It is known the fact that devigorating rootstocks determine in scion's leaves a higher accumulation of soluble sugars. A possible reason of this accumulation may be the scion's deficiencies in transport of sugars from leaves to roots, which has a lower

intensity when trees are grafted on devigorating rootstocks (Kamboj, 1996). On the other hand the root system of devigorating rootstocks has a lower hydraulic conductivity comparing with those of invigorating rootstocks, the water supply is reduced and tree behaves as in water stress conditions. This situation has been found on trees grafted on *Cydonia oblonga* which recorded bigger values of sugar content, comparing with those recorded in case of grafting on *Pyrus sativa*.

Table.5

Leave's dry matter variation (%) at pear fruit tree species

Scion / Rootstock	Grafting height	2007-2009			
		June	July	August	September
Untoasă Hardy / *Pyrus sativa*	V1 = 10 cm	2,13(Mt)	4,24(Mt)	6,75(Mt)	6,59(Mt)
	V2 = 20 cm	3,34 (x)	5,52	9,26	8,52
	V3 = 40 cm	4,02 (xx)	6,1 (xx)	10,4 (xx)	9,51 (xx)
DL 5% (mg/g s.u.)		0,91	1,24	31,32	1,44
DL 1% (mg/g s.u.)		1,79	3,02	3,10	3,21
DL 0,1% (mg/g s.u.)		3,14	5,71	5,79	5,90
Untoasă Hardy / Cydonia oblonga	V1 = 10 cm	2,37(Mt)	4,41(Mt)	6,90(Mt)	6,78(Mt)
	V2 = 20 cm	3,55 (x)	5,68	9,40	8,91
	V3 = 40 cm	4,27 (xx)	7,42 (xx)	10,95 (x)	10,11 (x)
DL 5% (mg/g s.u.)		*0,93*	*1,25*	*31,34*	*1,42*
DL 1% (mg/g s.u.)		*1,81*	*3,08*	*3,11*	*3,26*
DL 0,1% (mg/g s.u.)		*3,17*	*5,76*	*5,73*	*5,92*

From the obtained results can be seen clear differences regarding grafting at 10 cm, 20 cm and 40 cm. Since June it was record increases in the amount of carbohydrates in leaves with budding height increasing from 56% (V2) to 88 % (V3,) in case of grafting on *Pyrus sativa* and from 50% (V2) to 80 % (V3) when *Cydonia oblonga* was used as rootstock. During the growing period these differences were more subdued (tab. 6).

Table 6

Sugar soluble content variation (mg/g s.u.) at pear fruit trees

Scion / Rootstock	Grafting height	2007-2009			
		June	July	August	September
Untoasă Hardy / *Pyrus sativa*	V1 = 10 cm	2,13(Mt)	4,24(Mt)	6,75(Mt)	6,59(Mt)
	V2 = 20 cm	3,34 (x)	5,52	9,26	8,52
	V3 = 40 cm	4,02 (xx)	6,1 (xx)	10,4 (xx)	9,51 (xx)
DL 5% (mg/g s.u.)		0,91	1,24	31,32	1,44
DL 1% (mg/g s.u.)		1,79	3,02	3,10	3,21
DL 0,1% (mg/g s.u.)		3,14	5,71	5,79	5,90
Untoasă Hardy / Cydonia oblonga	V1 = 10 cm	2,37(Mt)	4,41(Mt)	6,90(Mt)	6,78(Mt)
	V2 = 20 cm	3,55 (x)	5,68	9,40	8,91
	V3 = 40 cm	4,27 (xx)	7,42 (xx)	10,95 (x)	10,11 (x)
DL 5% (mg/g s.u.)		*0,93*	*1,25*	*31,34*	*1,42*
DL 1% (mg/g s.u.)		*1,81*	*3,08*	*3,11*	*3,26*
DL 0,1% (mg/g s.u.)		*3,17*	*5,76*	*5,73*	*5,92*

As a dynamic, during the vegetation period the variation of the sugar content was the same irrespective the rootstock and budding height. Sugar content

is increasing until August and then decrease, starting September, as a consequence of their translocation in organs of resistance (trunk and roots) and transformation in reserve substances. Remarkably is that reduction of sugar content in September is bigger at the 20 cm and 40 cm grafted trees, comparing with control variant. For example, if in case of grafting on *Cydonia oblonga* at 10 cm differences between sugar content determined in August and September were only 2%, in case of grafting at 20 cm differences were about 5.3% and when grafting height was increased at 40 cm differences were about 7.7%. These differences were higher when *Pyrus sativa* was used as rootstock. This dynamic of sugar content during the vegetation period can lead us to the hypothesis according to which at pear fruit tree increasing the height of grafting determine, in leaves, an increased synthesis of soluble sugars which is translocated in perennial organs as reserve substances.

CONCLUSIONS

1. Irrespective of budding height, once with height grafting increasing, it has been found a reduction of scions length in a bigger percent in case of grafting on *Cydonia obonga* comparing with case when grafting was made on *Pyrus sativa*, total trees length recording insignificant statistical variations.

2. Trunk cross sectional area increased with height of grafting when *Pyrus sativa* was used as rootstock, and decreased with height of grafting, when graft was made on *Cydonia oblonga*

3. Comparing with grafting at 10 cm in case of variants grafted at 20 and 40 cm, leaves average area was bigger, but number of leaves/tree decreased so average of leaf area at this variants

4. Average leaf area recorded increasing values once with grafting at a height level above the soil, but not sufficient to offset the low number of leaves/tree, so that, at the 20 cm and 40 cm grafting trees it has been determined a leaf area reduction comparing with grafting at 10 cm, in a bigger percent, in case of grafting on *Cydonia oblonga*

5. Irrespective of budding height, at 20 cm and 40 cm grafted trees a higher content of dry matter and soluble sugars has been recorded.

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POLLEN MORPHOLOGY, POLLEN'S GERMINATION CAPACITY AND VIABILITY OF FOUR BLACKCURRANT CULTIVARS (*RIBES NIGRUM* L.)

MORFOLOGIA, CAPACITATEA DE GERMINARE ŞI VIABILITATEA POLENULUI A PATRU SOIURI DE COACĂZ NEGRU (*RIBES NIGRUM* L.)

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Abstract: *The research was conducted in 2010 and aimed at establishing the biological value of pollen of four varieties of black currant (three romanian varietes and one foreign variete): Deea, Abanos,Ronix, Tsema. Pollen viability was found between 64.9% and 86.39 %, and ability to germinate with values between 42.07% and 81.7%. These studies revealed a close link beetween pollen size and pollen germination capacity. Also to quantify results in terms of free pollination and self-pollination. Percentage of flowers setting fruit in free-pollination of self-pollination condition was 15-22% lower than in free pollination.*

Key words: blackcurrant (*Ribes nigrum* L.), pollen grain, viability, germination, self pollination.

Rezumat: *Cercetările s-au efectuat în 2010 şi au urmărit stabilirea valorii biologice a polenului a patru soiuri de coacăz negru (3 româneşti şi unul străin): Deea, Abanos, Ronix şi Tsema. S-a constatat o viabilitate a polenului cuprinsă între 64.9% şi 86,39%, şi o capacitate de germinare cu valori între 42.07% şi 81,7%. Aceste cercetări au relevat şi o strânsă legătură între dimensiunea grăuncioarelor de polen şi capacitatea de germinare. De asemenea s-a determinat coeficientul de autofertilitate şi fertilitate naturală. Procentul de fructe legate în condiţii de autopolenizare a fost cu 15-22% mai mic decât în cazul polenizării libere.*

Cuvinte cheie: coacăz negru (*Ribes nigrum* L.), polen, viabilitate, germinare, autopolenizare.

INTRODUCTION

Ribes nigrum L. is the species of currant with greatest economic importance of the genus *Ribes*. The quality of yield depends on several agrotechnical and pedoclimatic factors, but also the pollination process. Literature indicate major differences between processes of pollination and processes of fertilization. Pollination is conditioned on the kind of pollen vector, while fertilization depends on the number of pollen grains reaching the stigma (Kołtowski et al., 1999).

The most varieties of black currant are self-fertility, but to be emerged differences between the varieties what may have genetic causes, such as higher position of stigma versus the anthers, especially the flowers on top of racemic (Kołtowski et al., 1999, cited by Denisow B, 2003). Viability of pollen grains and weather conditions are other aspects to be considered in assessing the fertility of varieties. One consenquence of low relative humidity of air is the dehydrating pollen. This is

prevented by species-specific adaptation mechanisms or even variety. Drought during pollen development in anthers can strongly to affect viability of pollen (Bots and Mariani, 2005 cited by Davarynejad et al 2008). Determination of viability and germination capacity of pollen are important in selection of suitable polliniser, because not all pollen can reach to the eggs (Davarynejad et al 1993).

The ojectives of this study were to investigate the viability and germination capacity of grains pollen *in vitro,* knowledge of the biological value of pollen for selection of suitable pollinisier. By determining in free-pollination and self-pollination of the percentage of flowers setting fruit we studied the characterization of varieties in terms of fertility index. In the same investigation was performed also the study of the pollen grain morphology with a focus on the pollen grain size.

MATERIAL AND METHOD

The research was conducted in Iassy, 47°10' - 47°15' N 27°30'E, Romania, in spring 2010 using the biological material collected from four self-fruitful blackcurrant varieties (three Roumanian varietes and one foreign variety): Deea, Abanos, Ronix şi Tsema.

Pollen germination capacity was determined *in vitro* by on solid nutrient medium (17g sucrose, 1.5 g agar, 0.01 g of boric acid in 100 ml of distilled water) at 20-22^{0}C and a relative humidity of 70 - 90%. Germination energy was calculated as a percentage for each set of 10 measurements / variety (Cociu V. and Oprea Şt., 1989) after 24 hours.

Pollen viability was evaluated microscopically after staining with carmine-acetic. The stained pollens in red were considered as viable in these tests. The sterile pollen remains colorless or stained in pink (Cociu V. and Oprea St., 1989, and Botu Botu , 1997).

Self-fertility was expressed as percentage (number of flowers setting fruit x 100/ number of isolated flower) (Cociu V. and Oprea St., 1989, Botu and Botu, 1997).

To establish ***the natural fertility*** were the flowers at least 200 of each variety (50 in the four cardinal points), these branches were tagged and fruits were the results (Cociu V. and Oprea St., 1989).

Experince was conducted by randomized block method in four replications with six plants per plot.

For each variety was measured the transversal diameter (td) and the longitudinal diameter (ld) for 50 pollen grains on glycerin jelly slides each.

All observations, measurements and photos of blackcurrant pollen were made on the light Motic Microscope under x10, x40, x100 magnification.

For statistical interpretation of results we used the coefficient of variation (s%) which was accepted arbritar following values: 0-10% - lower coefficient of variation, 10-20% - mean coefficient of variation, 20-30% - great coefficient of variation.

RESULTS AND DISCUSSIONS

Phenological stages and weather conditions:

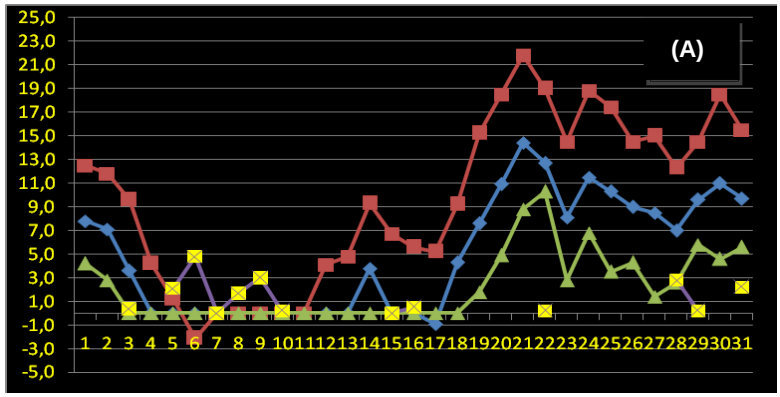
The bud burst appeared during the third week of March (table 1). In March 2010 the average air temperature was 4.3^{0}C, average absolute minimum air temperature -7.5^{0}C and average absolute maximum 21.,8^{0}C. The baloon stage of blackcurrant started in first of April. In April 2010 the average temperature was 11,9^{0}C. The blackcurrant varieties have different flowering times: Deea was the early blooming varieties in 3-April, while the Tsema flowers in 15-April which were the late blooming varieties. In during of flowering period the air temperatures dropped

below 17^0C, which determinated to extend this phenological stage. The flowering period took approximately 10-18 days. Beginning of the third decade of April (April 23) was marked by the temperatures below 0^0C. In this period the petals of Deea var. Fell and and the first fruit set. Rainfall recorded in March and April not quantitatively significant, the total being 18,1mm and 28mm (figure 1).

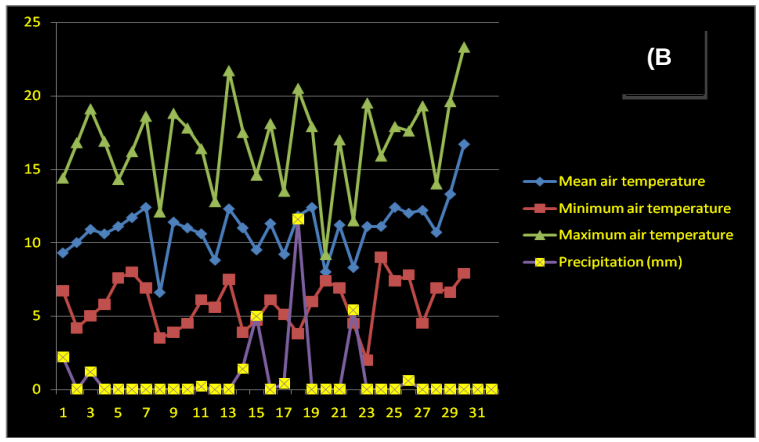
Table 1

Phenological stages of black currant under climatic conditions of Iassy, Romania (2010)

Varieties	Bud burst	Balloon stage	Full bloom	First fruit set
Deea	15 Mar.	17 Mar.	3 Apr.	20 Apr.
Abanos	18 Mar.	19 Mar.	5 Apr.	24 Apr.
Ronix	21	22 Mar.	7 Apr.	24 Apr.
Tsema	28	1 Apr.	15 Apr.	1 May



1. A



1 B.

Fig. 1 (A and B). Weather conditions during the bud burst period and flowering period of blackcurrant: March (A) and April (B) 2010

Biological value of pollen grains of black currant varieties:

The mean percentage germination ability and the percentage viability of pollen grains was differed significantly between varieties (table 2).

Table 2

Biological value of of pollen grains of black currant varieties

Variety	Germination ability of polen (%)	Viability of polen (%)	Percentage of flowers setting fruit in *free pollination* (%)	Percentage of flowers setting fruit *self pollination* (%)
Deea	81.7	86.3	47.0	32
Abanos	69.1	86.2	65.0	46.2
Ronix	42.07	64.9	39	26.4
Tsema	81,6	86,4	70,7	48,6
s %	17,97	19,45	17,55	16,64

The percentage of viable pollen to black currant varieties studied ranged between 64.9% and 86.4%, Ronix variety registering the lowest values. Researchs conducted over several years by Szklanowska et. al. (1997) shows that blackcurrant pollen viability does not depend on the cultivar. Our results can be explained by the existence of adverse climatic conditions during microsporogenesis.

After examining of data on germination capacity is observed that the values obtained in the varieties Tsema (figure 2) and Deea are close to the percentage of viable pollen (more than 80%). Lowest percentage germination (42.07%) was obtained from Ronix var.

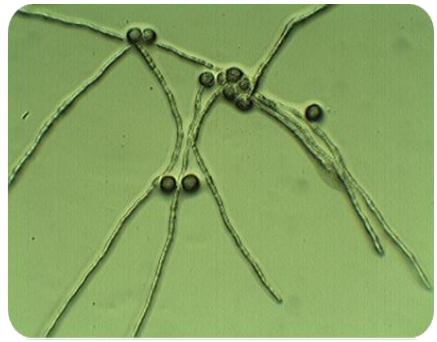


Fig. 2. Germination pollen of Tsema var.(MOTIC MICROSCOPES ob x 40)

The coefficient of variation (s%) of pollen grains viability for blackcurrant varieties analyzed was 19.45% and the coefficient of variation of pollen germination capacity was 17.97%. These results allows us to appreciate that there is a medium variability for these indicators of biological value of pollen.

The percentage of fruit setting varied depending on the pollination method and the variety of currant and (table 2). This index of the biological value of pollen had a coefficient of variation (s%), below 20%, indicating an medium variability. Highest values were obtained for the free pollination: Abanos var. 65%. and Tsema var. 70.7%, in agreement with the point of view of many authors

(Grădinariu G., 2002, Denisow B., 2002) about the importance of insects and their positive influence in the process of pollination in black currant.

At the same varieties, the self-ferility coefficient was 46.2% to Abanos var. and 48.6% to Tsema var., which shows that self-pollination does not guarantee a better fruit set even varieties with a high percentage of self-fertility. The index of natural fertility for Deea var. has had 47%, close self-fertility index (32%), which may be due to unfavorable conditions at the end of flowering or susceptibility of style.

Pollen size: After were measured of the lenght the pollen grain of blackcurrant varieties it was found that the longitudinal diameter (LD) and the transversal diameter (TD) are not equal, bud the raport LD/TD is close to 1 (table 4). The pollen grain of blackcurrant is circular and nonangular (figure 3) in accordance with the authors Wrońska-Pilarek (1998).

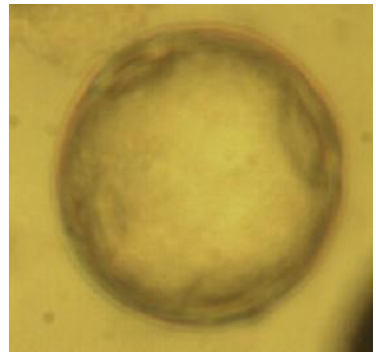


Fig. 3. Pollen grain of Tsema var. (MOTIC MICROSCOPES ob x 100)

The average lenght of the transversal diameter (TD) of the pollen grains varied in the range of 17.1 µm to 19.2 µm and the average lenght of the longitudinal diameter (LD) was between 18.1 µm to 20.3 µm.

Table 4

Size of pollen grains of blackcurrant varietes (µm)

Variety		Deea	Abanos	Ronix	Tsema
average	LD	18,7	18,9	18,1	20,3
	TD	17,9	17,9	17,1	19,2
	LD/TD	1,04	1,06	1,06	1,06
min	LD	14,6	16,1	13.7	16,6
	TD	13,7	15,6	13	18,0
max	LD	21,4	21,9	27,6	22,6
	TD	21,5	21,7	26,5	21,6

**Longitudinal diameter (LD)* ***Transversal diameter (TD)*

CONCLUSIONS

This researchs showed that there were differences between varieties of black currant regarding the biological value of pollen probably caused by unfavorable weather conditions (especially temperature) during of microsporogenesis and pollen tubes growth. The percentage of fruit set depended on the method of pollination and the currant variety.

The highest values of the self-fertility coeficient was: 48.6% on Tsema var., provided that the same varity of the natural fertility coeficient was 70.7%. The high values for germination capacity and pollen viability recommend the variety Tsema as best polliniser between varieties analyzed.

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INFLUENCE OF ROOTSTOCK ON GROWTH AND DEVELOPMENT OF IDARED AND GALA MUST VARIETIES OF TREES IN THE NURSERY

INFLUENŢA PORTALTOIULUI ASUPRA CREŞTERII ŞI DEZVOLTĂRII POMILOR SOIURILOR IDARED ŞI GALA MUST ÎN PEPINIERĂ

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Abstract. *Investigations were conducted in 2008-2009 in Nursery Fruit Company „Codru-ST" Ltd., which is located in the centre of Moldova. As biological material were used apple varieties Idared and Gala Must and were bench-grafted on rootstocks M 9, 62-396, M 26, M 7 and MM 106. Planting distance was 90x35 cm. On the basis of the research made it was found that growth and development of apple trees in the first field and the second field of the nursery varies according to variety-rootstock combination and the evidence obtained corresponds to the current standard of the Republic of Moldova.*

Key words: fruit nursery, apple varieties, rootstock, variety-rootstock combination, bench-graft, planting material

Rezumat. *Cercetările au fost efectuate în anii 2008-2009 în pepiniera pomicolă a companiei SRL „Codru-ST", ce este amplasată în zona de centru a Republicii Moldova. Ca material biologic au fost folosite soiurile de măr: Idared şi Gala Must altoite la masă pe portaltoii M 9, 62-396, M 26, M 7 şi MM 106. Distanţa de plantare a fost 90x35 cm. În baza cercetărilor efectuate s-a constatat că creşterea şi dezvoltarea pomilor de măr în câmpul întâi şi doi al pepinierei variază în funcţie de combinaţia soi-portaltoi şi indicii obţinuţi corespund standardului în vigoare al Republicii Moldova.*

Cuvinte cheie: pepinieră pomicolă, soiuri de măr, portaltoi, combinaţii soi-portaltoi, altoiri la masă, material săditor

INTRODUCTION

One of the main apple crop increased, including the Republic of Moldova, is the establishment and efficacious exploitation of intensive and superintensive orchards, used the grafted trees by small and medium vigor rootstocks led by well-structured system of crown, which can ensure the early economical fructification once two-three year after planting in the orchards (Babuc V., Rapcea M., 2002).

Two-year-old trees with one-year-old crowns are perfectly suited to the needs of modern 21st century fruit production because they start bearing early and produce higher yields, especially in the first two years after planting (Gudumac E., Peşteanu A., Gudumac Olga, 2007; Mika A., Buler Z. and Krawiec A., 2003; Bielicki P., Czynczyk A., 1999).

Of recent research (Gudumac E., 2008), on crown structure in second field of the nursery (of apple trees grafted by M 9 rootstock) was elaborated a mixed method which consists in the formation of base of crown by four normal (grown from last year buds), well-developed longer than 60 cm branches, and to the shoot axis extension two-three early branches obtained of early buds.

It is very important number, distribution uniformity and length of the shoots on the central axis bazitonic strict compliance with the principle, which are largely determined by biological features of varieties.

Varieties grafted on different rootstocks show major changes to growth vigor, to ability of sprout issue, including the sylleptic shoots, to economical fructification etc., which determine the habitus of trees. For these requirements it is necessary to develop and practice the formation methods of the crown, suitable with features of variety-rootstock associations, beginning in the nursery where are the formation of tree crown bases.

MATERIAL AND METHOD

The research was carried out during 2008-2009 in the fruit nursery of company „Codru-ST" Ltd., which is located in the central area of Moldova. As biological material were used the apple varieties: Idared (control) - homologated variety in Republic of Moldova and Gala Must – perspective variety, the bench-grafted rootstocks M 9, 62-396, M 26, M 7 and MM 106.

The bench grafting was performed in March, using the perfected copulation method with detached branch. Grafting site was tied with porous polyethylene tape designed specifically for graft and graft was paraffined. The grafted marcotes were stratified by placing them upright in containers, so that the basal layers (20-25 cm) to be placed in a layer of wet sand. The stratification temperature in the refrigerator was +2...+4^{0}C. To produce grafted trees were used well-developed layers of 10 mm diameter and graft branches with higher biological values.

The first field of tree nursery was established in the second half of April, with bench grafts. Distance of planting grafted plants was 90x35 cm. The aerial part was palisated on a stick of bamboo.

In the second field of nursery, early spring annual stems have been shortened to a height of 75-80 cm above the grafting site. During the vegetation was carried trunk release, being left only 4-5 shoots to form the crown base. To obtain sylleptic shoots on the central axle, when they reached the length of 15-20 cm, it was made the remove of apical leaves without hurting the point of growth. This operation is repeated every 5-7 days for 5-6 times. To stimulate the strong development of shoots are made more frequent irrigation and fertilization based on macro-and micronutrients.

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 the investigations is to determine the influence of rootstock on the degree of attachment, growth and development of apple trees, obtained by bench grafting of fruit growing nursery.

The number of repetition in each variant is four. The number of trees in each repetition is 20. The researches were made in field and laboratory conditions according to the required methods for doing experiments with fruit growing plants. The main results obtained were statistically processed.

RESULTS AND DISCUSSIONS

In the investigations it was found that attachment, growth and development of apple trees in the nursery first and second field depend on fruit variety-rootstock combination.

The degree of striking and growth starting of the bench-grafted plants and planted in the first field (fig. 1), is between the limits: 95,6-97,5% at Idared variety and 96,9-99,2% at Gala Must variety. Depending on the rootstocks studied, the highest values of this index were recorded for the Gala Must and Idared varieties were grafted on rootstock MM 106.

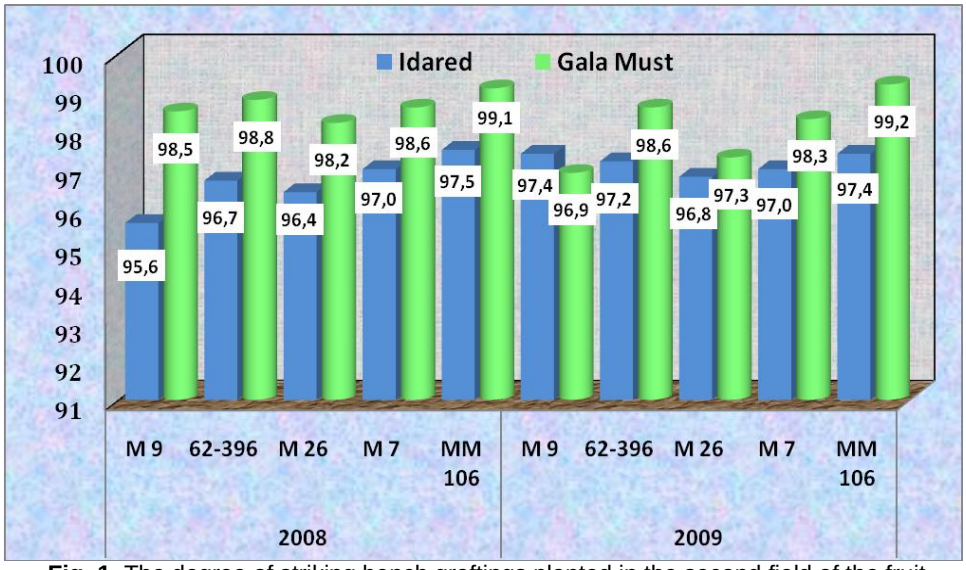

Fig. 1. The degree of striking bench graftings planted in the second field of the fruit nursery, %.

At the end of the first season, the highest values of graft height (tab. 1) were recorded in both years Gala Must varieties grafted on MM 106 rootstock, which has a medium force of growth and is 125-135 cm. At the Idared variety, the highest value of this index was recorded at the same event is 116-124 cm. With decreasing growth vigor of rootstocks studied, there is a decrease in the value of this index and is 109-111 cm at the Idared variety grafted on the rootstock M 9, respectively, 114-124 cm at the Gala Must variety grafted on the same rootstock. The graft diameter at 10 cm above the grafting site in the years 2008-2009, which are affected by increasing the vigor of the variety-rootstock combination was within 8,6 mm and 10,2 mm. Leaf area ranging from 0,21 m^2/tree to 0,35 m^2/tree according to growth vigor rootstock which has been used in the grafting.

At the end of the second growing season in nursery fruit growing (tab. 2) the height of apple trees is essentially influenced by variety-rootstock combination and is within the limits of 170,00-193,75 cm. The Idared variety

highest value of this index has been used for rootstock M 7, and the Gala Must variety – grafted on MM 106 rootstock of average vigor of growth. The lowest height of trees was in combination Idared/62-396 (182,50 cm) and Gala Must/M9 (170.00 cm).

Table 1

The main indicators of apple trees in the first field of the nursery depending on variety-rootstock combination

Rootstock	Varieties					
	Idared			Gala Must		
	graft height, *cm*	graft diameter,* *mm*	leaf surface, m^2/*tree*	graft height, *cm*	graft diameter,* *mm*	leaf surface, m^2/*tree*
2008 year						
M 9	111	8,6	0,23	124	8,9	0,27
62-396	115	8,7	0,26	126	9,0	0,30
M 26	117	8,9	0,27	128	9,6	0,28
M 7	118	9,0	0,27	131	10,0	0,30
MM 106	124	10,0	0,30	135	10,2	0,35
***DI*$_{0.05}$**	*2,86*	-	*0,04*	*1,98*	-	*0,03*
2009 year						
M 9	109	8,7	0,21	114	9,4	0,21
62-396	114	8,8	0,23	116	9,8	0,25
M 26	114	9,2	0,24	117	9,8	0,27
M 7	115	9,5	0,25	120	10,0	0,28
MM 106	116	9,7	0,26	125	10,1	0,29
***DI*$_{0.05}$**	*3,01*	-	*0,03*	*2,75*	-	*0,03*

**- 10 cm above the grafting site*

Trunk diameter is an indicator that directly affects the establishment of quality nursery trees of the carried investigations out with different variety-rootstock combinations that index was 15,00-16,33 mm.

Table 2

The height, trunk diameter and leaf surface of apple trees in the second nursery field depending on the combination of fruit variety-rootstock

Rootstock	Varieties					
	Idared			Gala Must		
	tree height, *cm*	trunk diameter,* *mm*	leaf surface, m^2/*tree*	tree height, *cm*	trunk diameter,* *mm*	leaf surface, m^2/*tree*
M 9	186,25	15,50	0,71	170,00	15,00	0,82
62-396	182,50	15,68	0,81	176,50	16,33	0,83
M 26	190,00	16,33	0,89	191,25	15,65	0,92
M 7	192,00	16,30	0,81	186,25	16,33	0,94
MM 106	190,25	16,25	0,84	193,75	16,25	1,00
***DI*$_{0.05}$**	*4,77*	-	*0,04*	*4,32*	-	*0,04*

**- 10 cm above the grafting site*

Apple tree leaf surface is majored concomitantly with the increase of rootstock vigor of growth, from 0,71-0,82 m^2/tree in the case when the varieties taken into the study were grafted on M 9 to 0,89 m^2/tree in combination Idared/M 26 and, respectively, 1,00 m^2/tree in the variant Gala Must/MM 106, or with 18-22%.

The number of normal branches on the crown base of the apple trees varieties taken into the study in the second field of the fruit nursery (tab. 3), is between the limits of 3,75-4,50 pcs/tree.

The branches average length from the base of the crown depend on the biological peculiarities of the varieties and rootstocks taken into the study, and also their number, thus in the second field of the fruit nursery the values of this indicator is between the limits of 67,24-86,50 cm.

Table 3

Number of normal branches, formed at the base of the crown, and sylleptic ones on the extension shoots and their average length at the apple trees in the second field of the fruit nursery in dependence on the combination variety rootstock.

root -stock	Varieties							
	Idared				Gala Must			
	normal branches		sylleptic shoots		normal branches		sylleptic shoots	
	number, *pcs/tree*	average lenght, *cm*	number, *pcs/tree*	average lenght, *cm*	number, *pcs/tree*	average lenght, *cm*	number, *pcs/tree*	average lenght, *cm*
M 9	4,00	67,24	4,25	34,38	4,50	80,00	3,50	23,00
62-396	3,75	72,50	1,75	37,16	4,50	73,13	4,00	30,75
M 26	4,00	80,30	3,00	32,50	4,25	78,78	4,75	33,39
M 7	4,00	83,44	4,00	37,96	4,25	86,50	7,25	28,00
MM 106	4,00	75,94	5,25	31,49	4,50	82,94	7,50	31,98
$Dl_{0.05}$	-	*5,09*	-	*1,68*	-	*2,72*	-	*3,76*

The number of sylleptic shoots formed from early buds on the extension shoot of the axle, at the varieties taken into the study, depends greatly on the variety's capacity to emit sylleptic shoots, and the vigor of growth of the variety-rootstock combination researched, registering at the variety control (Idared) 1,75-5,25 pcs/tree, with an average length between 31,49 cm and 37,96 cm. The variety Gala Must, considered as a perspective variety for the Republic of Moldova has formed a big number of sylleptic shoots (3,50-7,50 pcs/tree) with their average length of 23,00-33,39 cm. If to compare the value of this index at the rootstocks under the study, then we can observe that the greatest number of sylleptic shoots was formed by both the varieties under the study on rootstock MM 106, which manifest a greater vigor of growth in comparison with other rootstocks.

On the basis of the researches made and according to present standards of the Republic of Moldova (***, SM 155:2003), it was found that the apple trees obtained on different variety-rootstock combinations in the second field of the fruit nursery correspond to first category quality.

CONCLUSIONS

1. The degree of striking and starting to grow of the bench-graftings is very big, being between the limits of 95,6-99,2%;

2. To the end of vegetation period, in the first field of the nursery, at all the rootstocks taken into the study, the height of the bench-grafted apple trees with the varieties Idared and Gala Must constitute 109-135 cm, the diameter at 10 cm above the place of grafting is 8,6-10,2 mm and, respectively, the leaf surface is 0,21-0,35 m^2/tree;

3. Bioconstructive parameters of apple trees in the second field of the fruit nursery registered values that correspond to 1st category of quality according to the present standards on: height, trunk diameter, number of branches, as well as their average length;

4. The biological peculiarities of the combination variety-rootstock investigated influence apple trees growth and development in the nursery. For the apple tree superintensive system is recommended to use grafted apple trees on rootstocks M 9, 62-396 and M 26, and for the intensive system – more suitable are the rootstocks M 7 and MM 106;

5. The investigations made demonstrate that superior values of apple trees in the first and second fields of the fruit nursery were registered at the variety of perspective Gala Must, whose vigor of growth and capacity to emit sylleptic shoots is greater in comparison with the Idared variety, homologated in the Republic of Moldova.

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INFLUENCE OF THE DIFFERENT SLENDER SPINDLE CROWN FORMATION METHODS ON THE PRODUCTIVITY AND APPLES QUALITY

INFLUENŢA DIFERITOR METODE DE FORMARE A COROANEI FUS ZVELT ASUPRA PRODUCTIVITAŢII SI CALITĂŢII MERELOR

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Abstract. *The study was made in a commercial orchard "Codru - St" Ltd. founded in 2000 with bench-grafted marcotes. Apple trees from the varieties Gala Must, Golden Reinders and Idared growth on dwarfing M9 rootstock, the distance of plantation between rows is 4.0 m, and between trees in the row is 1.0 m. From 2003 to 2006 was studied the productivity of the apple orchard, fruit weight and fruit diameter in dependence of slender spindle crown formation methods. It was established that the biggest productivity at the varieties was registered in the variants with minimize of pruning degree at crown formation and design of 2 provisional horizontal branches through fixation on row direction – 33.46-37.72 t/ha. The positive correlation found was between fruits size, fruits weight and crown formation methods.*

Key words: variety, apple, orchard, provisional branches, fruits size.

Rezumat. *Studiul s-a efectuat într-o plantaţie pomicolă a întreprinderii "Codru - St" SRL fondată în anul 2000 cu marcote altoite la masă altoiri la masă. Pomii de măr din soiurile Gala Must, Golden Reinders şi Idared pe portaltoiul cu talie scundă M9, distanţa de plantare dintre rânduri 4.0 m, iar dintre pomi pe rând 1.0 m. Între anii 2003-2006 s-a studiat productivitatea plantaţiei de măr, masa medie a fructelor şi diametrul fructelor în funcţie de metodele de formare a coroanei fus zvelt. Cea mai mare productivitate la toate soiurile s-a înregistrat în varianta cu un grad minimum de tăiere la formarea coroanelor şi proiectarea a 2 ramuri provizorii dirijate către orizontală şi fixate la spalier – 33.46-37.72 t/ha. A fost stabilită o corelaţie pozitivă între masa medie a fructelor, diametrul fructelor şi metodele de formare a coroanei.*

Cuvinte cheie: soi, măr, livadă, ramuri provizorii, diametrul fructelor.

INTRODUCTION

The experience accumulated on the international scale in the fruit growing domain demonstrate that at present the most efficient fruit growing plantations are considered to be the superintensive orchard, planted on cloned rootstocks with a little vigor of growth (Mika A., 2000). In recent years the majority of fruit growing plantations were established with cloned rootstocks with an under- and little vigor that correspond to attributed requirements to intensify the pomology (Sadowski A. et al., 2000; Szczygiel A., Mika A., 2003).

The increase of fruit growing production in Republic of Moldova may be realized only in the conditions of establishing new apple tree plantations. These

plantations have a modern assortment that are grafted on rootstock with under- and small average vigor of growth to plant an optimal number of apple trees per a unit of area and to obtain an early fruit yield (Peşteanu A., Croitoru A., Gudumac E., 2005). The precociousness fructification of these plantations permits to diminish at minimum the non-productive period. The optimum number of plants per a unit of area due to the crown formation after fusiform method permits a more rational use of the plot destined for plantation and guarantees a higher output of production (Croitoru A., 2005; Rutkowski K. et al., 2005; Grădinăriu G. et al., 2000).

There were made essential modifications in recent years regarding the apple trees' formation and pruning in the superintensive system of culture. That is due to the fact of using in culture modern varieties that fructify on annual branches, rootstocks with a low vigor of growth and bigger plantation densities that permits to obtain greater yields of fruits from 2^{nd} - 3^{rd} year after being founded the orchard. These requirements are the most important because at the base of the plantation modern structure it is a compact crown formed by short 2^{nd} order branches and, upper on the central axle, some provisional branches with a more limited period of exploitation (Cimpoieş Gh., 2002; Cepoiu N., 1995).

Only in the conditions of the productive varieties with a rootstock with small vigor of growth, suitable to the pedoclimatic conditions of the country, plantation optimum density and crown compact format systems that permit to obtain stable (35-40 t/ha) and competitive yields (Salvador F et al., 2006; Szczygiel A., Mika A., 2003).

The aim of the research is to optimize the ameliorated slender spindle crown structure to urgent the entrance of apple trees on an earlier production, yield rapid growth and fruit production economic efficiency in the superintensive apple orchards.

MATERIAL AND METHOD

The experimental field is placed in the orchard "Codru-ST" Ltd. near the village Bucovat, district of Straseni. There was established in summer of 2000 a plantation with bench-grafted marcotes. As a biological material were used the apple tree varieties Gala Must, Golden Reinders and Idared grafted on rootstock M9.

The distance of plantation 4x1 m was established in conformity with present recommendations for apple trees grafted on M9, leaded after the slender spindle system (Cimpoieş Gh., 2002; Cepoiu N., 1995).

The variants to modify the methods of ameliorated slender spindle crown formation were established in conformity with the main principles of apple tree crown formation in the culture superintensive and intensive system (Peşteanu A., Croitor A., 2009; Cimpoieş Gh., 2000; Matinger H., Vigl J., 1999), being oriented to optimize to report between vegetative and reproductive organs of growth with the aim to urgent of having an early fruit production of trees.

During the vegetation of 2000 year, the apple trees grew having the form of rods, reaching the height of 1,2 m, that permitted in spring of 2001 to initiate the crown formation of slender spindle type in four variants:

Variant 1 (control variant) – according to present recommendations: the trees with a trunk of 50-55 cm with a well-developed weak zigzagged vertical axle; at the base of the crown 3-4 first order branches shortened of 40-50 cm with angles on

inclination of 60^0 from the vertical one; on the first order branches and above on the axle at an interval of 20 cm radially uniform placed the semi skeleton branches, oriented to horizontal preponderantly by transfer cuttings to lateral branches.

Variant 2. The crown bioconstructive base as a control variant compelled with: rational minimization formation cuttings degree; placement above the crown base of two provisional first order branches alternatively oriented and fixed on espalier in row direction, that after fructification are gradually shortened and being transferred into fructification branches; forced orientation in free space of crown of shoots and branches with a growth to vertical position to transfer them into fructification branches.

Variant 3. The bioconstructive base as in variant 2 with leading the semi skeleton branches to horizontal position by lateral transfer branch cuts.

Variant 4. The bioconstructive base as in variant 2 with renovation of semi skeleton branches by with the aim to obtain shoots from dormant buds.

Every variant includes four repetitions with eight trees, intervals between grassy rows, and the strips into the row are loose and herbicided. The soil is chernozem leachate sloppy with the humus content in 0-40 cm layer from 3,26% to 3,21%. Fertilization system as scheduled harvest. Drip irrigation.

In the years 2003 - 2006 according to approved methods was studied the apples production and quality. After ending the crown formation, based on variant 2 was performed fruition cutting according to the biological features of the studied varieties.

RESULTS AND DISCUSSIONS

The fruit production is one of the main indices taken into account in determining the suitability crown form for superintensive culture system (Peşteanu A., Croitor A., 2009; Sadowski A. et al., 2000).

The apple trees have entered on economic fructification in 2003, the third year after the initiation of crown formation in the orchard. The first economic crop (tab 1) in variant 1 (control) was: 22,22 t/ha in variety Gala Must, 26,65 t/ha in variety Golden Reinders and 20,75 t/ha in variety Idared.

Higher values of fruit harvest this year was registered in version 2, where the varieties taken under the study were obtained, respectively: 28,02 t/ha, 33,07 t/ha and 25,32 t/ha, exceeding the 22%, control – 26%. In variants 3 and 4 the first harvest of fruit varieties studied, overcomes the variant control with 13-16% and 11-14%.

In 2004 fruit harvest in most variants of crown formation is approximately at the same level with the fruit production obtained in 2003, remaining within: 24,00-27,82 t/ha in variety Gala Must, 22, 15-26,50 t/ha in variety Golden Reinders and 21,15-24,72 t/ha in variety Idared. In this limits, lower values belong to variant 1 and to variant 2 –the highest ones, overcoming the variant control, on the varieties, with 14-16%. In variants, 3 and 4 the prevalence of yield to variant control is 6-3% and 3-10%.

In 2005, fruit harvest in variant control majored to: 38,17 t/ha at Gala must variety, 40,83 t/ha at the variety Golden Reinders and 33,43 t/ha at the Idared variety. In variant 2 there have been the greatest values of fruit harvest, being respectively 47,15 t/ha, 48,63 t/ha and 41,11 t/ha overcoming the variant control

with 19-23%. In variants 3 and 4 the fruit harvest is lower than on variant 2, but superior to variant control, being respectively 12-16% and 9,10%.

In 2006, when trees have reached the period of maximum fruition, the fruit harvest for most variants was: 40,75-43,15 t/ha in Gala Must variety, 40,95-43,81 t/ha in variety Golden Reinders and 40,85-42,72 t/ha in variety Idared. Within the limits indicated, higher values were recorded in variant 2, which exceeded the witness according to the fruit harvest with 4-7%. In variants 3 and 4, the harvest fruit was approximately at the level of the control variant.

Table 1

Average fruit yield according to variety's biological particularities and crown formation mode, t/ha

Method of crown formation	2003	2004	2005	2006	Cumulative harvest
Gala Must variety					
Variant 1(control)	22,22	24,00	38,17	40,75	125,40
Variant 2	28,01	27,82	47,15	43,15	146,13
Variant 3	25,77	26,07	42,47	42,37	136,68
Variant 4	25,32	25,90	42,10	41,15	134,47
$LSD_{0,05}$	*0,75*	*0,45*	*0,55*	*0,95*	-
Golden Reinders variety					
Variant 1(control)	26,65	22,15	40,83	40,95	130,58
Variant 2	33,07	25,37	48,63	43,81	150,88
Variant 3	30,10	26,50	46,34	42,17	145,11
Variant 4	29,30	22,87	44,57	41,76	138,50
$LSD_{0,05}$	*1,35*	*0,85*	*1,20*	*0,77*	-
Idared variety					
Variant 1(control)	20,75	21,15	33,43	40,85	116,18
Variant 2	25,32	24,72	41,11	42,72	133,87
Variant 3	23,65	23,90	37,33	41,91	126,79
Variant 4	23,02	23,42	37,09	41,95	125,48
$LSD_{0,05}$	*1,10*	*0,95*	*1,15*	*0,92*	-

There were small differences of production than the variant control because, with advancing age trees, it was made reduction cuts of semi-skeleton branches and decreased the number of horizontalized shoots by tilt to avoid crown thickening, which achieved a maximum relative size. Simultaneously with entering trees on the full fruition in 2005 partially and completely in 2006, it was started to cut the fructification, made with all variations by the principle of rejuvenation that have fructified with the cycle of 3-4 years (Cimpoieş Gh., 2002).

In conclusion, the effect of minimizing, the cutting level of forming the crown in ensemble by placing two 1st degree branches above the crown basis, shots and branches orizontalization by forced inclination into free space, is significantly manifested. In this variant the total fruit harvest on the years 2003-2006 was of 146,13 t/ha at Gala Must variety, 150,88 t/ha in variety Golden Reinders and 133,87 t/ha in variety Idared. Production fruit harvest to control

variant the amount of variant four-year study on the varieties are, respectively: 20,73 t/ha, 20,30 t/ha and 17,69 t/ha or 16,5%, 15,5 % and 15,2%.

The main indicators of fruit quality are considered: the representative aspect, in particular, shape, color, size characteristic of the variety (Jamba A., Carabulea B., 2002). The degree of manifestation of these properties is influenced by environmental factors, rootstock, applied technology, including system management and pruning trees (Jamba A., Carabulea B., 2002; Takacs F., 2004).

In accordance with European standards apples fruited big issue characteristic representative variety, diameter 70 mm and higher grade are reported to "Extra" and with diameter of 65-69 cm - to 1st class.

On the average at varieties, the variants of crown formation and years taken into the study, the diameter is within the limits of: Gala Must variety - 71,1-72,7 mm, the variety Golden Reinders 70,2-72,5 mm and Idared variety 75,5-76,9 mm, exceeding the dimensions set for the "extra". This is due to load regulation of fruit trees, linked together with cuts in green and final correction after physiological fruit fall by hand thinning as scheduled and high quality crop of apples.

In variant 1 (control) fruit weight class "extra" 70 mm and larger diameter is within the limits: 57-62% at Gala Must variety, 67-69% at Golden Reinders variety and 84-86% at Idared variety. Apples of 1st class constitute respectively on varieties: 33-38%, 23-26% and 12-14% and less than 65 mm in diameter 0-6%, 4-5% and 0% at Idared variety.

In version 2, where the harvest is higher, the average diameter of apple varieties and years under study, is lower than variant control with 1,6-2,3 mm or about 3-4%. Apples of "extra" class in this variant are: 57-62% at Gala Must variety, 67-69% at Golden Reinders and 84-86% at Idared variety. Share apples diameter was 60-65 mm, respectively varieties, 3-7%, 5-6% and 0%.

In variant 3 and 4 the quota of apples of "extra" class, I and a smaller diameter than 65 mm is approximately at the level of the control variant.

In conclusion, the quality of apple varieties, methods of forming the crown and years of education is high. Higher indices of fruit diameter were recorded at Idared variety of "extra" class and 84-88% and 12-16% of 1st class, followed by Golden Reinders variety with 69-72% of "extra" class and 26-27 % of 1st class. Indices for smaller fruit diameter, but generally higher, were registered at Gala Must variety 61-67% of "extra" class and 35-39% of 1st class. In the limits indicated for each variety, values lower with about 4-6% were registered in variant 2, where the harvest of fruit trees is higher with 20-23% compared with the variant control.

CONCLUSIONS

1. Minimizing the pruning degree of crown formation and placement of two 2nd order branches above its base, influence the fruit harvest. The average amount of fruit production during 2003-2006 was of 36,53 t/ha in variety Gala Must, 37,72 t/ha in variety Golden Reinders and 33,46 t/ha in variety Idared. Increasing

the fruit harvest to the control variant the amount in sum for four years it will constitute on the variety: 16,5%, 15,5% and 15,2%.

2. The methods of formation have not essentially influenced the fruit quality. Depending on the variety's biological peculiarities, higher indices of fruit diameter were recorded at Idared variety 84-88% of "extra" class and 12-16% class I, followed by 69-72% with the variety of Golden Reinders "extra" class and 26-27% class I, and 61-67% of Gala Must variety of "extra" class and 35-39% class I.

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SPECIFIC CARACTERISTICS OF GOOSEBERRY VARIETIES IN NEW CULTIVATION CONDITIONS

PARTICULARITĂŢI ALE SOIURILOR DE AGRIŞ ÎN CONDIŢII NOI DE CULTURĂ

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Abstract. *The paper presents results of research conducted in the centre of Moldova during 2002-2006. Were studied the characteristic indices, gooseberry bush varieties enter the new conditions of growing and established the fruit production up to 5.5 t/ha achieved Şcedrîi, Ruski, Smena. Average crop of studied gooseberry varieties ranged from 1.2 to 14.6 t/ha and maximum yield from 3.4 to 20.8 t/ha. Highly productive varieties over 6 t/ha are Severnîi captain, Donetski krupnoplodnâi, Donetski perveneţ, Puşkinskii, Colobok, Rresistant.de Cluj. Mean weight of the varieties ranged from 1.4 to 4.2g values and maximum mass between 2.3 to 5.7g. The large fruited are Donetski krupnoplodnâi (4.2 g), Donetski pervenets (3.7g), Zenit,Rresistent de Cluj (3.6g). Varieties with few thorns Colobok, are resistant to powdery american mildew disease, Severnîi captain and variety without thorns Orlionok high resistance. Varieties Donetski krupnoplodnâi, Donetski perveneţ are resistant to american powdery mildew disease, large numbers of thorns. Very spiny-Ciorni negus varieties, Scedri have an average resistance to powdery american mildew disease.*

Key words: gooseberry, variety, yield, cultivate conditions, mildew disease, thorns.

Rezumat. *În lucrare sunt prezentate rezultatele cercetărilor efectuate in Zona de Centru a Republicii Moldova pe parcursul anilor 2002-2006. S-au studiat indicii caracteristici soiurilor introduce de agriş în condiţii noi de cultivare şi s-a stabilit ca, producţie de fructe pînă la 5,5 t/ha au atins Şcedrîi, Ruski, Smena. Recolta medie a soiurilor de agriş studiate a variat intre 1,2-14,6 t/ha, iar recolta maximă între 3,4-20,8 t/ha. Soiurile foarte productive peste 6 t/ha sunt: Severnîi capitan, Donetki krupnoplodnâi, Donetki perveneţ, Puşkinskii, Colobok, Rezistent de Cluj. Masa medie a fructelor de agriş pe soiuri a variat între valorile de 1,4-4,2g, iar masa maximă între 2,3 - 5,7g. Soiurile cu fructe mari sunt: Donetski krupnoplodnâi (4,2g), Donetski pervenets (3,7g), Zenit, Rezistent de Cluj (3,6g). Soiurile cu puţini ghimpi Colobok, Captivator, Severnîi capitan sunt rezistente la făinare, iar soiul fără spini Orlionoc cu rezistenţă înaltă. Soiurile Donetki krupnoplodnâi, Donetki perveneţ nu sunt rezistente la făinarea americnă, au un număr mare de ghimpi. Soiurile foarte ghimpoase-Ciorni negus, Scedrâi au o rezistenţă mijlocie la făinarea americană.*

Cuvinte cheie:agriş, soiuri, producţie,condiţii de cultivare, făinare, ghimpozitate.

INTRODUCTION

Gooseberry is an early fall bearing species and among the most productive fruit bushes. Production by gooseberry variety can be up to 10-20 t/ha for agro-compliance with maintenance plant-(Mladin Gh., Mladin Paulina, 1992).

Fruit size of gooseberry bush, although it is a varietal characteristic feature, varies widely depending on the year, age, condition and climatic factors established during the growing season (Franciuc E., 1975).

Degree of thorns allows appreciating the quality of gooseberry variety. Study of thorny degree allowed determining that it is the smallest variety Kolobok - 0.19 and the largest variety Şcedrîi - 0.53. Doneţki krupnoplodni and Şcedri varieties have thorns bifurcated and trifurcated, cutting operation in the collection is particularly difficult because injuries causing workers (Sava Parascovia, 2003).

According to the degree of thorns of the plants, gooseberry varieties were divided into six groups, starting varieties without thorns and finishing varieties with many thorns, classification was made by E. Kirtbaia (Kirtbaia E., 1985).

One of the most dangerous disease is powdery american mildew disease of gooseberry (Sphaeroteca juice-uvae). It can jeopardize more than one third of the crop susceptible varieties, if not made on time required for chemical treatment of this disease (Sergheeva K., 1989).

Location in a variety of different conditions can cause a responsive, gooseberry bush deviation degree of plant damage. If the favorable conditions of location, there the gooseberry varieties may be resistant or with very little affection by this disease, while varieties of European origin are strongly affecting. The resistant varieties to powdery american mildew disease often have a number of shortcomings such as: small fruits, the presence of barbs, lower taste qualities, while the sensitive varieties are whith large fruit, increased productivity, many thorns, good taste and high quality (Pîşina Z., 1985).

The gooseberry varieties approved in the Republic are: Donetski krupnoplodni and Donetski pervenets (Sava Parascovia, 2004).

MATERIALS AND METHODS

The investigations concerning the productivity and the quality of the goosbery fruits cultivate on the new climaterical conditions were made on the propriety of the experimental field of the Institute of Researches in Horticulture over the 2002 – 2006 years. The first objectives of the investigations were the wage of fruits, the productivity, *the resistance to powdery american mildew disease and* thorny degree of gooseberry varieties. There were studied 19 gooseberry varieties Donetski krupnoplodni, Donetski pervenets, Ruski, Grushenka, Zenit, Ciorni negus, Kolobok, Smena, Rezistent de Cluj, Captivator, Somesh, Orlionok, Sadko, Scedri, Lascovi, Pushkinski, Severni capitan, Finik, Ledenets, the plantation distances - 2,5 x 1,00m.

RESULTS AND DISCUSSIONS

We don’t have varieties created for our country condition. Introduced varieties, new cultivation conditions studied, other than those for which they were

created, they can adapt differently, may have a higher harvest or not, fruit quality can be better or vice versa. This is to determine the outcome of scientific research.

Gooseberry is demanding on soil moisture and air, especially, during the flowering and fruit growth is required 400-450 mm rainfall uniformly distributed (Mladin Gh., Mladin Paulina, 1992).

Climatic conditions set by the amount of rainfall and temperatures that were exposed gooseberry varieties studied are presented in tables 1.

Table 1

Climatic conditions in Republic of Moldova

Month	Rainfall quantity (mm) Sum			Temperature (ºC) Mean		
	1891-1980	1995-2001	2002-2006	1891-1980	1995-2001	2002-2006
I	**33**	**33**	47,4	-3,5	2,7	-2,8
II	**33**	**32**	50,4	-2,2	0,1	-1,3
III	**31**	**32**	41,2	2,6	3,7	3,7
IV	39	43,1	35,9	9,7	10,6	10,2
V	52	37,8	55,8	15,9	15,9	15,3
VI	72	52,6	55,8	**19,4**	20,2	19,8
VII	64	61,9	64,5	**21,4**	**22,9**	**23,1**
VIII	49	54,0	70,4	**20,7**	**21,8**	**21,8**
IX	38	81,1	46,4	16,0	**16,3**	**16,7**
X	34	53,8	***40,7***	10,1	11,2	12,0
XI	42	60,0	***43,2***	4,1	4,8	5,6
XII	36	42,4	***22,2***	-0,8	-0,8	0,4
Sum (mean) /an	**523**	**551**	**573**	**9,5**	**10,3**	**10,4**
Sum (mean) III-X	**379**	**416**	**410**	**14,5**	**15,4**	**15,4**
Sum (mean) IV-VI	**163**	**134**	**148**	**15,0**	**15,6**	**15,1**

Climatic conditions for agriculture in Moldova are difficult and risky. Last ten years were drought and high temperatures. Drought has affected plants during different periods of development (table 1). Action drought was manifested by the size and influence on fruit quality, production quantity, etc.

Multiyearly average rainfall for the years 1891-1980 (523 mm) was smaller than the years 1995-2001 (551 mm). Multiyearly average rainfall during the years 2002-2006 in the center of our country has reached 573 mm (table 1). Rainfall during the growing season ranges from 379-416 mm, and rainfall at flowering and fruit growth until maturity is less than 134-163 mm, which were not sufficiently to obtain high quality fruit and production. Moisture deficit in critical periods of development of fruit, gooseberry bush and high temperatures in these periods decreases the production of fruit and its quality affects the differentiation of fruit buds to harvest next year. According to data presented in table 1 highest average temperatures ranged from 9.5 to 10.4° C, average annual temperatures returned

full moon in July, which reached levels of 21.4 to 23.1° C, the lowest average annual temperatures during the growth and fruit formation were 14.5 to 15.6°C.

Table 2

Caracteristics of some gooseberry varieties, 2002-2006

Varieties	Fruit wage, g		Production, t/ha		Resistance to powdery mildew disease	Thorny degree
	Mean	Maximur	Mean	Maximum		
1.Donetski krupnoplodnâi	**4,2**	5,7	**7,7**	11,6	very poor	spiny
2.Donetski pervenets	**3,7**	4,6	**6,6**	8,1	very poor	spiny
3.Ruski	**2,9**	4,2	**5,0**	6,4	high	middle
4.Grushenka	**2,5**	2,7	**1,2**	3,4	high	poor
5.Zenit	**3,6**	4,4	**3,5**	7,2	high	middle
6.Ciorni negus	**1,4**	2,3	**2,4**	3,8	middle	very spiny
7.Colobok	**2,4**	3,2	**6,7**	9,6	high	poor
8.Smena	**3,1**	4,1	**5,2**	6,5	high	poor
9.Rezistent de Cluj	**3,6**	4,9	**6,3**	8,8	high	spiny
10.Captivator	**2,4**	4,0	**4,7**	8,8	high	poor
11.Somesh	**2,7**	3,9	**3,3**	4,0	high	middle
12.Orlionok	**3,4**	4,1	**2,8**	4,3	very high	no thorns
13.Sadko	**3,3**	4,4	**4,2**	7,2	high	poor
14.Scedrâi	**2,7**	3,1	**5,5**	8,4	middle	very spiny
15.Lascovâi	**2,6**	3,8	**2,1**	3,6	high	poor
16.Pushkinskii	**3,4**	4,4	**6,8**	9,6	middle	middle
17. Severnîi capitan	**2,2**	2,5	**14,6**	20,8	high	poor
18. Finik	**3,2**	4,0	**2,8**	4,6	poor	middle
19. Ledenets	**3,2**	4,2	**2,6**	4,8	middle	spiny
The limite of variation	**1,4-4,2**	**2,3-5,7**	**1,2-14,6**	**3,4-20,8**		

Productivity of gooseberry bush is 1.5-2 kg in the 4-5 year after planting 3-6 kg/ bush-in the coming years to obtain 5-8 t/ha fruit, sometimes depending on variety 12 -15 t/ha (Mihăiescu G., 1977).

Gooseberry is a profitable crop for the harvest of fruit than 2.0 t/ha. Gooseberry varieties are classified into three groups: production - with a harvest from 4.0 to 6.0 t/ha, average productivity - with 2.0 to 4.0 t/ha, poor production-under 2.0 t/ha (Zaletilo A., 1975).

After fruit wage, gooseberry varieties are classified into three groups: large fruit-over 4g, medium -2.5 to 4.0 g, small-up to 2.5g (Andruşchevici T., Dmitrieva A., 2009).

Research on fruit weight, productivity, thorn presence and its quantity, resistance to powdery american mildew disease, of gooseberry bush varieties during the years 2002-2006 allowed the results displayed in table 2. According to data presented in table varieties studied were assessed by fruit mass. The average weight per fruit, gooseberry bush varieties ranged from 1.4 to 4.2 g values and maximum fruit weight ranged from 2.3 g up to 5.7 g large fruited are Donetski krupnoplodni (4.2 g), Donetski pervenets (3.7 g), Zenit, Resistent de Cluj (3.6 g). Small fruited are Ciornii negus (1.4 g), Severnîi captain (2.2 g).

Thereafter production is growing most varieties except for varieties that have been negatively affected by the new growing conditions. In 2005 we obtained a maximum yield for most varieties this year but still fell the largest amount of atmospheric precipitation (annual amount of 660 mm and 230 in time training and increasing fruit, gooseberry bush), but those were higher temperature, which influenced the harvest next year with a slight decrease in susceptible varieties under new cultivation conditions.

Conditions created or shown to be favourable for the variety Severni capitan, which allowed to obtain a maximum harvest of 20.8 t/ha. According to the results of studied varieties can be classified into four categories of productivity: low, medium, high, very high. At first category refers Gruşenca variety which bears moisture deficit, poorly supplied with water falling fruit, is harvested-1.2 t/ha. Varieties from which to obtain a mid production to 3,5t/ha are: Zenit, Somesh, Orlionok, Finik.

Productive varieties produced fruit up to 5.5 t/ha Şcedrîi, Ruski, Smena. Average gooseberry crop varieties studied ranged from 1.2 to 14.6 t/ha and maximum yield from 3.4 to 20.8 t/ha. Highly productive varieties with an output over 6 t/ha are Severnîi captain, Donetski krupnoplodni, Donetski pervenets, Puşkinski, Kolobok, Resistant de Cluj. Varieties Donetski krupnoplodni, Donetski pervents are more resistant to drought, have large fruit and high production, but have some drawbacks - are susceptible to powdery american mildew disease, in which case requires 2-3 treatments with fungal preparations and have a large number of thorns which do difficult fruits harvesting.

Ciorni negus is very thorny varieties, Scedri have middle resistance to powdery american mildew disease. The variety Kolobok, Captivator and Severni captain with few thorns are resistant to powdery american mildew disease, the variety without thorns – Orlionok which has a high resistance.

CONCLUSIONS

1. The productive varieties, with fruit production until 5,5 t/ha are: Scedri, Ruski, Smena. Average yield of studied gooseberry varieties ranget from 1,2-14,6 t/ha, and maximum yield between 3,4-20,8 t/ha. The very productive varieties with production over 6 t/ha are: Severni capitan, Donetki krupnoplodni, Donetki pervenets, Puskinski, Kolobok, Rezistent de Cluj.

2. Fruit weight average of the gooseberry variety values ranged from 1,4-4,2 g, and maximum fruit weight varied from 2,3 g until 5,7 g. The large fruited varieties are: Donetski krupnoplodni(4,2g), Donetski pervenets (3.7 g), Zenit, Resistent de Cluj (3,6g). Varieties with small fruit are: Ciorni negus (1.4 g), Severni capitan (2,2g).

3. The varieties with few thorns Kolobok, Captivator, Severni capitan are rezistente to powdery american mildew disease, but thorn free Orlionoc has high resistance. Doneţki krupnoplodni, Doneţki pervenets varieties are not rezistente to powdery american mildew disease have large number of thorns, large fruited, high production, are more resistant to drought. Very thorny varieties Ciorni negus, Scedri have medium resistance to powdery mildew americane disease.

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STUDY OF ANATOMICAL PARTICULARITIES OF LEAVES AND WATER STRESS RESISTANCE OF SUCCULENT PLANTS

STUDIUL PARTICULARITĂŢILOR ANATOMICE ALE FRUZELOR ŞI REZISTENŢA LA STRES HIDRIC A PLANTELOR FLORICOLE SUCULENTE

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**PhD scholarship through POSDRU/6/1.5/S/14 Project "Increasing the attractiveness, quality and efficiency of university doctoral studies by doctoral scholarships"*

Abstract. *Succulent flower plants present some morfo-anatomical and physiological characteristics, that represent a hint concerning their biologic behaviour (these being little select concerning the water regime). This work aims to highlight the biometrical characteristics of those foliar structures that store water (the mesophyll cells) that reduce the water losses (the thickness of the cuticule, density of the stomata) and establish a connection between these and the percentage of water loss on a determined period. Determinations were achieved at eight species of succulent flower plants from four types (Aeonium, Kalanchoe, Sedum* and *Senecio).*
Key words: succulent, leaves, water stress

Rezumat. *Plantele floricole suculente prezintă anumite caracteristici morfo-anatomice şi fiziologice, ce constituie un indiciu privind comportarea biologică a lor (acestea fiind puţin pretenţioase în privinţa regimului de apă). Lucrarea de faţă îşi propune să evidenţieze caracteristicile biometrice ale acelor structuri foliare care depozitează apa (celulele mezofilului) sau reduc pierderile de apă (grosimea cuticulei, densitatea stomatelor) şi să stabilească legătura între acestea şi procentul de apă pierdută într-o perioadă de timp determinată. Determinările s-au efectuat la opt specii de plante floricole suculente din patru genuri (Aeonium, Kalanchoe, Sedum* şi *Senecio).*
Cuvinte cheie: suculente, frunze, stres hidric

INTRODUCTION

The succulent plants also called "fat plants" are plants that possess at least one organ that temporarily stores water (leaf, stem and in more rare cases even a root), which makes that for a certain period of time the plant do not depend of the external input water, encouraging the survival in an arid climate (Willert D. 1992).

The water content from the succulent plants is high enough (80-95%), this varying dependent by species, organs, tissue (Lambers H., 2008).

Willert Dieter, analyzing the water content to several succulent plants (40), discovered that the water percentage from leaves could vary between 77,9% and

93,3% from the stem can vary between 28,8% and 89,1% and in the root, between 29,9% and 77,7%.

The leaves represent the organs of water storage for the majority of succulent flower plants. The mesophyll is formed of parenchimatic big cells, specialized in storing the water (Eggli U. 2003).

In order to reduce the water losses, the succulent plants present several morpho-anatomical characteristics (reduction of foliar surface, presence of protective hairs, cuticle thickening, the reduced number of stomata and their positioning under the level of epidermal cells) and physiological (the percentage of water related is bigger than the free water, increasing thus the biological resistance in stress conditions such drought – because the water related evaporates only at the temperature of 100º C and freezes at lower temperatures of - 10º C (Lambers H., 2008).

MATERIAL AND METHODS

The biological material used was represented by mature leaves belonging to the eight species of succulent flower plants: *Aeonium domesticum, Aeonium tortuosum, Kalanchoe rhombopilosa, Kalanchoe tubiflorum, Sedum linearum, Sedum pachyphyllum*, *Senecio articulatum, Senecio rowleyanus*.

The samples were gathered from the plants collection belonging to the discipline Floriculture, Faculty of Horticulture. In order to emphasize the structure of the leaves, at the level of the foliar limb, there were achieved tangential and transversal cut sections from the middle part of the leaf.

The microscopic examination of devices was done at the Optech B4 microscope and the photos were achieved with a Cannon device.

The prominence of the dehydrating degree for the eight species was achieved through the analysis of the water content from plants (drying in oven), before and after these one were subjected to water stress (through total removal of watering).

After application of water stress, water content analysis was achieved in three weeks, at the first signs of wilting, at some species.

RESULTS AND DISCUSSIONS

The biometric values for the different structures of the foliar limb (the cells of the mesophylle, cuticle, stomata) are characteristic of the species, namely: the cells dimensions of the mesophyll (L/l) ranging between 162,5/72 μm at *Kalanchoe rhombopilosa* and 360,43/314,5 μm at *Senecio rowleyanus*; the cuticle thickness registers values ranging between 2,71 μm at *Senecio articulatum* and 19,52 μm at *Sedum pachyphyllum;* the stomata density varies between 5,88 stomata/mm² at *Sedum pachyphyllum* and 101,29 stomata/mm² at *Kalanchoe rhombopilosa* (fig. 1, 2, 3).

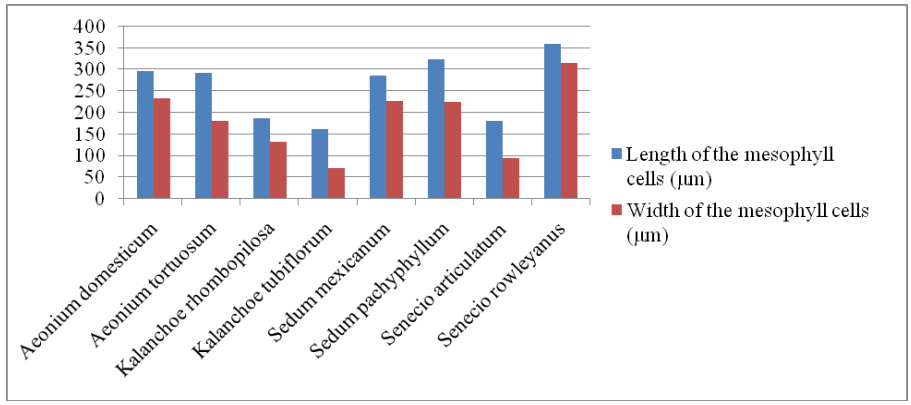

Fig.1. The dimensions of mesophyll cells

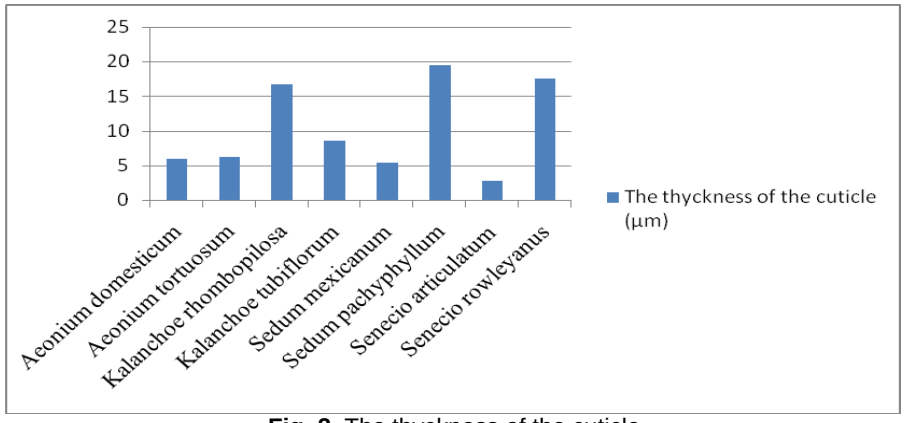

Fig. 2. The thyckness of the cuticle

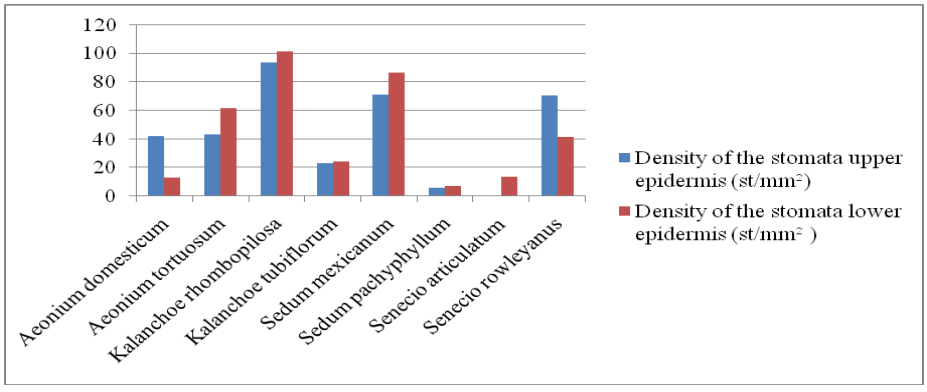

Fig.3. The density of the stomata

To all the species analyzed the initial water percentage from leaves was big, varying between 93,11% at *Kalanchoe rhombopilosa* and 99,24% at *Aeonium tortuosum* (fig. 4).

After three weeks of total suppression of waterings, the percentage of lost water varied between 0,32% (*Sedum pachyphyllum*) and 2,99% (*Aeonium tortuosum*) (fig. 4).

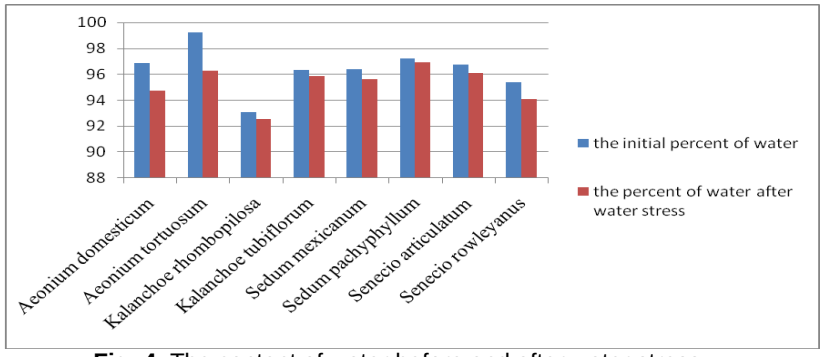

Fig. 4. The content of water before and after water stress

At the **Sedum** species, the small percentage of lost water through transpiration (0,32 at *Sedum pachypphyllum* and 0,74% at *Sedum mexicanum)* is owed to the big dimensions of the mesophyll cells that store a great quantity of water, and also to the reduced stomata density (for both species) and the cuticle thickness (*Sedum pachyphyllum*) that reduce the water losses (fig.5,6,7,8).

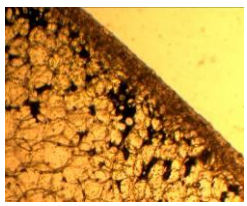

Fig.5

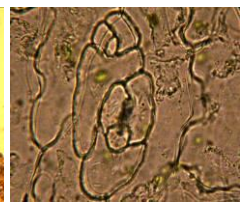

Fig.6

Sedum mexicanum

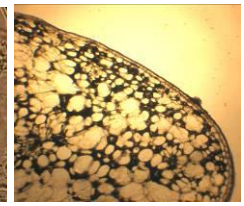

Fig.7

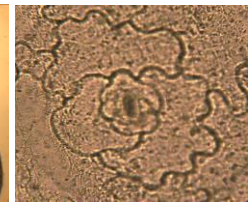

Fig.8

Sedum pachyphyllum

For the **Senecio** species the reduced values (0,68 % at *Senecio articulatum* and 1,28% *Senecio rowleyanus*) can be correlated with the cuticle thickness and the big dimensions of mesophyll cells (*Senecio rowleyanus*), respectively the reduced density of stomata and even their absence on the upper epidermis (*Senecio articulatum*) (fig.9,10,11,12).

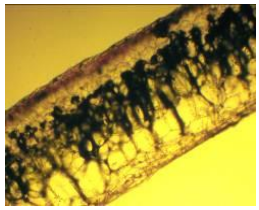

Fig.9

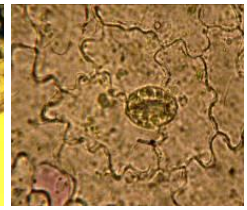

Fig. 10

Senecio articulatum

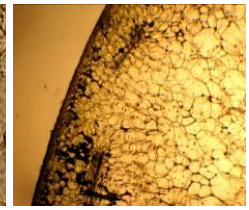

Fig.11

Fig. 12

Senecio rowleyanus

At **Kalanchoe** species, the percentage of lost water varied between 0,5% at *Kalanchoe tubiflorum* and 0,56 % at *Kalanchoe rhombopilosa*. The reduction of water losses is due to the reduced density of stomata (*Kalanchoe tubiflorum*) or the cuticle thickness (*Kalanchoe rhombopilosa*) (fig.13,14,15,16).

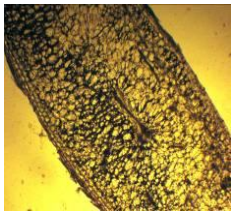
Fig. 13

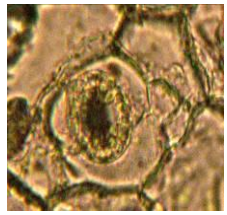
Fig.14

Kalanchoe rhombopilosa

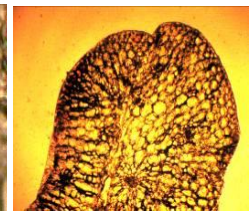
Fig. 15


Fig.16

Kalanchoe tubiflorum

The **Aeonium** species presents as well big mesophyll cells that provides the water storage, and the thin cuticle and the bigger density of stomata favored the loss of a higher water percentage (2,1% at *Aeonium domesticum* and 2,61% at *Aeonium tortuosum*) (fig.17,18,19,20).

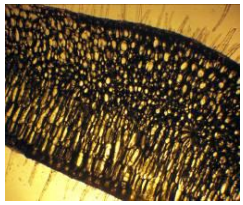
Fig. 17

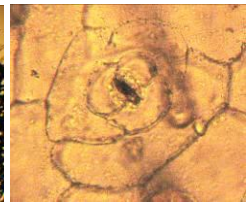
Fig.18

Aeonium domesticum

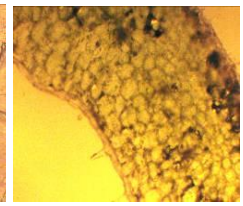
Fig.19

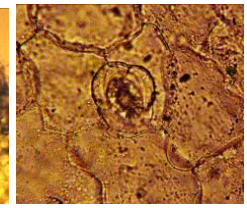
Fig.20

Aeonium tortuosum

CONCLUSIONS

1.Alle the species analyzed have a big content of water in their leaves varying between 93,11% (*Kalanchoe rhombopilosa*) and 99,24% (*Aeonium tortuosum).*

2. Dependant on the anatomical structures of the foliar limb that store the water or reduce the water losses, the lost water percentage in three weeks from suspending, the waterings is low, varying from 0,32% (*Sedum pachyphyllum*) and 2,99% (*Aeonium tortuosum*).

3.We determine an interdependence between the different anatomical determined structures.To some species there is a bigger development to those structures that store the water (*Aeonium domesticum, Aeonium tortuosum, Sedum mexicanum, Sedum pachyphyllum, Senecio rowleyanus*).To others, the reduced dimension of the mesophyll cells is compensated by the cuticle thickness (*Kalanchoe rhombopilosa)* or the reduced stomata density (*Senecio articulatum).*

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THE INFLUENCE OF BIOTIC AND ABIOTIC FACTORS UPON RHIZOGENESIS AT *ARGYRANTHEMUM FRUTESCENS* (L.) Sch. Bip.

INFLUENŢA FACTORILOR BIOTICI ŞI ABIOTICI ASUPRA RIZOGENEZEI LA *ARGYRANTHEMUM FRUTESCENS* (L.) Sch. Bip.

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Abstract. *Considering that Argyranthemum, in climate conditions in our country behave as annual plant, for the planting of material production potting-up is used on large scale. Research on factors influencing the rhizogenesis was carried within the floriculture course of USAMV Cluj, and the factors in the study are: the cultivar, the cuttings and the rooting substrate. From the obtained results it stands out the Butterfly variety, rooted in the mixed substrate composed of pearlite and peat.*
Key words: *Argyranthemum*, rhizogenesis, cutting, substratum

Rezumat. *In condiţiile climatice din România, specia Argyranthemum frutescens se comportă ca plantă anuală, iar pentru producerea materialului săditor se utilizează pe scară largă butăşirea. Cercetările privind factorii care influenţează rizogeneza s-au efectuat la USAMV Cluj, în cadrul disciplinei de Floricultură, iar factorii luaţi în studiu au fost cultivarul, tipul de butaş şi subs tratul de înrădăcinare. În urma rezultatelor obţinute s-a evidenţiat cultivarul „Butterfly", înrădăcinat pe substrat mixt format din perlit şi turbă.*
Cuvinte cheie: *Argyranthemum*, rizogeneză, butaş, substrat

INTRODUCTION

At the superior plants, the reproduction can be sexual or asexual. The sexual reproduction is realized through seeds and has the advantage that for one single plant you can obtain a large number of new plants, the disadvantage is of the unfaithful transmission of the parent's characteristics to the offsprings.

The asexual or vegetative reproduction is realized by using parts of the plant and has the advantage that the obtained plants keep identically all the characteristics of the mother plant.

In this case, the most used method is potting up. It is based on the quality of some species to recompose new plants from organs or organic fragments when they are cut off from the mother plant and are placed under optimal environmental conditions. The recomposition referrs both to the radicular system and the aerial plant parts. Potting up bases on the universal phenomena of polarity according to which some plant parts react differently to the two morphological poles. At the apical pole the aerial vegetative parts are recomposed, and at the basic pole the generating of the radicular system is carried out. In the case of cuttings, the first stage of recomposition

of an entire plant is the development of the radicular system, and in the second stage, the aerial parts are developed. The rhizogenesis is the assembly of phenomena which lead to the formation of the radicular system. For the tip cuttings, the mechanism of rhizogenesis is directly linked to the existence of the cambium which plays an important role in the radicular initiation, in two stages:

- the differentiation and development of cambium cells in primar meristems which later develop to radicular meristems;

- the development of the callus as a consequence of the proliferation of cambial cells, which form later radicular meristems. At the *Argyranthemum* variety, the radicular primordiums originate in groups of meristematic cells of primary type which appear between the vascular bundles, and the roots appear on the lateral parts and on the basis of the cuttings.

MATERIAL AND METHOD

The biological material used in this experiment is represented by the species *Argyranthemum frutescens* (L) Sch. Bip. *Astereaceae* family**,** with two cultivation forms: „Butterfly" with yellow flowers (fig. 1) and „Paris daisy" with pink-lilac flowers (fig. 2), belonging to the didactic collection of the USAMV Cluj-Napoca.

Fig. 1. *Argyranthemum frutescens* cv. „Butterfly"

Fig. 2. *Argyranthemum frutescens* cv. „Paris daisy"

The experiment was carried out in the year 2009, as a multiple factor-experiment, namely:

Factor A: **the cultivar,** with two scales: - ***„Butterfly";*** - ***„Paris daisy"***

Factor B: **the cutting type,** with two scales: - ***tip cutting***; ***- bole cutting***

Factor C: **the rooting substrate,** with three scales: - ***pearlite; - peat; - pearlite + peat - mixture, mixed in relation 1:1***

By combining the three experimental factors, we obtain 12 variants with three repetitions.

The work method was harvesting the tip cuttings (fig. 3) and the bole cuttings (fig. 4) from the mother plants of the two cultivars, healthy from the phytosanitarian point of view and biologically pure. These have been formed and prepared for rooting. After the formation, the cuttings were treated with rhizogene substances (Radistim) and then introduced in the three substrates. The maintenance works meant keeping the humidity of the substrate and the atmosphere constant, and the operations for fighting the pests have been carried out in 7 days terms.

Observations and biometric establishing have been carried out regarding the number of formed roots, as well as the degree of development of the roots, expressed by their length in centimeters.

Fig. 3. Shaped tip cuttings

Fig. 4. Shaped bole cuttings

RESULTS AND DISCUSSIONS

It seems that the influence of the cultivar on the number of formed roots is not so important, which is proven by the reduced number of roots formed at the cultivar „Paris daisy" (table 1)**,** where the average number of roots is 7.06**,** being therefore significantly negative compared to the reference (the „Butterfly" cultivar), which forms an average number of 18.5 roots.

Table 1

The influence of the cultivar on the root number

Cultivar	Average number of roots	%	Difference	Meaning
Butterfly	18.50	100	0.00	Mt
Paris daisy	7.06	38.1	-11.44	000
DL 5%				0.24
DL 1%				0.55
DL 0.1%			1.76	

Regarding the influence of the cutting type on the number of developed roots, the bole cuttings distinguish themselves at both cultivars, as they develop on an average 23.3% more roots (table 2) as the tip cuttings (reference), the differences being significantly positive.

Table 2

The influence of the cutting type on the root number

Cultivar	Average number of roots	%	Difference	Meaning
Tip cutting	11.44	100	0.00	Mt
Bole cutting	14.11	123.3	2.67	***
DL 5%				0.27
DL 1%				0.44
DL 0.1%				1.83

The rooting substrates like the peat and pearlite + peat-mixture distinguish themselves significantly positive from the reference (pearlite), leading to the development of averagely 12.25 roots, which represents a procentual growth of

14.8%, respectively 15.42 cutting roots with a procentual growth of 44.5%, compared to the reference (table 3).

Table 3

The influence of the substrate on the root number

Rooting substrate	Average number of roots	%	Difference	Meaning
Pearlite	10.67	100	0.00	Mt
Peat	12.25	114.8	1.58	***
Pearlite + peat-mixture	15.42	144.5	4.75	***
DL 5%				0.20
DL 1%				0.28
DL 0.1%				0.39

The same tendency is also noticed in the case of the combined action of the substrate and the type of cutting (table 4), where the two substrates distinguish themselves significantly positive of the reference (pearlite), which in the case of the tip cuttings lead to the development of averagely 9.33 roots on a cutting, and at the bole cuttings - of 12.0 roots. The tip cuttings rooted in peat averagely develop 11 roots compared to the bole cuttings, rooted in the same substrate, which develop 13.5 roots. The mixed substrate, consisting of pearlite and peat, averagely leads to the development of 14.0 roots at the tip cuttings and of 16.83 at the bole cuttings.

Table 4

The influence of the substrate - cutting type interaction on the number of roots

Rooting substrate	Cutting type	Average number of roots	%	Difference	Meaning
Pearlite	Tip cutting	9.33	100.0	0.00	Mt
Peat		11.0	117.9	1.67	***
Pearlite + peat-mixture		14.0	150.0	4.67	***
Pearlite	Bole cutting	12.0	100.0	0.00	Mt
Peat		13.5	112.5	1.50	***
Pearlite + peat-mixture		16.83	140.3	4.83	***
DL 5%					0.29
DL 1%					0.40
DL 0.1%					0.55

In order to produce good quality planting material, a mostly good rooting is required, this means both the forming of a big number of roots, and the their harmonious and strong development. To this respect, the present experiment presents data regarding the influence of the experimental factors studied regarding the length of the radicular system. According to the data presented in table 5, the cultivar has a pretty low influence on the length of the radicular system, where „Paris daisy" distinguished itself significantly negative compared to Butterfly. On the other hand, the bole cuttings distinguish themselves significantly negative compared to the tip cuttings, as the roots are with 29.5% shorter (table 6).

Table 5

The influence of the cultivar on the length of the radicular system

Cultivar	The average length of the radicular system	%	Difference	Meaning
Butterfly	5.02	100	0.00	Mt
Paris daisy	1.92	38.02	-3.10	0

DL 5% 1.45
DL 1% 3.34
DL 0.1% 10.64

Table 6

The influence of the cutting type on the length of the radicular system

Cutting type	The average length of the radicular system	%	Difference	Meaning
Tip cutting	4.07	100	0.00	Mt
Bole cutting	2.87	70.5	-1.20	00

DL 5% 0.43
DL 1% 0.71
DL 0.1% 1.33

Table 7

The influence of the substrate on the length of the radicular system

Rooting substrate	The average length of the radicular system	%	Difference	Meaning
Pearlite	2.60	100	0.00	Mt
Peat	3.05	117.3	0.45	***
Pearlite + peat-mixture	4.75	182.7	2.15	***

DL 5% 0.20
DL 1% 0.28
DL 0.1% 0.38

Table 8

The influence of the interaction between the substrate and the cutting type on the length of the radicular system

Rooting substrate	Type of cutting	Average number of roots	%	Difference	Meaning
Pearlite	Tip cutting	3.25	100.0	0.00	Mt.
Peat		3.55	109.2	0.30	*
Pearlite + peat- mixture		5.40	166.2	2.15	***
Pearlite	Bole cutting	1.95	100.0	0.00	Mt.
Peat		2.55	130.8	0.60	***
Pearlite + peat- mixture		4.10	210.3	2.15	***

DL 5% 0.29
DL 1% 0.40
DL 0.1% 0.54

The rooting substrate has a very signi-ficant importance for the development of the radicular system, where the pearlite - peat - mixture is highly distinguished, because for this substrate the radicular system obtains an average length of 4.75 cm, compared to the medium length obtained with pearlite, which is of only 2.60 cm. The

development of the radicular system in peat is with 17.3% better than the reference, reaching an average length of 3.05 cm (table 7).

The data regarding the influence of the interaction rooting substrate - cutting type is presented in table 8. Again, the pearlite - peat mixture is distinguished strongly positive, which leads to the medium development of the roots at the tip cuttings to 5.40 cm and of the bole cuttings to 4.10 cm.

Fig. 5. Tip cuttings rooted in pearlite

Fig. 6. Bole cuttings rooted in the three substrates

CONCLUSIONS

1. The number of roots developed by the cutting is influenced both by the cultivar, and here the „Butterfly" cultivar distinguishes itself, and by the cutting type, where the bole cuttings develop the biggest number of roots;

2. The rooting substrate has influenced the number of roots, whereas the peat - pearlite mixture obtained the best results.

3. The development level of the roots, expressed by their length is inversely proportional with their number, whereas the bole cuttings have a big number of roots, but with a significantly lower development, still, the mixed substrate consisting of pearlite and peat by his superior characteristics, succeeds to stimulate the develoment of the radicular system up to optimal values.

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SELECTION OF SOME RESISTANCE FORMS IN SPECIES *PHLEUM PRATENSE* L. AND *LOLIUM PERENNE* L., USED IN MIXTURES FOR LAWNS BASED ON SENSITIVITY INDEX AT SOIL ACIDITY

SELECȚIA UNOR FORME REZISTENTE ÎN CADRUL SPECIILOR *PHLEUM PRATENSE* L. ŞI *LOLIUM PERENNE* L., UTILIZATE ÎN AMESTECURILE PENTRU GAZON, PE BAZA INDICELUI DE SENSIBILITATE LA ACIDITATEA SOLULUI

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Abstract. *Fertilization with nitrogen, in particular with fertilizers based on ammonium, imposed by a qualitative and neat lawn, helps to increase soil acidity as a result of nitrificării. In the intensive fertilization of soil, the acidity can become problematic because nitrogen fixation is increasing rizosfera acidity as a result of excessive retention of cation. In addition, acid rain causes an accentuation of soil acidity in many regions (SAMAC and TESFAYE, 2003). Given that the focus is increasingly on improving areas of green spaces, to obtain new biological forms - varieties of the main species for lawn grasses, with greater resistance to increased acidity of land, can represent an important research objective for companies' producing seed of this kind researches. Thus, in the present paper, are played on research testing the response to acidification of soil, two species of grasses, which represents the ideal partner for simple and complex mixtures of grass.*

Key words: lawn specia, acid resitance, amelioration, stress sensitivity index, variation analysis

Rezumat. *Fertilizarea cu azot, în special cu îngrăşăminte pe bază de amoniu, impusă de cerinţele unui gazon de calitate şi aspectos, contribuie la creşterea aciditătii solului, ca urmare a nitrificării. În condiţiile fertilizări intensive aciditatea solului poate deveni problematică deoarece fixarea azotului măreşte aciditatea rizosferei, ca urmare a reţinerii excesive a cationilor. În plus, ploile acide determină o accentuare a aciditătii solului în multe regiuni (SAMAC and TESFAYE, 2003). În condiţiile în care se pune accent tot mai mare pe mărirea suprafeţelor de spaţii verzi, obţinerea de noi forme biologice – soiuri la principalele specii de graminee pentru gazon, cu rezistenţă sporită la aciditatea crescută a terenurilor poate reprezinta unobiectiv important al cercetărilor companiilor producătoare de sămânţă de acest fel. Astfel, în lucrarea de faţă, sunt redate cercetări privind testarea reacţiei la gradul de acidificare a solului, la două specii de graminee importante, care reprezintă parteneri ideali pentru amestecurile simple şi complexe de gazoni.*

Cuvinte cheie: specii de gazon, rezistenţă aciditat, ameliorare, indice sensibilitate stress, analiza varianţei

INTRODUCTION

Lawn establishment is done in many cases through direct sowing. In most cases the nature of the land is not suitable, being degraded as a result of construction work, pressed and covered with debris, stones, brick and so one. Thus, there is a very careful cleaning, then the drainage is done properly. In this situation contribution of earth borrowing in layers of 10-20 cm being mandatory, (Florincescu Adriana, 1999). In most of the cases the borrowing earth has a high acidity due to the fact that it derives from other foundations building or from the forest outskirts.

Future owners of the lawns installed in this way either without knowing or due to lack of time, applies a mineral fertilization (usually early spring) and then proceed to the sowing itself, without submiting the germination substrate to a pH correction.

Thus, in short, we tried to imagine a short scenario of what happens many times and has as consequence the obtaining of an average lawn, with many yellow spots and low degree of twinning.

As a conclusion, what is stated above, the development of genotypes resistant to acidity and aluminum in particular the mobile, the main stress factor in acid soils, is a growing concern of the current improvement programs.

This objective is also an issue on which the presented study tries to find a solution. Thus, we propose a short presentation of the experiments that are part of broader research project, funded through PN II, which aims to identify new genetic resources resistant to drought and acid plants of perennial pastures, in order to recovery areas affected by these phenomena. In this sense, the species that we have awakened interest were *Phleum pratense* L. and *Lolium perenne* L. diploid, with five biotypes on the market or selected by us, the more so as they are used in different mixtures lawn.

MATERIAL AND METHOD

To identify variability and inter-intra specific on soil acidity tolerance was organized an polifactorial experiment in pots. There were taken into study two species of perennial grasses adapted to temperate continental climate.

Experimental factors were:

- The biotype, with 2 grades:

1. Phleum pratense L. (known from now on as PHL) with 5 biotypes: 34R00, 10010, 10385, 14R00 şi 1Bv00;

2. Lolium perenne L. diploid (known from now on as LPD) with 5 biotypes: Mara, 2002, 20020, 20062 şi 2003 şi

- Substratum pH-ul , with two grades: acid (A) pH=4 and neutral (N) pH=6,7

The experiment was conducted in the greenhouse covered with polycarbonate at a temperature of 22-250C during the day and 12-150C during the night. Atmospheric humidity was maintained at 70-80%. There were sown approximately 150 seeds of each provenance in a neutral substratum. After about a month and half were prick plantule with a twig, in multipot plastic pots (6 x 6 x 7 cm):

- 64 plants in each biotype in a strong acid substrate (pH = 4), consisting of 25 g (dry weight) / acid peat mash "Plantobalt sphagnum Moss"
- 48 plants in each biotype in a neutral substrate (pH = 6.7), consisting of 25 g (dry weight) / peat mash neutral "may Plantobalt filling substrate (both substrates produced in Plantafor Hummus Verkaufs GmbH, Germany).

Plants of each provenance were placed together in a design of split-plot with four randomized rehearsals. Main plot is represented by the biotype and the parcel by acid substrate. Placing each repetition was changed regularly to eliminate errors due to microclimate. Experimental conditions and the work of care were the same as during the sowing - pricking.

The first measurements were made after approximately 30 days after transplantation into pots, the scale of individual plants at 2 cm from the package. There were carried out quantitative measurements, on the average green weight, for samples collected from the neutral substrate and harvested for the acid substrate (denoted Fyn and FYA). Similarly, it was calculated and the average dry weight of each sample, which was determined by drying in the drying stove at 1050C for 48 hours and then weighed. This time the scoring was done for the DMN which originated from the neutral substrate and the DMA for the acid substrate.

To detect the most tolerant biotypes to acid soil, were taken into account both absolute and percentage values of the substrate acid productivity and the stress sensitivity index, calculated according to the formula of Fisher and Maurer (1978):

$$S = (YN – YS) / (YN * D)$$

where:

S- stress sensitivity index; YN- variation production in normal conditions; YS- variation production in stress conditions; D- stress intesityintensitatea stres -ului

$$D = 1 – YSM / YNM$$

where: Y_{SM}- medium production of all variation in stress conditions; Y_{NM}- production of all variation in normal conditions

In table 1 were calculated two indices of stress sensitivity, meaning the acidity in our case. An index was calculated based on mass production of green, marked with SMV and another based on the production of dry matter, noted SMU.

To have a clear picture of the values recorded in the index of the acid sensitivity, experimental results were used by interpretation using statistical analysis variant. Thus, by calculating the limit differences were seen real and significant differences between experimental variants and media experience. The determination of these elements was based on indications found in the methodological literature (Ardelean and Sestraş, 1996).

RESULS AND DISCUSSIONS

Data obtained from measurements for the production of green mass and dry, for evidence from the neutral substrate and the substrate on the acid, were grouped in the summary table 1. Also in this table are recorded data and calculated the index of sensitivity to acidity.

Table 1

Yields average values of green and dry weight obtained in the study biotypes taken on neutral and acid substrate, and the sensitivity index to acidity

No. crt	Biotype	FYN (g/plant)	FYA (g/plant)	SMV	DMN (g/plant)	DMA (g/plant)	SMU
1.	PHL 34R00	21.93	1.05	1.000	4.43	0.31	1.002
2.	PHL 10010	27.59	0.93	1.015	5.12	0.28	1.019
3.	PHL 10385	23.29	1.53	0.981	4.17	0.45 *	0.961
4.	PHL 14R00	20.12	0.97	0.999	3.97	0.27	1.004
5.	PHL 1Bv00	24.64	1.11	1.003	4.59	0.30	1.008
6.	**PHL average**	**23.514**	**1.118**		**4.456**	**0.321**	
7.	LPD Mara	10.35	1.35	1.009	2.39	0.40	1.019
8.	LPD 2002	11.00	1.74	0.977	2.35	0.47	0.978
9.	LPD 20020	10.66	1.55	0.992	2.42	0.47	0.988
10.	LPD 20062	9.06	1.29	0.995	2.15	0.39	1.002
11.	LPD 2003	12.11	1.43	1.024	2.71	0.47	1.012
12.	**LPD average**	**10.636**	**1.472**		**2.404**	**0.438**	

In tables 2 and 3 are grouped synthetic meanings differences calculated values for the index of sensitivity to acidity.

Table 2

Statistical interpretation of the sensitivity index to acidity calculated according to the mass of green production

No crt.	Biotypes	Sensitivity index	Relative values compared with experiment average	+/- d compared with experiment	Difference significance
1.	***Phleum pratense***				
2.	PHL 34R00	1,00	100,04	0,0004	-
3.	PHL 10010	1,015	101,5406	0,0154	*
4.	PHL 10385	0,981	98,13926	-0,0186	ººº
5.	PHL 14R00	0,999	99,93998	-0,0006	-
6.	PHL 1Bv00	1,003	100,3401	0,0034	-
7.	DL 5% DL 1% DL 0,1%		0,011732746 0,017766730 0,028541701		
8.	***Lolium perenne* diploid**				
9.	LPD Mara	1,009	100,5581	0,0056	**
10.	LPD 2002	0,997	99,36217	-0,0064	ºº
11.	LPD 20020	0,992	98,86386	-0,0114	ººº
12.	LPD 20062	0,995	99,16285	-0,0084	ºº
13.	LPD 2003	1,024	102,053	0,0206	***
14.	**LPD average**	1,00	100		
15.	DL 5% DL 1% DL 0,1%		0,003578 0,005419 0,008705		

Subunit values of these indices show a sensitivity tolerance factor to increased stress tolerance more than the index value is lower. Therefore, we can say that the biotypes to which real differences are negative and significant opportunities of research in the direction of improvement desired.

Table 3

Statistical interpretation of the sensitivity index to acidity calculated according to dry production

No crt.	Biotype	Sensitivity index	Relative values compared with experiment average	+/- d compared with experiment	Difference significance
16.	***Phleum pratense***				
17.	PHL 34R00	1,00	100,04	0,0004	-
18.	PHL 10010	1,015	101,5406	0,0154	*
19.	PHL 10385	0,981	98,13926	-0,0186	ººº
20.	PHL 14R00	0,999	99,93998	-0,0006	-
21.	PHL 1Bv00	1,003	100,3401	0,0034	-
22.	DL 5% DL 1% DL 0,1%		0,011732746 0,017766730 0,028541701		
23.	***Lolium perenne* diploid**				
24.	LPD Mara	1,009	100,5581	0,0056	**
25.	LPD 2002	0,997	99,36217	-0,0064	ºº
26.	LPD 20020	0,992	98,86386	-0,0114	ººº
27.	LPD 20062	0,995	99,16285	-0,0084	ºº
28.	LPD 2003	1,024	102,053	0,0206	***
29.	**LPD media**	1,00	100		
30.	DL 5% DL 1% DL 0,1%		0,003578 0,005419 0,008705		

- obtained real difference is significant ** difference is true separately obtained significant *** difference obtained is very real and significant - the difference is not significant and real difference is negative 0.

Calculation of sensitivity and index analysis indicates the variant of these two species a wide variability intra-and inter specific (Table 2 and 3). Relative values of production substrate acid production from neutral substrate varies from a minimum of 0.977 g / plant (LPD 2002) to a maximum of 1,024 (LPD 2003) for green table and a minimum of 0,961 (PHL 10385) to a maximum of 1,019 (PHL 10010 and Mara LPD) for dry mass.

The interpretation of results through statistical analysis of variant forms have sought to highlight the distinct differences significantly negative compared with the average experience, because those have an index that is low stress tolerance acceptable acidity.

CONCLUSIONS

Calculate the sensitivity index to acidity, based on calculations of the production of green mass and dry matter in the five species of perennial grasses of meadows studied, allow the following conclusions:

In species *Phleum pratense*, in both mass production of green and for the production of dry, just biotypes PHL 10385 falls within the parameters of the experiment they seek. It just shows the difference of index-sensitivity very significantly negative, representing a starting point for improving the program that is intended to be started.

In *Lolium perenne* diploid species, two of the five biotypes LPD 2002, LPD 20062, significant differences separate negative and biotipul LPD 20020 differences are very significant negative. Data they read from tables 1.2 and 3 are quite interesting in the sense that the two biotipuri LPD 2002, LPD 20,020 from the mass production of green are located on the second and third, which is different from what we have seen so far in the sense that biotypes with high tolerance to acidity have the lowest yields. Therefore the two biotypes open premises creating new forms, which show a high degree of tolerance to an acid and to achieve a satisfactory production.

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WAYS TO IMPROVE THE BREEDING PROCESS TO SPECIES AND *AJUGA REPTANS* L. *CERASTIUM TOMENTOSUM*

STUDIUL MODALITĂŢILOR DE IMBUNATATIRE A PROCESULUI DE INMULTIRE LA SPECIILE *AJUGA REPTANS* L. ŞI *CERASTIUM TOMENTOSUM*

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Abstract. *Based on the fact that they have a small waist, a large coverage of the soil and remain over winter with persistent foliage, Ajuga reptans and Cerastium tomentosum species, they can be used to exceptional gardens settings, both rustic and classical style. Also, we can flourish in the borders, on level ground or downhill, in compact spots, in combinations and mosaics, the plant roof and rustic settings. The following study shows our concern to provide a significant multiplication rate of these species so to ensure the necessary material in sufficient quantities.*

Key words: rizogenesis, *Ajuga reptans*, *Cerastium tomentosum*, Radistim, Naporiz

Rezumat. *Speciile Ajuga reptans şi Cerastium tomentosum, prin faptul că au o talie mică şi o capacitate mare de acoperire a solului, rămân şi peste iarnă cu frunzişul persistent, se pot folosi la decoruri de excepţie atât în grădinile rustice, cât şi în cele în stil clasic. De asemena, le putem etala în borduri, pe teren plan sau în pantă, în pete compacte, în combinaţii şi mozaicuri, la acoperişuri vegetale şi la decoruri rustice. În studiul de faţă prezentăm preocupările noastre în a asigura o rata de multiplicare cât mai mare a acestor specii pentru a se putea asigura necesarul de material săditor în cantităţi suficiente.*

Cuvinte cheie:rizogeneză, *Ajuga reptans*, *Cerastium tomentosum*, Radistim, Naporiz

INTRODUCTION

Ajuga genus is part of the *Labiate* family. It contains many species and a large area spread across the globe. In Romania flora species are exceptional, waiting too long to be put into value, not necessarily through improvement and ennoblement (Parvu, 2003). There are 45 species with a small frame and a herbaceous habit, mostly perennial, and highly resistant winter foliage and keeping intact (Preda M., 1979).

Strains and rootstoks have also an edge form and the leaves can be whole, dental or increase on the edge of different colors. Leafs short and thick, help to maintain plant in a compact form.

Ajuga reptans is a decorative species, the leaves are red-violacee metallic-looking, brilliant. The variety "Atropurpurea" leaves are purple-golden color and intense-blue flowers in a spike-like formations elongate. At *Ajuga* reptans' *Alba*

'flowers are white and the *"Pink Beauty*" leaves are green and flowers are pink. In "Bronze Beauty" are the leaves and golden flowers are blue, and the "Gaiety" are leaves and purple-blue flowers are the color Liliacului (Preda M., 1979).

Cerastium genus is part of the family Caryophyllaceae. Most of them are part hardy plants and fewer of them annual, with origins in northern and temperate zones of Europe (Mărgărit A., Margarit Ana, 2004).

They get over the cold season, and are keeping all the air and groundwater, for example, semi wooden plants,whether the cold air coming in and they disappear only the shadow.

Increasing the air takes place rapidly during the spring, when temperature, light and high humidity favor this process (Mărgărit A., Margarit Ana, 2004).

Cerastium tomentosum leaves are soft, oblong-spatulate, color accented silver piliferous and numerous shorts (Mărgărit A., Margarit Ana, 2004).

Plants are easily multiplied by cuttings, in spring, the seedlings in the ground, with the addition of more sand, and a shading in the first phase.

Mature plants can regenerate, and also by cutting at 3-4 years. Once introduced into the garden is difficult to lose (Selaru Elena, 2001).

MATERIAL AND METHOD

In the research covered the work to follow the capacity of multiplication of species and studied how to improve them to get many more descendants a season of growing from a small amount of biological material used as the parent plant. Species taken in the study were: *Ajuga reptans* and *Cerastium tomentosum.*

For this reason, have used both products with a role of stimulating the rizogenesis: Radistim and Naporiz*.* They contain auxine ANA (naphthyl-acetic acid) and AIA (indolil-acetic acid) in different percentages. After quantifying the results in rooting process, was made a comparison between the behavior of plants under the action of these bioincentive substances.

In experiment were used 10 plants of each parent species. From the experience for the two species were harvested cuttings. They were root for the shelter, on a substrate of sand and peat 1/1. Rooting verification and quantification of results was done after four weeks.

The experiment contained three working versions. The first version, which was called variant witness was made up of cuttings rooted made simple without being treated with anything. A second variation has used cuttings treated with a bio incevetive called Radistim and the third option was used with another substance with bio incentive called effect called Naporiz.

The two products Radistim and Naporiz are talc powder containing auxine ANA (naphthyl-acetic acid) and AIA (indolil-acetic acid) in different percentages with positive influence on the rooting)

Thus was done the comperison between the behavior of plants under the action of these bioincentive substances.

Results obtained from experiments were analyzed statistically using analysis variant. Based on indications found in the methodological literature (Ardelean and Sestraş, 1996) were calculated and are such differences were seen real and significant differences between experimental variants and media experience.

RESULTS AND DISCUSSIONS

In the process of copying in the species *Ajuga reptans* resulted 73 rooted cuttings from the first possibility, the witness, where there were used no bioincentives. The second variant has been used as bioincentive, Radistimul, were obtained 78 rooted cuttings. In the third variant has been used as bioincentive substance called Naporiz and there were produced 75 rooted cuttings.

In species *Cerastium tomentosum* were collected 60 rooted cuttings in the first variant in which there has been no treatment to stimulate rizogenesis. In the second variant has been used for rooting stimulating Radistim , it resulted 65 rooted cuttings. For the third variant has been used Naporiz were obtained 62 rooted cuttings. Data are presented in tables 1 and 2.

Highlighting differences in meanings for the values calculated from these two species *Ajuga reptans* and *Cerastium tomentosum* is done by tables 1 and 2.

Table 1

The statistical interpretation of data obtained in the propagation of the species *Ajuga reptans*

No. crt.	Variant	No of plants obtained	Relative number	Differences	Significance
1.	V_1	73,00	100	-	-
2.	V_2	78,00	107	5,00	***
3.	V_3	75,00	103	3,00	**

DL 5% 2,01
DL 1% 2,89
DL 0,1% 4,25

For *Ajuga reptans* species comparison was done based on variant V_1 - witness (untreated), which has obtained a number of 73 rooted cuttings. In variant V_2, which was used Radistim number of rooted cuttings is 78, which means that the difference obtained from $V_1$is positive real and very significant. At V_3variant where bio incentives substance was Naporiz number of plants obtained from 75. Difference obtained from V_1 is distinct real significant.

Table 2

The statistical interpretation of data obtained in the propagation of the species *Cerastium tomentosum*

No. crt.	Variant	No of plants obtained	Relative number	Differences	Significance
1.	V_1	60,00	100	-	-
2.	V_2	65,00	108	5,00	**
3.	V_3	62,00	103	3,00	*

DL 5% 2,73
DL 1% 3,92
DL 0,1% 5,77

Table 2 data show that at species *Cerastium tomentosum* variant V_1 has been witness variant. In variant V_2, one in which treatment was Radistim number of plants obtained was of 65 rooted cuttings. The differences obtained were real positive and significantly distinct from variant witness.

At V_3 variant, in which treatment was done with Naporiz number of plants obtained was 62, the differences are real, positive and significant witness to the variant.

CONCLUSIONS

Following the study presented in this work we can say as a general conclusion that at the two species analyzed was observed an increase in the number of rooted plants, compared with untreated variant, both in situations in which was used as bio incentive RADISTIM and that has been used NAPORIZ.

Also, we can say that for both species the best results, with distinct differences and very significant, were the variations obtained in the treatments performed with RADISTIM. This highlights the superiority of this product in response to rooting the two species presented in the current study.

Among the species studied, the best results were obtained in *Ajuga reptans* species (78 plants), and at *Cerastium tomentosum* (65 plants) when they were treated with Radistim.

Positive differences, real and very significant were obtained only if the species *Ajuga reptans* treatments with Radistim, which highlights the better responsiveness of this species for this bio incentive.

Real differences, positive and significant distinct were obtained in the case of species *Ajuga reptans* to treatment with Naporiz and for species *Cerastium tomentosum* treatment with Radistim.

At *Ajuga reptans* species have been obtained very good results after treatment with Radistim and good results after treatment with Naporiz where real difference is produced separately significant.

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DETERMINING THE WATER CONSUMPTION OF CUCUMBERS GROWN IN SOLARIUMS IN THE WESTERN PART OF ROMANIA

DETERMINAREA CONSUMULUI DE APĂ AL CASTRAVEŢILOR CULTIVAŢI ÎN SOLARII, ÎN CONDIŢIILE DIN ZONA DE VEST A ROMÂNIEI

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Abstract. *The experiment referred to in this paper was conducted in Husasău de Tinca, Bihor county, a place situated at 35 km distance from Oradea, in a private vegetable micro-farm and on alluvial soil. The soil presented an average total porosity on the depths of 0-20 cm, 20-40 cm and 40-60 cm; the apparent density of 1.41 to 1.65 g/cm^3 characterizes a low-compression soil (0-20 cm); on the other depths there is a moderate-compression soil. The field-capacity for water presents an average value, ranging from 23.6 to 24.3%, while the wilting coefficient ranges between 9.2 to 11.1%. During the high-season months, the daily water consumption of the plants is expected to be, on average, of about 50-60 m^3/ha, depending on the species. Water consumption is an important aspect related to cucumbers, since insufficient quantities of water determine the ceasing of growth, the emergence of a greater number of male flowers, fruit deformation and bitter taste. Cucumbers are not resistant to drought and therefore, if irrigation is not ensured, the turning of late flower in young fruit is threatened.*

Key words: plant water consumption, cucumber crops, solariums

Rezumat. *Experienţa a fost amplasată în localitatea Husasău de Tinca, judeţiul Bihor, la 35 km de Oradea, într-o microfermă legumicolă privată pe un sol aluvionar. Solul are porozitatea totală mijlocie pe adâncimile 0-20 cm; 20-40 cm; şi 40-60 cm, densitatea aparentă de 1,41-1,65 g/cm^3 caracterizează un sol slab tasat (0-20 cm), pe celelalte adâncimi evidenţiază un sol moderat tasat. Capacitatea de câmp pentru apă are valoare mijlocie, variază de la 23,6 la 24,3%, iar coeficientul de ofilire se situează între 9,2-11,1%. Consumul de apă zilnic al plantelor se estimează în lunile de vârf în medie la cca 50-60 m^3/ha în funcţie de specie. Consumul de apă al castraveţilor prezintă importanţă deoarece insuficienţa duce la oprirea creşterii, apariţia unui număr mai mare de flori mascule, deformarea fructelor şi apariţia gustului amar, fiind puţin rezistenţi la secetă, dacă nu sunt ajutaţi prin irigare se periclitează legarea florilor târzii şi creşterea fructelor tinere.*

Cuvinte cheie: consumul de apă al plantelor, cultura castraveţilor, solar

INTRODUCTION

Water is an essential element for plants, as physiological and biochemical processes may take place only in its presence. Water is a constitutive element, a medium of physiological and biochemical reaction, a carrier of mineral and

synthesis substances, acting as heat regulator for tissues, through the processes of sweating and evaporation (Ruxandra Ciofu et al., 2003).

Most vegetable plants need high quantities of water since, given their eco-physiologic features, they are included in the category of vegetables with high consumption of water and reduced absorption capacities (Apahidean Al.S. et al., 2003).

MATERIAL AND METHOD

The experiments presented here describe cucumber crops obtained in solarium conditions, in a conventional cultivation system, in the Western part of Romania, for either black polyethylene mulch, or non mulch varieties.

The direct methods for determining water consumption rely on the control of soil moisture with the help of gravimetric, tensiometric, electrometric methods, etc. Among such methods, the tensiometric one is more and more widely used, this situation being facilitated by the construction of electronic tensiometers that are very accurate and easy to use.

The indirect methods for determining water consumption are based on the relationship between the water consumption of plants (which is directly determined) and the reference evapo-perspiration (ET_0). The reference evapo-perspiration may be calculated with the help of a large variety of methods, using weather elements; it may also be measured with the help of evaporimeters and lysimeters (Domuţa et al., 2000).

Applying indirect methods, one can obtain reference values of evapo-perspiration (ET_0), which are turned into water consumption with the help of the crop coefficients Kc. Kc coefficients are obtained by a specific methodology - by comparing the optimal daily consumption of water to the reference evapo-perspiration daily average (Domuţa, 2005).

RESULTS AND DISCUSSIONS

Soil sampling (every 10 days) and the preservation of the water reserve between the lower value and the field capacity ensured the optimal water regime for plants.

Table 1

Estimation of water quantities in soil (0-150 cm) and average daily water consumption of cucumber crops in solarium conditions, for mulch and non-mulch types (Husasău of Tinca, 2009)

Type	Interval		No. of days	Initial reserve	Watering	Total in the soil	Final reserve	Total consumption of water	Daily consumption of water m^3/ha
	From	Until							
Non-mulch	24.06	31.07	38	3970	1450	5420	4010	1410	37,1
	01.08	31.08	31	4010	1090	5100	3370	1730	55,9
	01.09	30.09	30	3370	800	4170	3210	960	32,0
	14.06	30.09	99	3970	3340	7310	3210	4100	41,4
Mulch	24.06	31.07	38	4010	1450	5460	4100	1360	35,8
	01.08	31.08	31	4100	1090	5190	3540	1650	53,2
	01.09	30.09	30	3540	800	4340	3390	950	31,7
	14.06	30.09	99	4010	3340	7350	3390	3960	40,0

At the beginning and the end of each month, soil samples were taken from depths of 0-150 cm, thus ensuring optimum conditions for calculating the actual consumption level (ETRopt) of the crop. (Domuţa et al., 2000). The final calculations, of the water quantity in the soil, are presented in table 1.

The decadal determination of soil moisture, on a 0-50 cm depth, ensured that the water reserve was preserved between the minimum threshold and the field capacity; thus plants received optimum water supplies, in accordance with the water consumption needs of mulch and non-mulch cucumbers.

It may be observed that the water supply determined at the establishment of the cucumber crop was below the field capacity of the soil, at a depth of 0-150 cm, 5611 m^3/ha.

The total water consumption at the non-mulch cucumber type was of 4100 m^3/ha. At the mulch type, the water consumption decreased by 3.0% (140 m^3/ha). The difference of 140 m^3/ha results from the fact that, at the non-mulch type, cucumbers consumed (and respectively lost, due to evapo-transpiration) 140 m^3/ha more water. As a result, the quantity of water consumed from the reserves of soil water, in the total water consumption of cucumbers, is higher: 18.5% versus 15.6% (table 2).

Table 2

Analyzing the influence of mulching upon the total water consumption in the case of cucumbers grown in solarium conditions Husasău of Tinca, 2009

Year	Type	Total consumption of water		Sources providing for the required consumption of water			
				From the soil reserve		From irrigation	
		m^3/ha	%	m^3/ha	%	m^3/ha	%
2009	Without mulch	4100	100	760	18,5	4840	81,5
	With mulch	3960	97,0	620	15,6	4840	84,4
	Difference	-140	-3,0	-140	-2,9	0	+ 2,9

CONCLUSIONS

1. Decadal determinations of soil moisture have indicated that, in order to preserve the water reserve between the minimum limit and the field capacity on a depth of 0-50 cm, the following irrigation norms have been put into practice: 500 m^3/ha in June (2 watering stages); 950 m^3/ha (4 watering stages) in July; 1090 m^3/ha (four watering stages) in August; and 800 m^3/ha (3 watering stages) in September.

2. The total water consumption of the mulched cucumber crop had a value of 3960 m^3/ha, by 140 m^3/ha less than the total water consumption of the non-mulched version.

3. Daily water consumption values of mulch cucumbers were also lower. The values of he daily water consumption of mulched and non-mulched cucumbers were of 37 m^3/ha/day and 35.8 m^3/ha/day in June, July; of 55.9 m^3/ha/day and 53.2 m^3/ha/day in August; and of 32.4 m^3/ha/day and, respectively, 31.7 m^3/ha/dat in September.

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THE INFLUENCE OF SOME AGRO-TECHNOLOGICAL FEATURES ON THE CUCUMBER YELD FROM PLASTIC TUNNELS IN THE WESTERN AREA OF ROMANIA

INFLUENŢA UNOR PARTICULARITĂŢI AGROTEHNOLOGICE ASUPRA PRODUCŢIEI DE CASTRAVEŢI DIN SOLARII, ÎN ZONA DE VEST A ROMÂNIEI

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Abstract*. In household systems, cucumbers are cultivated on a large scale in solariums, so as to obtain both early and summer-autumn productions of semi-long and small (cornichon-type) fruits. The crops are placed in specially designed solariums or are transplanted in hotbeds, in case of thermophilic crops. The experiment was meant to indicate the effect of mulching the soil, and that of plants closeness to one another, upon the quantitative and the qualitative production of cucumbers, at a summer-autumn crop, using a small-fruit hybrid, intended for conservation.*

Key words: production of cucumbers, solariums, agro-technological features

Rezumat. *Cultura castraveţilor în solarii are o extindere mare în sistem gospodăresc pentru obţinerea de producţii timpurii dar şi de vară toamnă, folosindu-se cultivare cu fructe semilungi respectiv, mici, de tip cornichon. Cultura se practică în solarii special amenajate sau după producerea de răsaduri destinate culturilor termofile. În experienţă s-a urmărit efectul mulcirii solului şi a desimilor diferite, asupra producţiei cantitative şi calitative de castraveţi, la o cultură de vară-toamnă, utilizându-se un hibrid cu fructe mici, destinat pentru conservare.*

Cuvinte cheie: producţia de castraveţi, solarii, particularităţi agrotehnologice

INTRODUCTION

In recent years, cucumber crops have become more and more extended in solariums, as such forms of production are safer than the ones grown in open-fields (Apahidean Al.S. et al., 2003). Solarium production can be meant for either immediate consumption, when obtained from early cultures, or for conservation, when resulting from the summer-autumn crops.

Cucumber is a species that requires a special humidity regime, both in the soil (75-80% of the field capacity until fruition and 80-85% during fruition) and in the atmosphere (Domuţa C., 2005). Therefore, providing adequate quantities of water during the growing season, largely conditions the production achieved.

MATERIAL AND METHOD

The experiment presented here describes the cornichon-type crop obtained in solarium conditions, in a conventional cultivation system, with black polyethylene mulch, or non mulch varieties; the Szatmar F1 hybrid cucumber has been used, the different planting distances between plants in row being of 20, 30 and 40 cm (Table 1).

Table 1

Experimental varieties

Variety	Mulch	Distances between the plants in a row	Hybrid-type
I	Non-mulch	20 cm	Szatmar F_1
II	Non-mulch	30 cm	Szatmar F_1
III	Non-mulch	40 cm	Szatmar F_1
IV	Black polyethylene mulch	20 cm	Szatmar F_1
V	Black polyethylene mulch	30 cm	Szatmar F_1
VI	Black polyethylene mulch	40 cm	Szatmar F_1

The preparation of the land took place after the previous crop (tomatoes) was removed, vegetable waste being collected and turned into compost. The soil was fertilized with 70 t/ha of decomposed manure, 300 kg/ha of super-phosphate, and 200 kg/ha of calcium sulfate (Apahidean Al.S. et al., 1999). The incorporation of fertilizers was done by plowing with the help of a motor plough, at a depth of 26 cm. All these activities started in early September. Until establishing the cucumber crop, a strawberry culture was placed in mid September, which was subsequently removed in June. After removing the strawberry plant remains, the land was fertilized with 250 kg/ha nitrogen. Using the black polyethylene mulch (Draghici Elena, Ruxandra Ciofu, 1998) prevented the emergence of weeds, which appeared only on traffic lanes, on the edges of the solarium and at non-mulched variants.

The setting of the crop was done by directly placing two seeds in a nest, in accordance with the research scheme. The sawing was done on the 24th of June.

Until the emergence of plants, watering was ensuring by using a hose with filter; it was done daily, early in the morning. Due to high temperatures during the day, besides the drip irrigation, watering was also ensured by a hose with filter, after sunrise, for a period of 10 days. Until the end of the crop, watering was ensured weekly, depending on the phenophase.

Soon after sunrise, the support system was being mounted, using plastic mesh fences, which are much easier to install and more efficient at directing cucumber stalks. Both the main stem and side shoots were directed on this fence, weekly adjustments being performed.

Particular attention was given to the microclimate of solariums. In July and August high temperatures, of 40° C and even more, were recorded in solariums and therefore all ventilation mechanisms were used.

The relative humidity of the air ranged between 60-90%. August was very warm month as well, but the relative humidity of the air was of 75-90%, due to the more abundant vegetation. September brought lower temperatures and, alongside the decrease of the minimum temperatures outside, solariums were closed during the night (Ciofu Ruxandra, et al., 2004).

During the growing period, the cucumbers in the classical culture were fertilized only by the irrigation water. The first supply of Ferticare II K was done on the 15th day from sprouting, the action being repeated every 15 days with Ferticare III K and

Fertiacare Ca K respectively; in addition, at the beginning of flowering, three polyethylene mulching have been applied (Davidescu D. Velicia Davidescu, 1992).

The protection of solarium-grown crops against pests and diseases was ensured through the application of treatments with Dithane M 45, Curzale Manox, Aliette 80 WP (for disease prevention); for the prevention and control of pests, aphids more specifically, Calypso and Confide 200 SL have been used.

RESULTS AND DISCUSSIONS

Due to favorable temperatures, specific to the North-Western part of our country, the crop could be continued until early October, a situation that is not possible in other areas of the country. Analyzing the overall dynamics of harvesting, which is the result of agro-technological peculiarities associated with the crop, in 2008 we could observe the influence of such factors, applied to specific situations. The first harvest began in the second decade of July, on the 18th of July respectively. The first harvesting began in the second decade of July, more exactly on the 18th of July. The entire harvesting period was of 81 days. Data referring to the dynamic of harvesting in terms of months and decades, for each variant (average productions), are presented in table 2.

Table 2

Harvesting Dynamics
Husasău de Tinca, 2008 (Kg/m^2)

Variant	Months and decades										
	July		August				September			October	
	2	3	1	2	Early production	3	1	2	3	1	Total production
1	-	0,23	0,38	0,47	1,17	0,67	0,31	0,48	0,33	0,25	3,21
2	0,18	0,37	0,48	0,65	1,68	0,69	0,43	0,51	0,34	0,21	3,86
3	-	0,12	0,45	0,58	1,15	0,72	0,67	0,58	0,49	0,34	3,95
4	-	0,13	0,25	0,35	0,73	0,73	0,58	0,64	0,45	0,49	3,62
5	0,34	0,47	0,62	0,55	1,98	0,95	0,83	0,77	0,54	0,20	5,27
6	0,21	0,30	0,46	0,45	1,42	0,89	0,63	0,76	0,63	0,51	4,84

The intervals of harvesting were, in relation to the stage of fruit growth, of 2-4 days. Fruits were gathered in the morning, as they were more turgescent at that time of the day. To the possible extent, small and extra quality, or first quality fruit were gathered though, given the rich foliage, fruit of larger dimensions have also been harvested.

As table 2 indicates, the dynamics of production was generally better at black polyethylene mulch types.

In terms of production, the differences between variants were significant. Of the six variants, only two variants were able to exceed the average of the experiment. The best results were obtained at the black polyethylene mulch type and a 30 cm density of the Szatmar F1 hybrid, from which 52.7 tons/ha were

harvested, with a production increase of 11.5 t/ha. Difference from the proof was statistically ensured, as it was very significant.

The mulch type with 40 cm distance between nests was able to accumulate, up until the end of the growth period, a quantity of 48.4 t/ha cucumber fruit. As compared to the proof, a 7.2 t/ha higher quantity of cucumbers could be harvested, this difference being significant.

The lowest level of total production was recorded at the non-mulch type, with a 20 cm distance between nests. Cucumber fruits harvested from this variant totaled only 32.1 t/ha, about 9 t/ha less than the average of the experiment and 16.3 t/ha less than the highest production type.

CONCLUSIONS

1. The best harvesting dynamic could be observed to the type mulched with black polyethylene film, the distance between the plants in a row being of 30 cm.

2. At all mulch types, the harvested yields were higher, on each decade, as compared to the non-mulch types.

3. Production ranged between 36.2 -52.7 t/ha, depending on plant density. The highest production was recorded when a space of 30 cm was left between plants per row, i.e. a density of 44,000 plants/ha.

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PHYSIOLOGICAL AND BIOCHEMICAL BEHAVIOUR OF BRILIANT – CREATED MELON VARIETY IN V.R.D.S. BACAU

COMPORTAREA DIN PUNCT DE VEDERE FOZIOLOGIC ŞI BIOCHIMIC A SOIULUI BRILIANT CREAT LA SCDL BACAU

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Abstract. *The Romanian market is full with a diversity regarding imported fruits Cucumis melo. During the last years, we studied the behavior of some foreign cultivars in environmental condition of Romania. Unfortunately in our country environmental condition the studied melons developed inappropriate tastes qualities. The main features are of Briliant fruits are: early genotype, strongly recommended for protected areas. The color fruit at physiological maturity is yellow, green lines ribbed. The inside color fruit is light green. The fruits are round, 1.23 shape index and an average weight 1.4 kg. The taste is sweet, juicy with specially flavors. In this research paper we discuss the physiological and biochemical changes during the last days of maturation and the increasing or decreasing manner of the content in total dry matter, water, soluble dry matter, β carotene, ascorbic acid respiration intensity and flavors. We analyzed these parameters because of their importance in melons quality.*

Key words: melon, respiration, carotene, soluble solids, flavor, citric acid, water content

Rezumat. *Piata romaneasca este invadata de o gama variata de pepeni galbeni importati. In ultimii ani am cercetat comportarea acestor genotipuri de origine straina. Din pacate in conditiile climatice ale Romaniei, varietatile analizate nu au atins parametrii optimi. Cele mai importante caracteristici ale soiului Briliant sunt: timpurietate, cu pretabilitate pentru spatiile protejate, culoarea fructului la maturitatea fiziologică – galben uşor striat cu dungi de culoare verde închis. Fructul este rotund, indicele de formă 1.23 greutate medie de 1,4 kg. Culoarea mezocarpului – verde albicios; Gustul foarte dulce, aromat, zemos.Lucrarea prezinta variatia unor parametri fiziologici si biochimici pe parcursul maturarii in fructele de pepeni Briliant, maniera in care cresc si/sau descresc continuturile de caroten, substanta uscata solubila, arome, acid citric, apa. Acesti indici au fost analizati datorita importantei pe care o au in determinarea calitatilor organoleptice a pepenilor. Briliant a dezvoltat valori optime la toti parametrii analizati..*

Cuvinte cheie: pepene, respiratie, caroten, arome, acid citric, apa, substanta uscata solubila

INTRODUCTION

Because of the large range of imported melons in Romanian market, we tasted the behavior of these in culture condition of Romania. A lot of them

developed inappropriate qualities fact witch determinate us to create and brevetted a new genotype - Briliant. In this research paper we present some physiological and biochemical changes during ripening process in Briliant and Ogen fruits. The aim of our study is to demonstrate the better taste quality of Briliant's fruits.

MATERIAL AND METHOD

The experiments were conducted for three experimental years at the Vegetable Research Station Bacau. The melon plants were grown under greenhouse natural conditions. Our experiments regard Briliant variety – developed and patented at VRDS Bacau. For witness variant we choose Ogen cultivar. Our investigations were performed during the ripening process, in two different periods: unripe and ripe fruits.

We used detached fruits and RIKEN analyzer in order to determinate the respiration intensity, expressed in mg CO_2/kg/hour.Total dry matter and water content were determined by drying the fresh flash (of known weight) at 105°C for 24 hours, after that the values being expressed in percents.

The soluble dry matter content was determined using refractometer method, and then, expressed in percents.

The most important pigment in melon flash, responsible for orange color (β carotene), was extracted in petrol ether and determined at spectrometer at λ=415 nm. Content of β carotene is expressed in mg/100g.

Acid ascorbic content was extracted in oxalic acid and determined with Nexus spectrometer (FT-IR). The quantity of ascorbic acid is expressed in mg/100g.

Volatile oils were determinate by a hidrodistilate method. and analyzing at GC

RESULTS AND DISCUSSIONS

The intensity of respiration process shows us the biodegrading rate in melon fruits. The respiration process indicate us the ripe moment, physiological tissue state or biodegrading of reserve substance. We observed (figure 1) how the respiration rate becomes higher during ripening process in case of both genotypes. The Brilliant's fruits registered at harvesting time 60.67 mg CO2/kg/hour respiration rate and 1.65 increasing respiration rhythms.

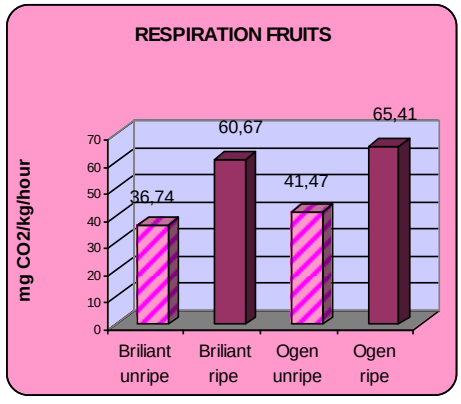

Fig. 1. Respiration fruits during ripening. process

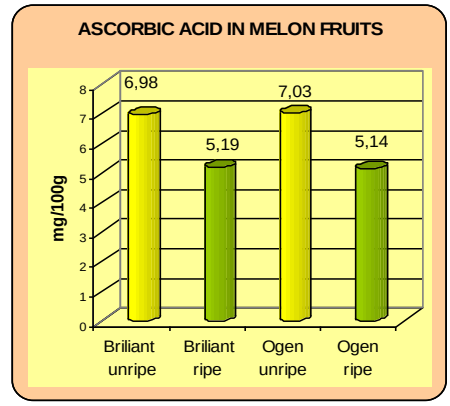

Fig. 2. Decreasing manner of ascorbic acid in melon fruits.

Ogen maturated fruits registered 1.58 times higher respiration intensity comparing unripe fruits. Analyzing ripped fruits from both genotype .we observed 1.08 higher respirations on Ogen's fruits than Briliant's.

Ascorbic acid is the most important vitamin in melon fruits, reason for what these fruits are strongly recommended in human nutrition.

We noticed that the ascorbic acid content in melon fruits decreased during the maturation process, due to its oxidation and transformation in other compounds.

The degradation speed depends on the intensity of metabolic process, its perishable and storage conditions. Our study relives that the ascorbic acid content decreased during ripening process from 6.98 mg/100g to 5.19 mg/100 g in case of Briliant genotype. The decreasing was 1.34 times. The decreasing in case of Ogen's fruits was 1.37. We noticed close values in case of both cultivars.

Concerning the flash color Briliant and so Ogen are low pigmentation melons; demonstrated by low carotene level in melon flash. We observed the manner how the chlorophyll content drops gradually with a final rapid decline, coinciding with carotenes synthesis and ripening process. The most important carotene is β carotene. This one was determined with spectrometer at λ= 451 nm. Pigmentation process commences in the centre of the fruits, near seminal cavity and progress outward trough the skin until the flash is uniform, more or less orange (depends of cultivar) at fully maturity. We fund a stain slightly accentuated in case if Brilliant's fruits – 0.84 mg/ 100g, towards 0.72 mg/100 g at Ogen fruits. – figure 3

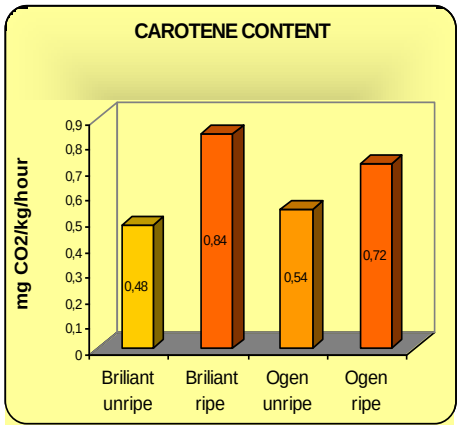

Fig. 3. Carotene content in melon fruits during ripening process

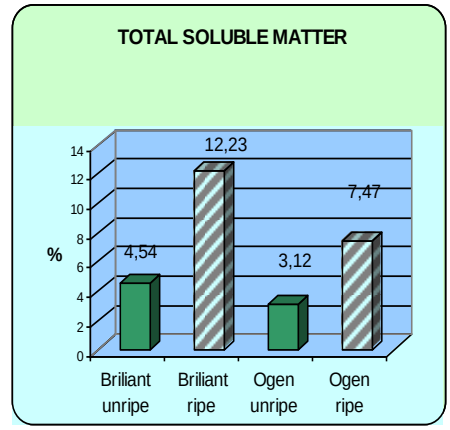

Fig. 4. Soluble dry matter

A height level of total soluble matter it is not directly proportional with fruits quality even it is not correlate with flavor. As we can observe in figure 4 Briliant's fruits 12.23 % reached the highest level of this parameter. In case of this genotype, the rhythm of increasing was 2.69. Ogen fruits obtained a smaller value

of this parameter, only 7.47 % for fruits on maturity level. The increasing rhythm in Ogen fruits was 2.39.

Regarding total dry matter, we observed an increasing manner during ripening process in all studied fruits. We observed the increasing of total dry matter while content in water decreasing. The highest level of total dry matter was in Briliant ripe fruits 9.14 %.

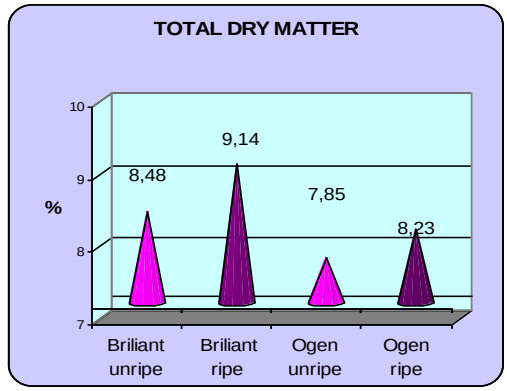

Fig. 5. Total dry mater content

The main responsible compound for aroma/flavor were esters (Z)-6-nonenal, (E)-6-nonenol. A strong correlation can made between ethyl esters content and full maturity level. This provides that ethyl esters are compounds of major importance in determining the flavor and can be considered indicators to quality establish. Most of these compounds were formed during the biosyntheses occurring during ripening free amino acids in fruit Volatile oils determined in flash melons are presented in table 1

Table 1

Volatile oils determined in flash melons

Nr.	Retention time	Substance	% A
1	5.61		0.63 %
2	5.72		2.24 %
3	5.85		0.43 %
4	6.12		1.14 %
5	14.2	Octanol	1.31 %
6	16.37		0.26 %
7	17.62	Acetat de benzil	1.40 %
8	18.86	Alil anisol (estragol)	3.11 %
9	19.27	Octil acetat	13.27 %
10	20.73	Fenil acetat	1.33 %

Nr.	Retention time	Substance	% A
11	20.88		0.85 %
12	24.7	Fenil propil acetat	1.62 %
13	25.01		0.79 %
14	25.16		0.21 %
15	25.34	Decenil acetat	5.73 %
16	25.41	Decadienol	4.28 %
17	25.92	Decilacetat	1.97 %
18	27.13		0.37 %
19	27.26	Dictiopteren	1.28 %
20	29.34		1.21 %
21	29.58	Cadien	2.36 %
22	31.02	Dodecatrien	1.94 %
23	31.17	Farnasen	11.03 %
24	31.39	Dodecenilacetat	3.82 %
25	31.57	Dodecadienol	2.17 %
26	33.02	∃ cadinol	14.89 %
27	33.12	Cadinol	1.37 %
28	33.4		9.99 %
29	41.24		1.18 %
30	43.93		1.07 %
31	44.39	Nonadecan	1.20 %
32	46.84		0.18 %
33	48.73	Eicosan	2.63 %
34	52.74		2.13 %
35	54.11		0.50 %
36	59.63		0.12 %

CONCLUSIONS

Because of lower value of respiration and a higher content of total dry matter, fruits of Briliant cultivar are more resistant at transportation and less perishable.

The content of ascorbic acid reached close values in case of both genotypes, but melons registered differences in case of soluble dry mater.

The content of soluble dry matter was higher 1.63 times in Briliant's fruits. There is a significant correlation between sugars content and fruit quality. In Briliant's fruit, the total dry matter was higher 1.1 times comparing Ogen's flash. The difference regarding carotene content was 0.28 in Briliant's fruits favor.

The sweetest fruits are Briliant's. In case of them, the registered value was 1.63 times towards Ogen's fruits.

Photo. 1 – Briliant fruit

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THE STUDY OF CUCUMBER HYBRIDS ABILITY FOR CULTIVATIONS IN TUNNELS IN ECOLOGICAL AGRICULTURE CONDITIONS

STUDIU PRETABILITĂŢII UNOR HIBRIZI DE CASTRAVEŢI PENTRU SOLARII LA CULTURA ÎN AGRICULTURĂ ECOLOGICĂ

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Abstract *The experiments were accomplished at Vegetable Research and Development Bacau during 2007 – 2008. Among the assortment of hybrids tested in the present study, Mirabelle hybrid obtained the best results. It was tolerant to pathogen attack and it produced 111 – 118,3 to/ha. The nearest yields were registered at the following hybrids: Pasandra (118 to/ha), Mandy F1, (108,7 to/ha), Bodina F1 (108 to/ha) and Cosima (108,7 to/ha). The hybrids: Beluga F1, (67,7 to/ha), Componist F1 (100,7 to/ha), Fivos F1 (102,0 to/ha), Madita F1 (104,0 to/ha) Magdalena F1 (78,3 to/ha), Levina F1 (95,3 to/ha), Pant hibrid F1 (97,7 to/ha) and Ginga F1 (87,0 to/ha) registered inferior productions comparatively with the control - Mirabelle F1.*

Key words: study, cucumber hybrids, tunnels, ecological agriculture

Rezumat. *Experimentările s-au efectuat la S.C.D.L. Bacău în perioada 2007 – 2008. Hibridul Mirabelle F1 a fost cel mai bun cultivar pentru cultura ecologică din sortimentul încercat, fiind tolerant la atacul patogenilor şi realizând o producţie de 111 - 118,3 t/ha. Producţii apropiate au realizat şi hibrizii: Pasandra (118 t/ha), Mandy F1, (108,7), şi Bodina F1 (108 t/ha), Cosima (108,7 t/ha). Hibrizii: Beluga F1, (67,7), Componist F1 (100,7), Fivos F1 (102,0), Madita F1 (104,0) Magdalena F1 (78,3), Levina F1 (95,3), Pant hibrid F1 (97,7), Ginga F1 (87,0) au realizat producţii inferioare martorului de comparaţie Mirabelle F1.*

Cuvinte cheie: studiu, hibrizi de castraveţi, solarii, agricultură ecologică

INTRODUCTION

The cultivation of cucumber in ecologic/organic/biologic agriculture has a large perspective (Jeanine Davis and co., 2008).

In this field of activity, the study of variety and hybrids ability to be cultivated in ecologic agriculture conditions has a tremendous importance, the factor variety or hybrid influencing significant the quality and quantity of yields obtained (Gloss, 2004).

In Romania, the assortment of cultivated cucumber expanded during the last years, through the introduction of new hybrids and varieties created in our country or abroad.

MATERIAL AND METHOD

The experimentations were accomplished in the polygon of ecologic agriculture from V.R.D.S. Bacau. The assortment studies were realized in tunnels with a surface of 300 m^2, utilizing the methods and practices specific to ecologic agriculture.

In the present study, we tested hybrids with different origin and different consumption destinations, the experimental results being compared with a tested hybrid that gave good results for the ongoing year.

The following hybrids were tested: 2007: Renato, Passandra F1 and Mirabelle F1. 2008: Beluga F1, Componist F1, Fivos F1, Mandy F1, Madita F1, Magdalena F1, Mirabelle F1, Levina F1, Pant hibrid F1, Bodina F1, Cosima F1, Ginga F1.

Planting time: 12.04.2007, 21.04.2008.

The observations were oriented for the following features: dynamic of blossom; dynamic of fruits settlements; quantity, quality and dynamics of yielded production; sensibility to pests and diseases attack.

RESULTS AND DISCUSSIONS

The experimental results, regarding the average production obtained and its significance comparing with the control, at cucumbers cultivated ecologically in tunnels are presented in table 1.

The date of first harvest: 03.06.2007, 19.05.2008.

The date of last harvest: 30.07.2007, 07.07.2008.

In 2007, the hybrids Passandra F1 (118,0 t/ha), and Mirabelle F1 (118,3 t/ha), salad type obtained higher production comparing with the control – Renato F1 (95,7 t/ha). Mirabelle F1 was tolerant at attack of *Fusarium* spp. and *Verticilium* spp.

Table 1

The yield of cucumber hybrids in ecological agriculture

Nr. crt	Variant	Production		Relative production %	Significance of differences
		t/ha	Difference t/ha		
1	2	3	4	5	6
2007					
1	Renato F1	95,7	0	100	-
2	Passandra F1	118,0	+22,3	123	***
3	Mirabelle F1	118,3	+22,6	123	***
2008					
1	Beluga F1	67,7	-43,3	61	000
2	Componist F1	100,7	-10,3	91	000
3	Fivos F1	102,0	-9,0	92	000
4	Mandy F1	108,7	-2,3	98	

1	2	3	4	5	6
5	Madita F1	104,0	-7,0	94	00
6	Magdalena F1	78,3	-32,7	71	000
7	Mirabelle F1	111,0	0	100	
8	Levina F1	95,3	-15,7	86	000
9	Pant hibrid F1	97,7	-13,3	88	000
10	Bodina F1	108,0	-3,0	97	
11	Cosima F1	108,7	-23	98	000
12	Ginga F1	87,0	-24,0	78	000

2007: DL 5% = 5,1 t/ha; DL 1% = 9,3 t/ha DL 0,1% = 12,9 t/ha
2008: DL 5% = 4,1 t/ha; DL 1% = 5,5 t/ha DL 0,1% = 7,3 t/ha

The market yield of Mirabelle was bigger 95% (fig. 1). The yield of Renato was inferior because the 30% of yield had second quality.

Mirabelle F1 had very good ability at cultivation in ecological agriculture.

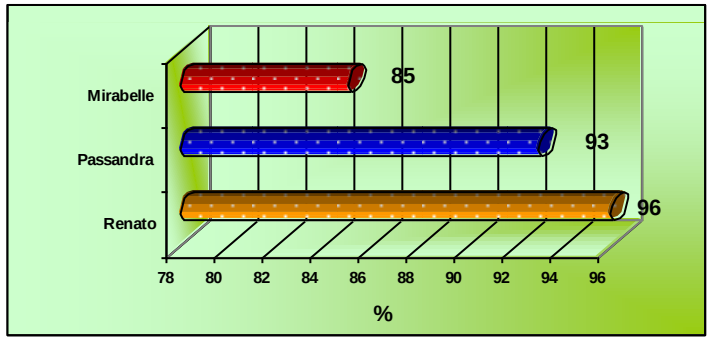

Fig. 1. The ecological market yield of cucumber hybrids in 2007

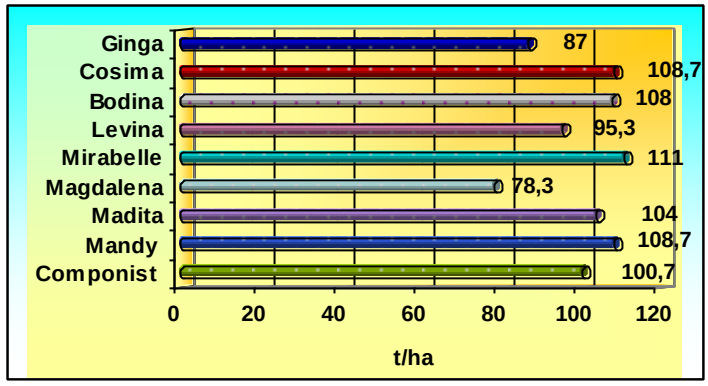

Fig. 2. The hybrid production of Cornichon type

The Cornichon cucumber type: Componist, Mandy F1, Madita F1,

Magdalena F1, Levina F1, Bodina F1, Cosima F1 and Ginga F1, in 2008 had inferior yield comparative with, control Mirabelle F1 (fig. 2).

The long fruit type hybrids for salad: Beluga F1, Fivos F1 and Pant hybrid F1 obtained inferior yield compare with Mirabelle F1 (fig. 3).

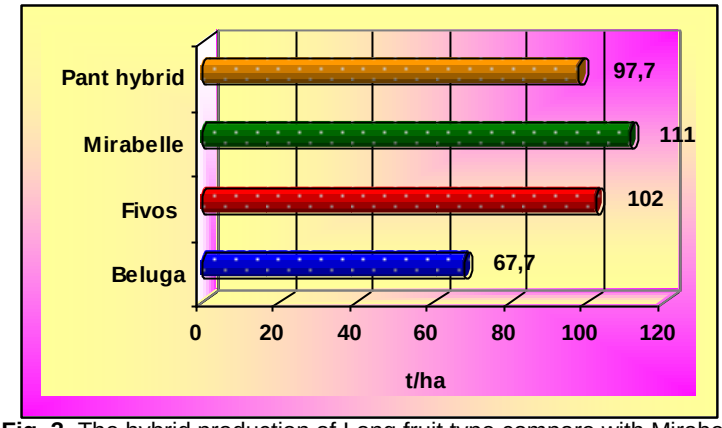

Fig. 3. The hybrid production of Long fruit type compare with Mirabelle

CONCLUSIONS

The experiments were conducted at Vegetable Research and Development Bacau during 2007 – 2008.

Among the assortment of hybrids tested in the present study, Mirabelle hybrid obtained the best results. It was tolerant to pathogen attack and it produced 111 – 118,3 to/ha.

The nearest yields were registered at the following hybrids: Pasandra (118 to/ha), Mandy F1, (108,7 to/ha), Bodina F1 (108 to/ha) and Cosima (108,7 to/ha).

The hybrids: Beluga F1, (67,7 to/ha), Componist F1 (100,7 to/ha), Fivos F1 (102,0 to/ha), Madita F1 (104,0 to/ha) Magdalena F1 (78,3 to/ha), Levina F1 (95,3 to/ha), Pant hibrid F1 (97,7 to/ha) and Ginga F1 (87,0 to/ha) registered inferior productions comparatively with the control - Mirabelle F1.

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EVALUATION OF SOME F_1 HYBRID OF CARROT (*DAUCUS CAROTA* L.) PROSPECTIVE IN THE AREA SOUTH AND SOUTH EAST AREA OF THE ROMANIA

EVALUAREA UNOR HIBRIZI DE MORCOV (*DAUCUS CAROTA* L.) DE PERSPECTIVĂ ÎN ZONA DE SUD ŞI SUD-EST A ROMÂNIEI

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Abstract. *During the 2007 - 2009 period, six carrot hybrids developed at Reserch and Development Institute for Vegetable and Flower Growing Vidra, were studied in a comparative trial in the South and South-East zone of Romania for evaluation and selection of the best one. During the growing season observations, descriptions and biometric determinations were done, also at the maturity the total yielding capacity was determined. In all areas, all hybrids fell under the semi-early precocity category. The greatest production was obtained by HMV1 hybrid (74.5t/ta) and the lowest one by HMV12 hybrid (48.2t/ha). For all studied features and characteristics (precocity group, root size and form –Nantes cylindrical type, yielding capacity), HMV1 hybrid proved the most valuable one, which was referred to State Institute for Varieties Testing and Research for Testing and Registration in the Official Catalog of Varieties.*

Key words*:* heterosis, yielding capacity, quntitative characteristics, carrot

Rezumat. *În perioada 2007-2009, au fost studiaţi în culturi comparative organizate în zonele de sud şi sud- est a ţării, şase hibrizi de morcov creaţi la Institutul de Cercetare-Dezvoltare pentru Legumicultură şi Floricultură Vidra, în vederea selectării celui mai performant. Pe parcursul perioadei de vegetaţie au fost efectuate observaţii, descrieri şi determinări ale plantelor, iar la maturitate a fost determinat poteţialul de producţie. În toate zonele, toţi hibrizii s-au încadrat în grupa de precocitate semitimpurie. Cea mai mare producţie (74,5t/ta) s-a înregistrat la hibridul HMV1, iar cea mai mică (48,2t/ha) la hibridul HMV12. Pentru toate caracteristicile şi însuşirile studiate (grupa de precocitate, mărimea şi forma rădăcinii – cilindrică de tip Nantes, poteţialul de producţie), s-a evidenţiat hibridul HMV1 care a fost înaintat la ISTIS în vederea testării şi înregistrării în Catalogul Oficial al Soiurilor.*

Cuvinte cheie*:* heterosis, capacitate de producţie, caracteristici cantitative, morcov

INTRODUCTION

Although open pollinated varieties are hybrid populations, their morphological trait variability is large (30-50%) due to the protandry phenomenon (Mazurkiewicz, 1973).

By introduction of F1 commercial hybrids in carrot having as genitors homozygotic inbred line, heterosis phenomenon can be expressed by the root uniformity, their shape and size, a rapid rate for growing and development, a higer uptake of the fertilizeas (Kastler and colab, 1982), yield quality (Gauchene,1989), higer weight for commandity output (Axelson, 1976).

The root shape, which represents an important goal for breeding in carrot is geneticaly determined, but is influenced strongly by the environment, mainly by the soil type.

The aim of this investigation was to select the best carrot hybrid in order to tested in growing conditions for its registration in the Official Catalog of Varieties.

MATERIAL AND METHOD

During the 2007-2009, six F1 hybryds carrot developed at the Research and Development Institute for Vegetable and Flower Growing –Vidra, were investigated in comparative trials for evaluation order the growing conditions of the southern part (Research and Development Institute for Vegetable and Flower Growing –Vidra, Ilfov District) and southern-eastern part of Romania (Research and Development Station for Vegetable Growing - Buzau and Commercial Society Petrosu – joint stock company - Braila).

Observation, descriptions and biometrical determinations were made for made for root characteristics (its shape, weight, length and diameter), leaves (leaf and petiole, number of leaves per plant), and at the maturity stage, when the root shape was definitive yielding ability was recorded.

The results recorded here reprezent average for values for three years of experiment in the three research stations.

The significance of differences among the hybrids was computed by the multiple comparatine method i.e. Duncan test.

RESULTS AND DISCUSSIONS

All the hybrids investigated were classified in the group of mid- early varieties with 12-130 days to harvest under the two areas of growing.

The root shape was definitive was of cylindrical type for four hybrids, conic type in HMV12 hybrid, which had a shape point and a concave shape, the other hybrids had tot shape of blunt-rounded type and plane-convex shape at the highest point. (fig 1,2,3, table1).

Fig. 1. HMV 1 hybrid

Fig. 2. HMV 5 hybrid

Fig. 3. HMV 12 hybrid

Table 1

Variability of some morfological and physiological traits of the carrot hybrids

Code	Root shape	Shape of the base	Top shape	Length of vegetative period (days)
HMV1	cylindrical	plane-convex	blunt, round	130
HMV2	cylindrical	plane-convex	blunt, round	128
HMV5	truncated	plane-concave	blunt, round	125
HMV7	cylindrical	plane-convex	blunt, round	130
HMV8	cylindrical	plane-convex	blunt, round	126
HMV12	cone	plane-concave	sharp	122

Regarding the quantitative characteristics of the root and leaf, the differences recorded among the hybrids were significant (table 2 and 3).

The root length ranged between 21.6 cm in HMV1 hybrid and 16.2 cm in HMV12 hybrid. The root diameter varied between 4.9 cm in HMV5 hybrid (truncated cone shape type) and 2.5 cm in HMV12 hybrid (cone shape type).

Table 2

Variability of the some quantitative characteristics of the carrot hybrids grown in the comparative plots for evaluation

Code	Root weight (g)	Semnifi-cance*	Root leagh (cm)	Semnifi-cance*	Root diameter (cm)	Semnifi-cance*
HMV1	265,0	a	21,6	a	3,8	b
HMV2	201,5	c	19,9	ab	3,2	c
HMV5	172,4	d	18,8	b	4,9	a
HMV7	141,9	e	19,2	b	3,3	c
HMV8	238,2	b	20,2	a	3,7	b
HMV12	108,4	f	16,6	c	2,5	d

* Variants having the same letters do not differ significantly for the level of P=5%

Concerning the root weight some significant differences among hybrids were recorded. It ranged from 265 g (HMV1 hybrid) to 108.4 g (HMV12 hybrid).

In genotypes having a root of cylindrical and cone cylindrical shape the increase of the root weight is achieved mainly by their length and in those of truncated shape, the root weight is done by the contribution of the diameter.

For the leaf characteristics the differences were significant and positively correlated with the other characteristics of the plants. The leaf length was of 42.6

cm in HMV1 hybrid, which had the biggest root and of 34.8 cm in HMV12 hybrid, which the smallest root.

The number of leaves ranged between 19.5 cm (HMV1) and 13.2 cm (HMV12). It was found that the leaf length was not correlated with the petiole length. For same leaf length same genotypes had a larger leaf aver while other had the petiole higher.

Table 3

Variability of some quantitative traits of the carrot hybrids grown in the comparative plots for evaluation

Code	Leaf length (cm)	Semnifi-cance*	Petiole leagth (cm)	Semnifi-cance*	Number of leaves	Semnifi-cance*
HMV1	42,6	a	24,7	b	19,5	a
HMV2	40,4	b	24,5	b	16,2	b
HMV5	37,8	c	21,3	c	15,7	b
HMV7	39,6	b	22,7	c	13,3	c
HMV8	41,8	a	30,5	a	15,2	b
HMV12	34,8	d	18,2	d	13,2	c

* Variants having the same letters do not differ significantly for the level of P=5%

Regarding the yielding ability established at the root maturity stage, the hybrid HMV1 which gave 74.5t/ha, was remarkable. The hybrid HMV12 recorded the least yield of 48.2t/ha. So the difference between the hybrids was of 26.3 t/ha (table 4).

Table 4

Yielding ability of some F_1 carrot hybrids under invetigation during the 2007-2009 period

Code	Yield (t/ha)	Semnificance*
HMV1	74,5	a
HMV8	69,8	ab
HMV2	67,4	b
HMV5	54,6	c
HMV7	53,4	c
HMV12	48,2	d

* Variants having the same letters do not differ significantly for the level of P=5%

CONCLUSIONS

1. The six carrot hybrids under trial were classified in the mid-early group of earliness.

2. Significant differences among hybrids for all their quantitative traits were recorded.

3. The hybrid HMV_1 was handed to State Institute for Varieties Testing in order to be tested and registered in the Official Catalog of Varieties for Romania. This hybrid rendered evident for all its characteristics and traits studied (group of earliness, root shape and size-cylindrical shape of Nantes type, yield ability).

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COMERCIAL DISORDERS OF TOMATO FRUITS – POSSIBLE CAUSES AND CONTROL I. DISORDERS DEPENDING OF CLIMATE, GENETIC AND TECHNOLOGICAL FACTORS

DEFECTE COMERCIALE ALE FRUCTELOR DE TOMATE – CAUZE POSIBILE ŞI REMEDII I. DEFECTE CAUZATE DE FACTORI CLIMATICI, GENETICI ŞI TEHNOLOGICI

LĂCĂTUŞ V.[1]***, GLĂMAN G.***[2]***, ŢUŢUIANU V.***[3]***, COSTACHE M.***[1]***, CÂRSTEA Luminiţa Nicoleta***[1]

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Abstract. *The main commercial disorders related to ripening, color, shape or firmness of tomato fruits have been presented. The selected disorders are the most common ones, present either in open field or indoors and might cause important losses of yield. Uneven or blotchy ripening, blossom end rot, misshaped fruits, internal browning or whitening "vessels", cracking fruits. These symptoms are analyzed from the perspective of climatic reasons (too high temperature, atmospheric drought, high solar radiation), technological ones (inappropriate irrigation and/or fertilization, use of some plant growth regulators) or genetic ones. Prevention and treatment methods have also been described.*

Key words: tomato fruits, commercial disorders, climatic, management, genetic reasons, prevention, control

Rezumat. *În lucrare sunt prezentate principalele defecte de maturare, de culoare, de formă şi de consistenţă ale fructelor de tomate, întâlnite mai des în culturile din România din câmp şi din spaţii protejate şi care reduc uneori sensibil producţia comercializabilă. Printre acestea sunt descrise fructele cu maturare neuniformă, cu ţesut alb în pereţii loculari, cu putregai apical, fructele deformate, cu goluri, crăpate, sau pătate. Aceste simtome sunt analizate prin prisma unor cauze posibile cum ar fi cele de natură climatică (temperaturile ridicate, seceta atmosferică, insolaţia), de natură tehnologică (irigarea şi fertilizarea necorespunzătoare, aplicarea unor regulatori de creştere), genetică şi altele. Cazurile menţionate sunt însoţite de măsuri de prevenire şi remediere.*

Cuvinte cheie: fructe tomate, defecte comerciale, cauze climatice, tehnologice, genetice, prevenire, remediere

INTRODUCTION

Quality of agricultural products in general and vegetables in particular is a complex concept which includes a large number of characteristics and can be

appreciated basis on more criteria: the species and the plant part taken into account, the destination of the crop, size, firmness and shape of the fruits, color, taste, symptoms of diseases, nutritive and energetic value, and many other relevant signs and symptoms in this meaning (Lacatus and colab; 2006; Bissuel Christine 1999). The quality of vegetables in a modern acception includes a perfect appearance, high use value and on the other hand a high level of beneficient constituents, silmultaneously with an as low as possible content of dangerous substances (Petitjean Marie-Francoise 2001; Lacatus 1999;Hardh 1982). The changing of some climatic factors, both at the global and at the regional level, in the night and day, low relative humidity, the drought but the cold rains or the hail too, have directly or undirectly affected the plant metabolism and implicitly the ripening way of the tomato fruits (Lacatus and colab 2009; Lacatus 2007; Lacatus and Voican 2006). It is equaly true that some technological factors such as irrigation, fertilization, and the stimulation or the environmental factors directing in the case of the protected crops have largely affected the commercial and nutritional quality of tomato fruits (Voican, Lacatus 2006; Lacatus et colab. 2006; Lacatus and colab 2009; Lacatus, Tutuianu 1998; Blancard 1994; Hobson and colab. 1977).

In this paper are presented the observations, which habe been carried out by our staff, both in experimental and in commercial tomato crops, either in the open field or in the greenhouse spaces. To these we add the findings of other experts in this field of activity. (Blancard, Lecocq, Laterrot, Hobson and athers). The purpose of the paper is to spread our observations among the specialists but also among the farmers, to lighten them the diagnosis, and especially to contribute as far as possible to the prevention of some symptoms which usually depreciate the commercial and nutritional quality of tomato fruit. And last but not least, to update some of the prevention and control measures in the field of mineral nutrition and nutritive solutions.

MATERIAL AND METHOD

The effort has materialized in the description of five cases in which the commercial quality of tomato fruits was strongly affected. The considered factors through which the tomato crop was kept under observation were the following: **a)** factors of climatic nature (high or low temperatures, great temperature differences between night and day, low or high relative humidity, sunstroke, hail); **b)** factors of technological nature (the cultivation of some inadapted hybrids discontinuous, insufficient or excessive irrigation, inadequate ventilation and planting densities, excessive defoliations); **c)** factors of agrochemical nature (deficiency of potassium and calcium in the soil, excess soluble salts in the soil solution); **d)** factors of genetics nature. In order to simplify the work, we will synthetically expose the cases using as main procedures the description, the explanation of all causes and as a result of our observations the proposal of various and suitable remedies.

RESULTS AND DISCUSSIONS

1. Blotchy ripening (fig.1.). This ripening deficiency is one of the most commonly found in tomato crops grown not only under protection, but also in the open field. A part of the fruit delays its maturation proces, forming a green, yellow or

virtual uncolored area. In the section, in the pericarp, a browned tissue may occur, without being about a virus or bacteria (fig. 1a). Sometimes there is a waxy patch, an extreme form of blotchy ripening, where the walls of the fruit have a translucent appearance (fig. 1d). On the fruit surface it does not notice hollows and drops or simple irregularities, but the discoloured areas are stronger than surrounding tissues which normally at the red colouring are somewhat softer. Most often, the area, which is showing an abnormal pigmentation, lies around the calyx zone. The route of the vascular fascicles as a result of the purplish- brown tissue, can be often pursued in the pericarp of the fruit, especially when the normal pigments are in small enough quantities.

a) **b)** **c)** **d)**

Fig.1. Fruit discoloration in the maturation proces

The fruits with an affected area of 40 % and with browned vessels 100 % had a nitrate content lower with 69 %, the acidity lower with 21 %, potassium lower with a rate of 14 % dry mass content lower with a rate of 13% and the total sugar content lower with a percentage of 6 %.

Causes. Lack of potassium, stress due to environmental factors that affect the supply routes of the plants in the most sensitive point – the cells with thin walls which form the vascular channels. Among the environmental factors we mention the temperature, whose influence on the synthesis of pigments is well known. Thus, low temperatures tend to reduce the synthesis of lycopene, but temperatures above 30°C may also inhibit the production of lycopene. This latter case is very common in the most green and plastic houses in Romania, whose ventilation system and surface are uncorrelated with the temperatures of the months of the period June- August. Likewise, temperatures of 40°C or higher inhibit carotenoid synthesis. At these temperatures the production of ethylene and the synthesis of polygalacturonasis. are also inhibited An indirect cause of the fruits temperature increase may be the exaggerated plant defoliation.

Remedies. Avoid high temperatures and the excessive defoliations, shading, the increasing of the potassium dose with about 25 %, growing the hybrids with mid-size fruits and the tolerant hybrids. Tolerance to high temperatures (as also to the low temperature) differs from hybrid to hybrid, depending of the temperature value and exposure time. In the case of tolerant hybrids, the negative effects of high temperatures may still be reversible after 2 days of exposure at 40°C, 4 days at 35°C or 6 days at 30°C if the fruits are transferred to a warehouse with an optimum temperature for maturation proces (20-25°C).

2. Fruits with green or greenish yellow collar-greenback (fig. 2.). The fruit does not ripen evenly, not redden entirely, leaving around stalks an yellow or

green zone. The phenomenon is sometimes encountered in hybrids with large fruits that are not perfectly spherical, have some so-called "shoulders" which remain hard green while the remainder of the fruit ripens normally. These are hybrids likely able to accumulate a higher content of chlorophyll in the walls of the unripe fruit. The phenomenon is specific for the hybrids with darker foliage and which respond in this way to a stronger nitrogen fertilization. Area appears as a circle (completely or partially) around the calyx and remains so, or transferred to green-yellow or even to yellow covering till one third of the total fruit surface. Inside, under these areas may occur a white tissue containing starch, strongly brow ned cell walls and empty spaces between cells.

Causes. Susceptibility of some hybrids to gain a higher content of chlorophyll in the walls of the unripe fruit; a real cause can also be the excessive solar radiation and hot air streams.

Remedie. Increasing doses of phosphorus and potassium; shading; avoiding drastic defoliation; cultivation of hybrids with genetic resistance.

3. Fruits affected by sunscald. Sunscald occurs in maturation green stage through an yellow or whitened areas, diffuse spot, which appears on the solar radiation exposed side. On the green fruits, this area is dehydrated and the epidermis becomes like a "skin" or wiggles.

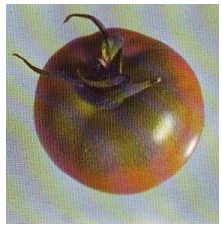

Fig. 2. Greenback

Fig.3. Sunscald

Causes. Strong exposure to sunlight with fruit temperatures larger than 30°C which inhibits the synthesis of lycopene, but not that of carotene.

Remedies. Shading and avoid excessive defoliation.

4. Fruits with white tissue in the locule walls. Apparently, the fruits are normally colored and the epidermis is of an uniform red. But when the fruits are cut, inside in the locule walls occurs a white tissue that can all around or only partly include the fruit, usually in the peduncle zone. Affected cells are hard, thick and opaque.

Causes. Mostly, this ripening deficiency is caused by the cultivation of hybrids which are inappropriate for the environmental conditions, especially in protected culture, when some cultivars carryng the „even ripening" allele are exposed to excessive sunlight. It is mainly about hybrids or varieties with ovoid fruits , often for growing in the open field for processing. The phenomenon has increased in recent years due to excessive solar radiation and insufficient potassium fertilization.

As we have already indicated in the case of the spotting ripening, the environmental factors stress causes interruption of the leading fascicles in their

most sensitive points, namely the cells of thin walls joined to the vascular fascicles, forming in this way a brown tissue, sometimes in the locular walls. The more thickened and lignified the cells are, the more white tissue is formed as a result of the stress and premature aging.

Fig. 4. Fruits with „white" tissue within the thickness of the locule walls

Remedies. Selection of hybrids suitable for the conditions from Romania, increasing the dose of potassium with a rate of 25% and reducing excessive exposure to sunlight using the shading method.

5. Affected fruits by blossom-end rot (fig. 5). In the apical part of the fruit develops a circular area of brown colour, relatively hard and dry. When plants are grown on unamended acidic soils, or acid peat substrate, or on salty soil, specific symptoms occur on the leaves. The leaflets of the top leaves are dark green firstly with pale green edges and then they become yellow, curl and dry up. Growing tips die. Symptoms spread to the base leaves.

Fig. 5. Fruits affected by blossom-end rot

Causes. The main issue is the lack of calcium. This may be directly due to lack of calcium in the soil. But there may be a sum of factors that induce this failure. Calcium, like other nutritive elements, is transported into the plant by means of water. When there are factors hindering continuous water supply, is interrupted the plant calcium supply too, which unlike other nutritive elements are not translocated from older to younger leaves towards growing tips. It remains fixed in the cell walls in the shape of calcium pectin. The lack of water due to either discontinuous irigation or soil pathogen agents, which cause vascular disease or to excessive concentrations of soluble salts (as a result of fertilization with high doses, especially with ammonium nitrogen-based fertilizers) induces calcium deficiency. This phenomenom can happen when tomatoes are cultivated on the cold soils, because of the developing of a poor root system, which can not sustain a normal water supply of the air part under the conditions

of a strong evapotranspiration. Also, the unbalanced fertilizations outline the antagonism of the ammonium, magnesium and potassium ions with the calcium ion. The phenomenon is commonly encountered in the open field tomato crop in early periods, but later in autumn, when the green fruits are affected, making impossible to market them as green pickled tomatoes. Also it is encountered in the cultures from protected areas, at the plants affected by *Verticillium dahliae***,** as in the case of an inadequate ventilation in the conditions of a very high relative air humidity. And the water excess in its turn can cause calcium deficiency due to the asphyxiation root system. Sometimes, calcium deficiency can be found in the case of the cultivation of some hybrids sensitive to lack of calcium.

Remedies. Amendment with calcium carbonate of the acid soils, or peat in the case of the crops on this substrate; the suitable addition of calcium nitrate in nutrient solutions; uniform and continuous irrigation; achievement of an optimal ventilation; treatment of diseased plants, at the root and leaves with a solution of Topsin M 45 0.1 to 0.15 %; preventive foliar fertilization with CaFORTE 0.3 to 0.5 %.

CONCLUSIONS

1.The excessive climate factors, some technological measures, but the lack of potassium and calcium, significantly reduce the percentage of marketable tomato fruits;

2.The cultivation of some inadequate tomato hybrids and varieties, some of them being genetically sensitive may also affect the commercial quality of the fruits.

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COMERCIAL DISORDERS OF TOMATO FRUITS – POSSIBLE CAUSES AND CONTROL II. DISORDERS DEPENDING OF TECHNOLOGICAL AND PATHOLOGICAL FACTORS

DEFECTE COMERCIALE ALE FRUCTELOR DE TOMATE – CAUZE POSIBILE ŞI REMEDII II. DEFECTE CAUZATE DE FACTORI TEHNOLOGICI ŞI PATOLOGICI

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Abstract. *The main commercial disorders related to ripening, color, shape or firmness of tomato fruits have been presented. The selected disorders are the most common ones, present either in open field or indoors and might cause important losses of yield. Misshaped fruits, cracking, russeting, bronzing, spotted fruits or soft rots of the fruits. These symptoms are analyzed from the perspective of climatic reasons, technological ones (inappropriate irrigation and/or fertilization, use of some plant growth regulators) or pathological ones (attacks of fungi, bacteria or viruses). Prevention and treatment methods have also been described.*

Key words: tomato fruits, commercial disorders, climatic, management, pathologic reasons, prevention, control

Rezumat. *În lucrare sunt prezentate principalele defecte de maturare, de culoare, de formă sau de consistenţă ale fructelor de tomate, întâlnite mai des în culturile din România din câmp şi din spaţii protejate şi care reduc uneori sensibil producţia comercializabilă. Printre acestea sunt descrise fructele deformate, cu goluri, crăpate, rugoase, bronzate, pătate sau bolnave. Aceste simptome sunt analizate prin prisma unor cauze posibile cum ar fi cele de natură climatică, tehnologică (irigarea şi fertilizarea necorespunzătoare, aplicarea unor regulatori de creştere), şi patologică (ciuperci, bacterii şi virusuri). Cazurile menţionate sunt însoţite de măsuri de prevenire şi remediere.*

Cuvinte cheie: fructe tomate, defecte comerciale, cauze climatice, tehnologice, patologice, prevenire, remediere

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Quality of agricultural products in general and vegetables in particular is a complex concept which includes a large number of characteristics and can be appreciated basis on more criteria: the species and the plant part taken into account, the destination of the crop, size, firmness and shape of the fruits, color, taste, symptoms of diseases, nutritive and energetic value, and many other relevant signs and symptoms in

this meaning (Lacatus and colab; 2006; Bissuel Christine 1999). The quality of vegetables in a modern acception includes a perfect appearance, high use value and on the other hand a high level of beneficient constituents, silmultaneously with an as low as possible content of dangerous substances (Petitjean Marie-Francoise 2001; Lacatus 1999;Hardh 1982). The changing of some climatic factors, both at the global and at the regional level, in the night and day, low relative humidity, the drought but the cold rains or the hail too, have directly or undirectly affected the plant metabolism and implicitly the ripening way of the tomato fruits (Lacatus and colab 2009; Lacatus 2007; Lacatus and Voican 2006). In this condition, the pressure of different pathogenes and pests were incresed and reduced, sometimes considerably, the quantity and the quality of the marketable fruits (Costache and colab. 2007; Lacatus and colab. 2002 a and b; Lacatus and Stoenescu 2002; Blancard 1994; *** 1987). It is equaly true that some technological factors such as irrigation, fertilization, and the stimulation or the environmental factors directing in the case of the protected crops have largely affected the commercial and nutritional quality of tomato fruits (Voican and Lacatus 2006; Lacatus and colab 2006; Lacatus and colab 2009; Lacatus and Tutuianu 1998; Blancard 1994; Hobson and colab. 1977).

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MATERIAL AND METHOD

The effort has materialized in the description of eight cases in which the commercial quality of tomato fruits was strongly affected. The considered factors through which the tomato crop was kept under observation were the following: **a)** factors of climatic nature (high or low temperatures, great temperature differences between night and day, low or high relative humidity, sunstroke, hail); **b)** factors of technological nature (the cultivation of some inadapted hybrids, discontinuous, insufficient or excessive irrigation, inadequate ventilation and planting densities, excessive defoliations); **c)** factors of agrochemical nature (deficiency of potassium and calcium in the soil, excess soluble salts in the soil solution); **d)** factors of pathogenical nature (virusis, pathogenic phungi, bacteria and pests); **e)** factors of genetics nature. In order to simplify the work, we will synthetically expose the cases using as main procedures the description, the explanation of all causes and as a result of our observations the proposal of various and suitable remedies.

RESULTS AND DISCUSSIONS

1. Fruits heavily ribbed and deformed (fig.1, 2). Here it is about the fruits, which between the parenchymatous tissue around the seeds and the walls from the outside pericarp area have hollows without placental fluid. Sometimes the tissue around the seeds is green and unripe with a drying tendency. These fruits have a low resistance to transport and quickly lose their firmness. The phenomenon is especially

found in protected crop systems, where parthenocarpic hybrids are preferably cultivated, especially on their first inflorescence.

Causes: among the most common situations in which occur fruit hollow and deformed, are those that especially use bioactive substances - hormones - to improve the fruit setting, or in other words, to reduce their flowers abortion rate in unsuitable climatic conditions such as low luminosity. The phenomenon may be an expression of the change ratio of inhibitory and stimulanting substances. Especially when it is using stimulants that have in their composition 2,4 D, or it is only stimulating with this product, an fenoxiclorinat compound, a synthetic auxine which is not approved for this. Another reason is the low temperature, the phenomenon being accentuated in this case by the biostimulators application.

Fig. 1. Fruit with hollows

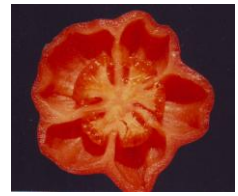

Fig. 2. Fruit hollow and deformed caused by fruit-settingproduct

Remedies: the increasing of the temperature average at 22°C from case to case, for 5-10 days; the supplement of the potassium quantity in the fertilization program, the increasing of the electrical conductivity (EC) of nutrient solution for fertigary; the avoiding of chemical stimulators; the using of the bumble- bees.

2. Stylar end of fruit pointed (fig. 3). Here it is about the fruits, whose apical part is elongated, sometimes in the shape of a greater or smaller mucron. But there may be other types of deformed fruits, with corky scars of varying sizes – cracked corky scars – or so-called "catface."

Fig. 3. Stylar end of fruit pointed

Causes: also in this case, the main factor leading to deformation fruits is the chemical biostimulators application, and in particular the 2.4 D application and sometimes twice on the same flower. This causes the formation a stylar end of fruit pointed, a "mucron" in the apical part of the fruits, probably due to an imbalance between auxinic compounds, concentrated in the apical area and environmental factors (temperature, water and nutrients supply etc.).

What it should have been a commercial disadvantage, turned in the recent years into an advantage. In this way consumers differentiate the tomatoes produced in Romania, of imported products, determining the farmers to continue to use it. But for some hybrids, such as Precos F1, this phenomenon has an undesirable extent. The phenomenon can be extended in the case of the repeated application of the stimulator on the same flower, or applying it both on the floral buds and the leaves. Also the application of chemical stimulators in the low temperatures conditions. And the cultivation of some hybrids sensitive to stimulation, such as Precos F1 increases the percentage of deformed fruits. To these causes it adds a too early planting, when soil

is rather cold and this condition leads to deficiencies of potassium and phosphorus, a too low light intensity, excess of nitrogen, high relative humidity or too dry atmosphere, the too low or on the contrary too high night temperatures.

Remedies: the use of adequate hybrids, with high binding capacity during the cloudy periods; the avoiding of chemical biostimulators, based mostly of 2.4 D; the bumble- bees using.

3. Cracked fruits (fig. 4). Tomato fruits cracking or splitting includes the radial and concentric cracking, and simply the fruits splitting.

Fig. 4. Cracked fruits

Causes: skin thickness appears to be directly accountable of the resistance to splitting, although its strength and elasticity may play an important role; this character is genetically controlled, but there are many other aggravating factors such as water excess, the abrupt temperature increase, too large temperature differences between night and day, discontinuous irrigation, nitrogen application through scattering and overreipening.

Remedies: the use of a suitable biological material, the avoiding of the large fluctuations concerning the hydric regime practiced in warm periods, the introduction and the development of drip irrigation and its correlation with environmental factors, the guarantee of an adequate calcium nutrition, the foliar fertilization with CaFORTE 0.3-0.5 %.

4. Rugged fruits (fig. 5). Fruits skin is partially or almost entirely circularly furrowed by small cracks, giving a rugged appearance as being like the „scab".In the case of the wide spider attack, which is manifested in distinct areas, radial cracks may occur due to strong toxins secreted by spider adults. But in this situation, the fruits are all really compromised.

Fig. 5. Rugged fruits

Causes: Excessive application of pesticides under conditions of excessive daytime temperature and relative humidity too low, followed by a too low night temperature; increased and long cloudiness; too low concentration of soluble salts; spider attack, especially that caused by polyphagotarsonemus latus; the cultivation of sensitive varieties.

Remedies: the treatments application on the well-watered plants; the correlation of the ventilation and irrigation with the development of the climatic factors; the fertilizers doses fractionation; the proper choice of biological material suitable to the environmental conditions; the treatment accomplishment against wide spider attack using Vertimec CE 1.8 or Milkbecknok 1 EC 0.1 %, or Envidor 24 SC 0.05 %; the increase of the air relative humidity.

5. Infected fruits with viruses (fig. 6). In such cases the fruits are "tanned", with the brown process of the tissue at the stalk insertion place, with uncolored areas and sunken brown stripes or simply become fruits with a mosaic aspect.

Fig. 6. Infected fruits with viruses

Causes: the use of the unresistant cultivars and varieties; the seeds purchase from unauthorized sources; the seeds growing, which are extracted from the hybrid fruits (F2); attack of the virosis vectors insects.

Remedies: the cultivation of the resistant *varieties* / hybrids; the vectors control (Confidor SL or Kochinor 20 SL 0.075 %, Confidor 70 WG or Heloprid 70 WG 0.02 %, Confidor Energy 85 OD 0.15 %, etc).

6. Fruits affected by *Phytophtora infestans or parasitica* (fig. 7). It is produced by *Phytophthora infestans*, the traditional „air-borne" blight and usually starts at the insertion of the stem in shape of some large brown-olivacee pathes, wich afterwards grow and become brown covering the whole fruit; the green fruits are rugged. This disease can be also produced by *Phytophthora parasitica*, the „soil-borne" blight, when on the green fruits appear large green-gray-brown spots with irregular, soft, wet edges; sometimes appears a mould.

Fig. 7. Fruits affected by *Phytophtora parasitica* (left) and *infestans* (right)

Causes: the presence of two pathogenous agents, the low temperature and high relative humidity.

Remedies: treatment with one of the the products: Previcur Energy 0.15 %, Melody compact or Aliette 0.2 %, Ridomil Gold MZ 68 or Curzate Manox or Super Champ 0.25 %, or bordeaux mixture 0.75 %.

7. Fruits attacked by *Helicoverpa (Cloridea) armigera* Hbn. (fig. 8). It is observed on the fruit a perforation due to the larva attack, which leaves inside many dejections, making them unfit for consumption.

Fig. 8. Fruit attacked by *Helicoverpa armigera*

Causes: larvae that develop on leaves and flowers then penetrate into the fruit inside where they leave many dejections.

Remedies: Alternative treatments performed before the larvae penetration into the fruit with: Sinoratox 35 CE or Novadim 40 EC 0.15 %, Decis 2,5 EC 0.05 %, Faster Forte 20 CE 0.015 %.

8. Attacked fruits by bacteriosis (fig. 9). It is about the *Pseudomonas tomato***,** which usually causes the black colour spots with a rugged- coal-black aspect,

Clavibacter michiganense with spots of type *„bird's eye "*and *Xanthomonas vesicatoria* - slightly sunken spots, of brown colour, darker at the edges area. All these bacteria specially affect tomato fruits which are to be harvested as green tomatoes.



Causes: the bacteria presence, relative humidity over 85% and temperatures between 19 and 23 °C and in other cases from 26 to 30 °C.

Fig. 9. Green tomato fruits affected by bacteriosis

Remedies: Treatments with Alcupral 0,4 - 0.5 %, bordeaux mixture 0,75 %, Super Champ or Kocide 0.25 %, Melody compact 49 WG 0.2 %.

CONCLUSIONS

1. The irrational use of growth regulators, but also the inadequate irrigation determine the impairment of tomatoes marketable quality.

2. A series of pathogens, viruses and bacteria, significantly reduce the marketing percentage of both mature and green tomato fruits.

3. The cultivation of an inadequate biological material, but also the reuse of the seeds from hybrid fruits (F2) affects the efficiency of tomato crops.

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STUDY OF THE MAIN PHYSICAL CHEMICAL PROPERTIES OF VEGETABLE SOIL IN A VEGETABLE ECOLOGICAL FIELD

STUDIUL PRINCIPALELOR ÎNSUŞIRI FIZICE ŞI CHIMICE ALE SOLULUI ÎNTR-UN CÂMP LEGUMICOL ECOLOGIC

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Abstract. *The paper presents results of a study on the main physical and chemical features of soil in organic vegetable field, from the Faculty of Horticulture Iasi, in order to assess operational requirements to meet organic. The study was conducted by specific methods, using soil samples taken from the field and the solar crops of tomatoes, peppers and aubergines. On physical characteristics, research was done on clay content, aeration porosity and electrical conductivity. For chemical characteristics were analyzed following indicators: soil (pH), humus, nitrogen (Nt), phosphorus (P_{AL}), potassium (K_{AL}), exchange bases sum (SB), cation exchange capacity (T), degree of saturation with bases (V).*

Key words: soil, physical and chemical features

Rezumat. *Lucrarea prezintă rezultatele unui studiu referitor la principalele însuşiri fizice şi chimice ale solului în câmpul legumicol ecologic, al Facultăţii de Horticultură din Iaşi, în scopul de a evalua satisfacerea cerinţelor pentru exploatare în sistem ecologic. Studiul a fost realizat, prin metode specifice, folosind probe de sol prelevate din câmp şi din solar, la culturile de tomate, ardei şi pătlăgele vinete. Referitor la însuşirile fizice, s-au făcut cercetări la conţinutul de argilă, porozitatea de aeraţie şi conductivitatea electrică. În ceea ce priveşte însuşirile chimice au fost analizaţi următorii indicatori: reacţia solului pH, humus, azot Nt, fosfor P_{Al}, potasiu K_{Al}, suma bazelor de schimb SB, capacitatea de schimb cationic T, gradul de saturaţie cu baze V.*

Cuvinte cheie: sol, însuşiri fizice şi chimice

INTRODUCTION

Physical and chemical properties of soil influence on majeure on how it operates within an ecosystem. Knowledge of developments in key physical and chemical properties of soil plays an important role in maintaining its fertility status (Davidescu D., Davidescu Velicica 1992).

Investigations aim is to determine the extent to which soils of vegetable land UASVM Iasi correspond to organic vegetable crop. To achieve the intended purpose were established the following objectives: determination and physical properties of soil analysis, determination and chemical characteristics of soil analysis.

MATERIAL AND METHOD

Experience was held in the field of organic vegetable "V. Adamachi'' farm, from University of Agricultural Sciences and Veterinary Medicine Iasi (UASVM Iasi). Studies have been conducted based on soil samples taken from vegetable land of polytunels and field, the 0-20 cm depth.

Grounds that have taken soil samples were growed, field and polytunels, with: peppers, aubergines, tomatoes and cucumbers **(**Munteanu N., 2009). Soil samples, both and the field were collected from among the plants and the interval between them. The vegetable land were taken 14 soil samples on 10/6/2009, of which eight samples and six samples in the field.

RESULTS AND DISCUSSIONS

Analysis of physical and chemical characteristics of soil samples showed differences in the characteristics analyzed in field and protected crops. At matected crop soil texture is fine (Class T-loamy clay) as in field vegetable crops soil texture is also fine (TT-clay clay textural class average).

Values colloidal clay content on tomato plot (0-20 cm depth), ranging from 35.1% to 36.6% between plat rows (T, fine texture class clay);on the pepper plot turn from 34.6% to 35.4% between rows, and on the cucumber plot from 34.3% to 35.6%, all the time (Munteanu N. si colab. 2008).

Vegetable crop field, soil texture is fine cambic chernozem (grade fine texture, medium loamy clay TT) values are higher as 37.5% on tomato and 38.1% of all in the range, the pepper colloidal clay content values are somewhat higher, namely 39.3% and 38.2% between rows, the aubergines values are 38.1% and 37.6% on a time frame.

Table 1

The main physical properties of soil resources UASVM

Ecopedotop	Specification	Below 0.002 mm clay	textural hold	aeration porosity(%)	Wet soil Consistency	EC mS/cm
0	1	2	3	4	5	6
UASVM Iasi 10.06.2009	polytunnels pepper row	34.6	T	21	friable	0.198
	polytunnels peppers range	35.4	T	11	hard	0.420
	polytunnels aubergines row	33.9	T	22	friable	0.254
	polytunnels aubergines range	34.2	T	10	hard	0.602
	polytunnels tomato row	35.1	T	18	friable	0.171
	polytunnels range tomato	36.6	T	9	hard	0.665

Continue of table 1

0	1	2	3	4	5	6
UASVM Iasi 10.06.2009	polytunnels cucumber line	34.3	T	19	friable	0.247
	polytunnels cucumbers range	35.6	T	8	hard	0.644
	pepper field line	39.3	TT	14	hard	0.124
	pepper field range	38.4	TT	8	very hard	0.284
	aubergines field line	38.1	TT	15	hard	0.175
	aubergines field range	37.6	TT	7	very hard	0.235
	tomato field line	37.5	TT	15	hard	0.224
	tomato field range	38.1	TT	7	very hard	0.341
	cucumber field line	36.4	TT	16	hard	0.290
	cucumber field range	38.3	TT	18	very hard	0.320

*CE(mS/cm)= soil electrical conductivity meters per second /cm

Determinant of aeration porosity values of soil organic(0-20 cm depth) in turns polytunnels medium (18-22%), and the low range (8-11%), field are low and the line (14-15%) and very low range (7-8%) due to fine soil texture, drip between irrigation and soil compacting by manual and mechanical interventions, between rows.

Electrical conductivity (EC) of soil solution in polytunnles crop row of plants, the lowest values were recorded on tomato crop (0.171mS/cm), and the highest crop of eggplants (0.254 mS / cm). The range found values between 0.420mS/cm, the pepper, 0.665mS/cm and tomatoes. In the field, in turn, values are increasing, from crop 0.124mS/cm pepper to cucumbers 0.290mS/cm, and the interval from aubergines 0.235mS/cm is the lowest and highest 0.341mS/cm tomatoes.

Values of soil reaction (pH) in samples collected from polytunnels vary slightly in weak acid, neutral, turn (from 6.42 to 6.92 pH units) and weak acid-neutral, but slightly higher range (6.62 to 7.14 pH units) - pepper and tomato crops. Turn field varies larger (6.71 to 7.35 pH units) the aubergines and cucumbers, but differ within soil reaction values (6.91 to 7.52) - from aubergines and tomatoes.

Humus content is generally medium in green houses, all with values ranging between 3.625 to 3.742% - the cucumbers and peppers and somewhat higher, but still medium-sized range from 3.715 to 3.923% - the cucumbers and tomatoes. Lower values are encountered in the field: are on peppers and cucumbers 3,156-3, 345% - and some higher range are on peppers and aubergines: 3,318-3, 514%

Table 2

The main chemical properties of soil resources UASVM Iasi

Ecopedotop	Specification	pH (H2O)	Humus (%)	Nt (%)	P_{AL} (ppm)	K_{AL} (ppm)	SB (me)	T (me)	V (%)
UASVM Iasi 10.06.2009	polytunnels pepper row	6.42	3.742	0.246	72	193	28.4	32.1	91
	polytunnels peppers range	6.62	3.815	0.261	76	201	31.3	35.5	93
	polytunnels aubergines row	6.67	3.654	0.222	53	241	29.8	31.3	91
	polytunnels - range aubergines	6.81	3.761	0.255	57	257	33.1	34.5	94
	polytunnels tomato line	6.92	3.714	0.232	71	203	27.6	30.1	92
	polytunnels range tomato	7.14	3.923	0.264	80	221	30.8	33.8	93
	polytunnels cucumber row	684	3.625	0.251	48	232	26.1	29.5	90
	polytunnels cucumbers range	7.05	3.715	0.266	56	245	32.4	35.1	93
	pepper field row	7,25	3,156	0,179	30	158	25,5	27,7	85
	pepper field range	7,44	3,318	0,191	35	176	30,4	33,1	90
	aubergines field row	6,71	3,263	0,181	33	143	27,1	31,5	87
	aubergines field range	6,91	3,514	0,197	36	158	29,6	34,2	91
	tomato field row	7,33	3,218	0,185	27	165	20,1	25,8	86
	tomato field range	7,52	3,461	0,204	38	181	24,7	26,1	89
	cucumber field row	7,35	3,345	0,260	18	120	25,3	23,2	81
	cucumber field range	7,50	3,483	0,276	24	140	22,4	26,3	80

*Nt - Total nitrogen content
*P_{AL} - mobile phosphorus content
*K_{AL} - assimilable potassium content
*SB - exchange bases sum
*T - cation capacity chimb
*V - degree of saturation with bases

Content (Nt%) of total nitrogen in soil samples collected from polytunnels, has generally higher values (0.222 to 0.251%) per row, something that the between rows is higher (0.255 to 0.266%) - crops of eggplants and cucumbers. Somewhat lower values, but medium in the field (0.179 to 0.260%) - were found on line and somewhat higher, respectively (0.191 to 0.276%), the range, the peppers and cucumbers.

The polytunnels content, mobile phosphorus (P_{AL}- ppm) has values in the rows of plants between 48-72ppm - the cucumbers and peppers, as higher range, respectively, 56-80ppm - cucumber and tomato crops.

Assimilable potassium content (K_{AL} ppm) in the polytunnels has values between 193-241ppm - plant row and the values were within 201-257ppm - the peppers and aubergines. Potassium content in the field or recorded values between 120-165ppm - row of plants and 140-181ppm respectively, the range from cucumbers and tomatoes.

In the field, mobile phosphorus levels are medium, slightly lower on all 18-33ppm - cucumbers and aubergines and somewhat higher in the range 24-38ppm of cucumber and tomato crops.

Exchange bases sum indicator values (BS me), in polytunnels row of plants are raised from 26.1 to 29.8 me - the cucumbers and aubergines and higher range of occasions, from 30.8 to 33.1 me insufficiently explored - tomatoes and aubergines, cationic change capacity (T em) has medium values in the solar plant row from 29.5 to 32.1 me - the cucumbers and tomatoes and some higher range from 33.8 to 35.5 me - tomato and pepper crops.

Lower values of the indicator base exchange amount is recorded in field vegetables: 20.1 to 27.1 me - turn the tomatoes and cucumbers and 22.4 to 30.4 me - on the range, the cucumbers and peppers. Cation exchange capacity is medium values from 23.2 to 31.5 me - cucumbers and tomatoes and turn slightly higher from 26.1 to 34.2 me - the period from crops of tomatoes and aubergines.

Degree of saturation with bases (V%) in polytunnels is generally high values (90-92%)- turn the cucumber and tomato, but the higher range (93-94%, eubazic) the cucumbers and aubergines and some smaller submezobazic among plants in the field (81-87%) - the cucumbers and aubergines, that values of 89-91% - the range from tomatoes and aubergines.

CONCLUSIONS

1. In the vegetable field exploited in ecological conditions, hortica antrosol soil type –in polytunnels sun, and molic cambic in the open field.

2. Soil texture at the two locations of soil types is fine.

3. Polytunnels crop of both plant row and the period, there were higher values physical indicators, to the open field.

4. Due to poaching fine soil texture, qualities of his fund in the interval between rows of plants remains untapped.

5. Ground reaction in weak acid-neutral, humus content is within normal limits, being beneficial for growing organic vegetables.

6. Chemical characteristics of soil values(Nt%, P_{AL}ppm, K_{AL} ppm, SB me, T me, V %), species grown in organic vegetable field are higher polytunnels than open field.

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RESEARCH REGARDING THE POSSIBILITY OF STAGGERING THE GREEN ONION PRODUCTION ON THE ENTIRE YEAR PERIOD

CERCETĂRI PRIVIND POSIBILITATEA EŞALONĂRII PRODUCȚIEI DE CEAPĂ VERDE PE ÎNTREAGA PERIOADĂ A ANULUI

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Abstract. *The paper presents the results of the experiments made with the purpose of staggering the green onion production for the entire year by varying the species assortment belonging to this type. The following species have been used for the experiments: common onion (Allium cepa), winter onion (Allium fistulosum), echelon onion (Allium ascalonicum), onion for cutting (Allium schoenoprasum). In order to set up the experiments, bulbs, seedling and seeds have been used, being sowed both in field and protected areas in different time periods. This way, there have been achieved a production of green onion throughout the year.*

Key words: onion, cultivar, phasing

Rezumat. *Lucrarea prezintă rezultatele experimentelor efectuate cu scopul eşalonării producției de ceapă verde pe întreaga perioadă a anului prin diversificarea sortimentului de specii aparținând genului Allium şi prin înființarea culturilor în epoci diferite. Pentru experimente, au fost folosite speciile: ceapa comuna (Allium cepa), ceapa de iarnă (Allium fistulosum), ceapa eşalotă (Allium ascalonicum), ceapa de tuns (Allium schoenoprasum). Pentru înființarea experiențelor au fost folosiți bulbili, răsad şi sămânță, semănându-se în câmp şi în spații protejate în perioade diferite, reuşindu-se astfel obținerea de ceapă verde pe întreaga perioadă a anului.*

Cuvinte cheie: ceapa, cultivar, esalonare

INTRODUCTION

The fresh vegetable consumption is increasingly greater, being one of the parameter that proves the level of development and evolution of the concept regarding the rational dieting and its diversification. An increasingly accent is put upon the diversification of the assortment which should allow a phasing on a period as long as possible a year. As far as the onion in concerned, one of the most important vegetables, the bulbs are mainly consumed, but also the false stem and the leaves, when they are green, containing the greatest quantity of vitamins from the B group (Brewster J.L.,1994). The onion bulbs are obtained only in the field (Malcica P., 1986, Popandron N., 2003, Popandron N., 2007), while the green onion is obtained both in the field and in protected spaces, this being done is order to achieve a phasing during the entire year period, if possible (Radoi V.,1995, Popandron N.,2009). Many experiments have been made in order to phase the green

onion production, being used as biological material: seeds, bulbs, bulbils, seedlings. It has been obtained a conveer over the entire year period.

MATERIAL AND METHOD

The experiments have been carried out in the field and in protected spaces (solar and greenhouse).

In order to produce green onion during the cold period of the year, the following species have been cultivated in protected spaces: *Allium fistulosum* (winter onion – through seedling), *Allium fistulosum* (onion for binding produced directly from seed), *Allium cepa* (bulbils with width bigger than 22 cm.). For the experiments in the field the following species have been used: *Allium cepa* (the early hybrid Musica F1 and the variety Swift with passing through winter, bulbils from the Androna variety and seedling from the Briliant variety), *Allium fistulosum* (the Parade variety directly seeded), *Allium ascalonicum* (scallion bulbs form Ambition F1 hybrid) and *Allium schoenoprasum* (onion for cropping – local population).

The experimented variants have been added in three foundation schemes and three densities. The three foundation schemes have been as follows: 5 rows of bedding distanced at 20 cm, 4 rows of bedding distanced at 25 cm and 3 rows of bedding distanced at 33 cm, and the distance between the plants on the bedding has been of 3 cm, being obtained densities of: 1 million pl./ha, 1,25 million pl./ha and 1,5 million pl./ha. All the sustenance works have been performed, observations and biometrical determinations have been carried out during the vegetation period, the green onion production (t/ha) has been determined for all the variants.

RESULTS AND DISCUSSIONS

The effects regarding the green onion production obtained in protected spaces are described in table1.

Table 1

The green onion production obtained in protected spaces

Nr. crt.	Technology	Density	Density	Density
		1 mill.pl./ha	1,25 mill.pl./ha	1,5 mill.pl./ha
1	Winter onion- seedling	33,00	37,50	39,00
2	Onion for binding	25,00	28,75	31,50
3	Common onion- bulbils	30,00	38,75	42,00

As regarding the culture obtained from *Allium fistulosum* (winter onion), by means of seedling, the biggest production (39,0 t/ha) has been obtained at the highest density (1,5 mil/ha). The culture obtained in this way, being phased within October – November period, was cropped within December – February period. For the variant when the culture has come into being by dissemination directly in protected spaces the *Allium fistulosum* being used (Parade variety), dissemination phased at 30 days time distance, beginning with August and finishing with the late November, was obtained a staggering of production for the time period of the last decade of October – April. The plants are of good quality, have a dark green color, but they don't form bulbs. The third variant was established by the culture

set up with by the bulbils belonging to Androna variety (with its diameter bigger than 22 mm). The culture was set up at intervals in autumn beginning with the second part of September, until the end of the second decade of November. It was obtained a staggering of the onion production within December period and the first decade of February (for the culture coming into being in September - October) and within March – April period (for the culture coming into being in October – November). The best production (42,0 t/ha) has been obtained at the density of 1,5 mill. pl./ha. The phasing of the obtained production in protected spaces is described in fig. 1.

Month decade Technology	I			II			III			IV			V			VI		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Winter onion																		
Onion for binding																		
Common onion																		
Month decade Technology	VII			VIII			IX			X			XI			XII		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Winter onion																		
Onion for binding																		
Common onion																		

Seeding/ Planting Topping

Fig. 1. The phasing of the green onion production in protected spaces

Analyzing the production data, it is recorded that at all the studied varieties, the production is growing according to the density. The cultures set up in autumn with the purpose of obtaining green onion in the cold period during the winter time, in certain periods with energy consumption, also being necessary the heating up of the protected spaces, had results.

As a result to the experiments carried out in the field (table 2) with the purpose of staggering the green onion production for a period of time as long as possible, a production from March to November can be obtained (figure 2).

If the production obtained in protected spaces are added, a conveer on the entire year period is obtained. The biggest green onion production obtained in the field have been at the variants where the cultures come into being directly with the early hybrid Musica F1 (57,0 t/ha at the density of l1,5 mill. pl./ha) and with the Swift variety (52,5 t/ha – seeded in autumn, the density of 1,5 mill.pl./ha).

Good production has been obtained at the variants where seeding has been used from the Briliant variety (38,10 t/ha), scallion from the Androna variety (30,0 t/ha) and bulbs of echelon onion from the Ambition F1 hybrid (28,5 t/ha).

Table 2

Green onion production obtained in the field

Nr. crt.	Culture system	Production t/ha		
		1 mill.pl./ha	1.25 mill. pl./ha	1,5 mill.pl./ha
1	Onion from bulbils	20,0o	25,00	30,00
2	Onion from seed with passing through winter	35,00	43,75	52,50
3	Onion from seed – very early hybrid	38,00	47,00	57,00
4	Onion from seedling	25,40	31,75	38,10
5	Onion for cutting	15,00	20,00	25,00
6	Onion for binding from seed	17,00	21,25	25,50
7	Onion from bulbs – echelon	19,00	23,75	28,50

In order to provide the consumers with green onion in July – September period, onion for biding has been obtained from seed (Parade variety) and green onion from a local population belonging to *Allium schoenoprasum* variety (onion for cutting). The phasing of the obtained production in the field is described in fig. 2.

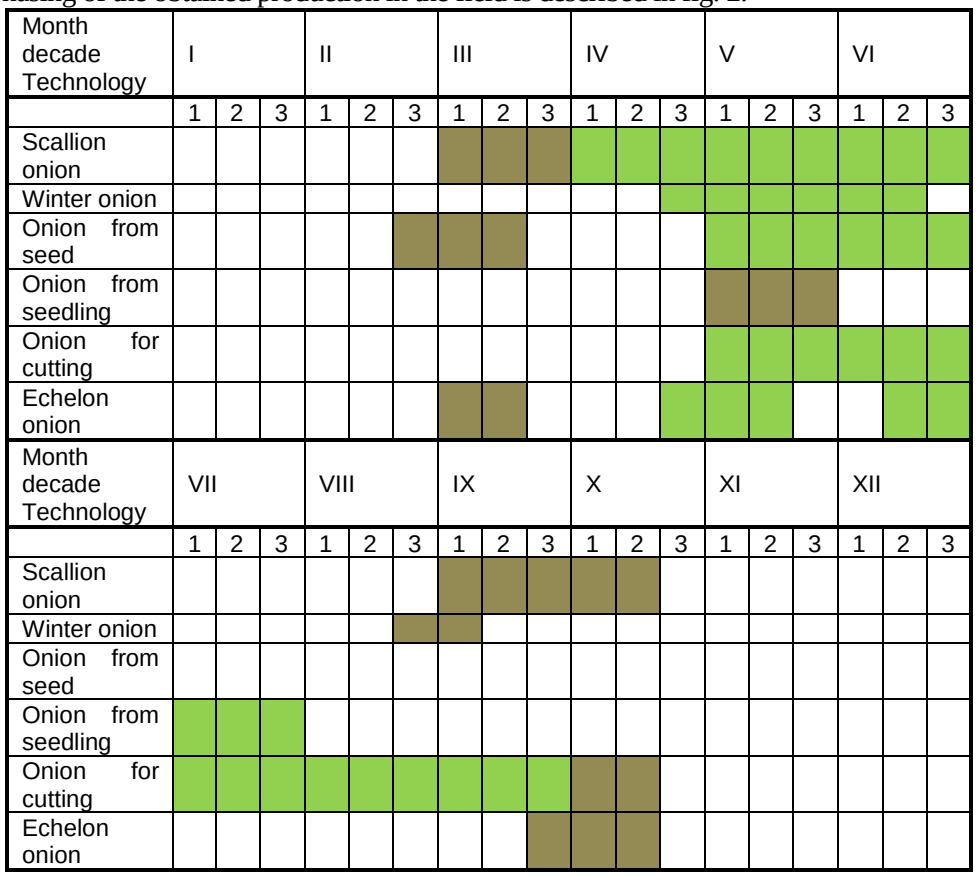

Fig. 2. The staggering of the green onion production in the field

The green onion production obtained in protected spaces and in the field are presented in the fig. 3 and 4.

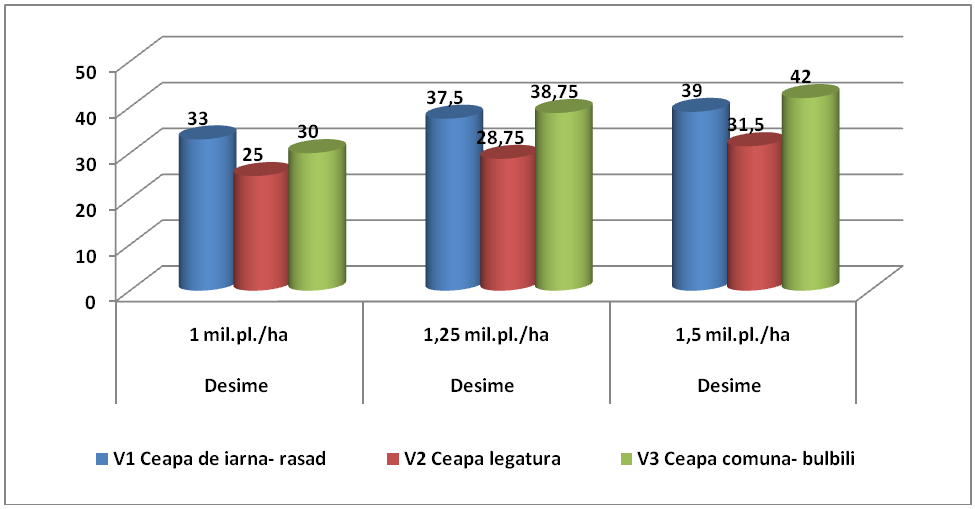

Fig. 3. The green onion production obtained in protected spaces according to the applied technology

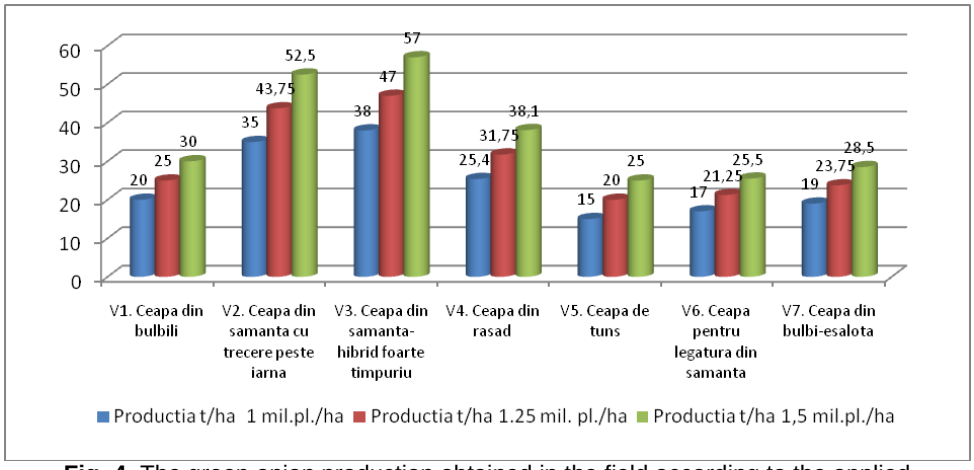

Fig. 4. The green onion production obtained in the field according to the applied technology

CONCLUSIONS

1. By testing the three technologies of obtaining green onion in protected spaces and seven technologies of obtaining green onion in the field, it has been obtained a production staggering for the entire year period.

2. In protected spaces, the best production has been obtained from bulbils (Androna variety) at the highest density (1,5 mill.pl./ha).

3. In the field a green onion production phasing on a eight month period (March - October) was a success, the biggest production being obtained by the

variants that came into being by seeding directly in the field in the spring (the beginning of March – the very early hybrid Musica F1) and in autumn (in August – September period, Swift variety).

4. For obtaining green onion in the warmest period of the year (July - September) onion for cutting (*Allium schoenoprasum*) and onion for binding (*Allium fistulosum* – Parade variety) have been used.

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ASPECTS REGARDING THE BEHAVIOR OF SOME SPECIES FROM THE *SOLANACEAE* FAMILY TO THE ULTRASOUND TREATMENT

ASPECTE PRIVIND COMPORTAREA UNOR SPECII DIN FAMILIA *SOLANACEAE* LA TRATAMENTUL CU ULTRASUNETE

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Abstract. *The paper presents the results of a study referring to the behavior of the Lycopersicon esculentum Mill. (Kristin variety) and Solanum melongena L. (Daniela variety) species to the ultrasound treatment. The results obtained emphasize specific values of the analyzed indicators (the percentage of germinated seeds, the water and dry substance content of the seedling, fresh weight of the seedling, the length of vegetative organs of the seedling) according to the species and the experimental conditions. In both analyzed species, the percentage of germinated seeds progressively increases during the analyzed period; the germination is epigeous. At the end of the experiment (at 22 day) on constate: a high degree of hydration of the seedlings in all the experimental variants; high values of the length of vegetative organs at variants with a short exposure time of ultrasounds.*

Key words: *Lycopersicon esculentum* Mill., *Solanum melongena* L., morphometric and physiological indicators, ultrasounds.

Rezumat. *În lucrare se prezintă rezultatele unui studiu referitor la comportarea speciilor Lycopersicon esculentum Mill., soiul Kristin şi Solanum melongena L., soiul Daniela, la tratamentul cu ultrasunete. Rezultatele obţinute evidenţiază variaţii valorice specifice ale indicatorilor analizaţi (procentajul seminţelor germinate, conţinutul de apă şi de substanţă uscată a plantulelor, greutatea proaspătă şi lungimea organelor vegetative ale plantulelor) funcţie de specie şi de condiţiile experimentale. La ambele specii analizate, procentajul seminţelor germinate creşte progresiv pe parcursul perioadei analizate; germinaţia este epigee. La finalul experimentului (la 22 zile) se constată: un grad mare de hidratare a plantulelor la toate variantele experimentale; valori ridicate ale lungimii organelor vegetative la variantele cu timp de expunere mic la ultrasunete.*

Cuvinte cheie: *Lycopersicon esculentum* Mill., *Solanum melongena* L., indicatori morfometrici şi fiziologici, ultrasunete.

INTRODUCTION

Ultrasounds differentiate from the sounds through their high frequency (over 16 kHz) and the enormous quantity of energy that they effuse in the propagation media. For these reasons, they have a large utility, being used in

physics, chemistry, biology, medicine, agriculture, industry etc. (Dimitriu Elena, Nicolau P., Teodoru V., 1990) .

The researches carried out by a series of authors (Albu E., Auslander D., Veress Eva, 1969; Albu Elena, Veress Eva, Auslander D., 1968; Albu Elena, Auslander D., Fodor M., Veress Eva,1968; Dăbală I., Auslander D.,1970; Dimitriu Elena, Nicolau P., Teodoru V., 1990) have emphasized the stimulating effect of ultrasounds on the germination, growth and development of plants and on the vegetal production as well. Albu and collab. (1968) have discovered the fact that the ultrasonic irradiation of tomato seeds, Seelandia variety favorably influence the germinative faculty and energy, the growth and development of plants, the production and increases the resistance of plants to the attack of cryptogenic diseases. In addition, the experiences carried out by us with the seeds of *Pastinaca sativa* and S*pinacia oleracea* have emphasized a stimulating effect of ultrasounds on the respiration intensity and the activity of some oxidoreductases (Stratu Anişoara, Olteanu Zenovia, Peptanariu M., Zamfirache Maria – Magdalena, 2005; Stratu Anişoara, Olteanu Zenovia, Peptanariu M., Murariu Alexandrina, 2009).

Based on these considerations, we proposed to test the effect of the ultrasound treatment on the tomatoes (*Lycopersicom esculentum* Mill.) and eggplants (S*olanum melongena* L.) seeds.

MATERIALS AND METHODS

As a biological material, we used seeds of tomatoes (Kristin variety) and eggplants (Daniela variety) extracted from the crop of 2008, acquired from S. C. Unisem Iaşi. The Kristin variety is semi-early, recommended for industrialization and consume in fresh state. It distinguishes itself through a great capacity of production, the strong red color of fruit and the high content of dry substance (www.recolta.eu/).

Daniela variety is semi-early, recommended for the harvest in the field and in the solar. They have vigorous plants, with high waist and present a productive potential of 38-43 t/ha (www.gazetadeagricultura.info).

The seeds of the two species were subjected to the action of an ultrasonic field, with the frequency of 48 and 36 kHz, electrical power of 60 and 30 V.A., at time intervals of 1, 2, 4 minutes. For ultrasounding the seeds we used two ultrasound beats which distinguish themselves through the frequency and electrical power properties. After the ultrasounding, the seeds were inserted into water for drenching, for 24 hours in laboratory conditions. Afterwards, the seeds were placed in pots with soil that present the following characteristics: pH comprised between 5.5 – 6.5; water content of 60 - 70 %, azote - 410 ppm, phosphorus – 192 ppm, potassium 1350 ppm. For each variant, we used 20 seeds. For each tested species we achieved five experimental variants: a control variant and four treatment variants – where the seeds were tested with ultrasounds (table 1).

We analyzed the following indicators : the percentage of germinated seeds (we considered it equivalent with the percentage of seedlings emergence); the water and dry substance content of seedlings (Boldor O., Trifu N., Raianu O. 1981), the fresh mass and the length of vegetative organs of seedlings at 22 days since the experiment beginning.

Table 1

The experimental variants

Experimental variants	Exposal time (minute)	Acoustic parameters	
		Frequency (kHz)	Electric power (W)
M		-	-
V1	1	48	60
V2	2	48	60
V3	2	36	30
V4	4	36	30

RESULTS AND DISCUSSIONS

The results obtained emphasize specific value variations of the analyzed indicators according to the species and the experimental conditions.

The germination of seeds. We notice the fact that the tomatoes seeds germinates easier in comparison with the eggplants ones. In both analyzed species, the germination is epigeous.

In tomatoes, four days after the experiments startup, the percentage of germinated seeds has values comprised between 50% - 80 % for the treatment variants and 90% for the control. Starting the 5th day for the variants V2, V3, V4, respectively the 6th for the variant V1 the percentage of germinated seeds remains constant until the end of the experiment. The maximum percentage (100%) is obtained at the V2 variant and the minimum one (60%) in the V1 variant (figure 1).

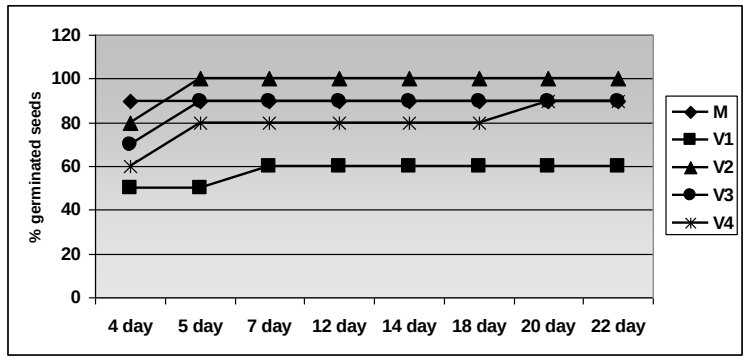

Fig.1. The percentaje of germinated seeds at tomatoes

In eggplants, 9 days since the experiment beginning, the percentage of seedlings emerged varies between 20 % (M, V1, V4) and 40 % (V2) (figure 2).

During the analyzed period, in all the experimental variants, the percentage of emerged seedlings progressively increased until the 18th day after which it remains at constant values until the end of the experiment, the maximum percentage is obtained in the V2 variant (90%) and the minimum one (50%) in the V4 variant. In comparison with the tomatoes, the eggplants have a lower germination percentage (80%).

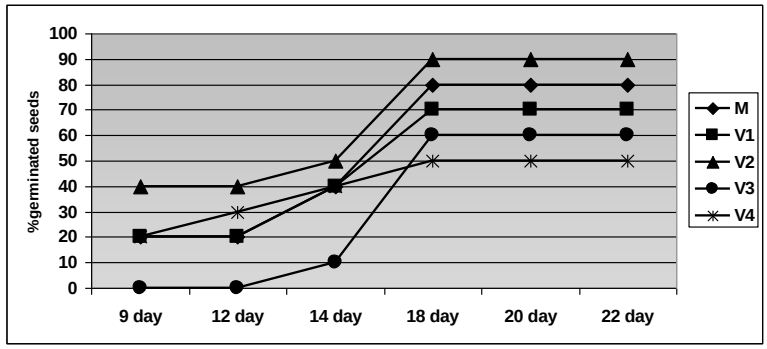

Fig. 2. The percentaje of germinated seeds at eggplants

The **water content** varies between 95.02 g % and 95.13 g % in tomatoes and 96.13 g % and 97 g % in eggplants. We discover very small value variations between the control and the treatment variants. We notice the fact that the seedlings have a higher degree of hydration at 22 days after the experiment startup (figure 3). The dry substance content has low values, comprised between 4.87 g % and 4.98 g% in tomatoes and between 3.0 g % and 3.87 g % in eggplants.

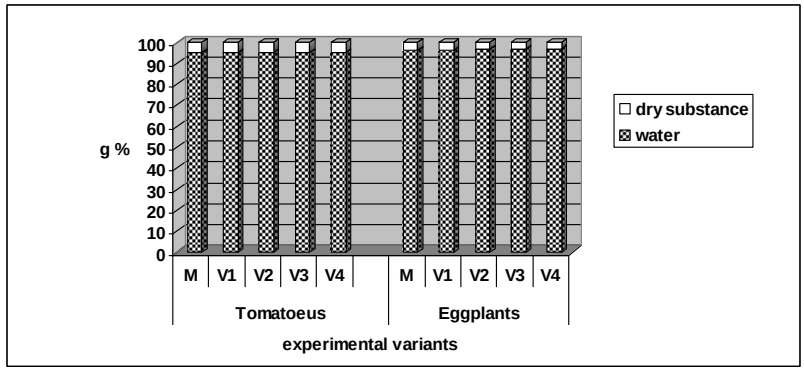

Fig. 3. The water and dry substance content of seedlings at tomatoes / eggplants

The seedlings from the two test species are distinguished through some morphological and morphometric characteristics. In tomatoes the surface of aerial organs is covered with hairs, the leaves are odd-pinnate. The root is pivoting. The epicotyl is developed. In the control the length of seedlings /of vegetative organs and the fresh mass of seedlings, have intermediary values compared to those registered in the control variants. The length of the hypocotyl is bigger than the roots (figure 4; 5).

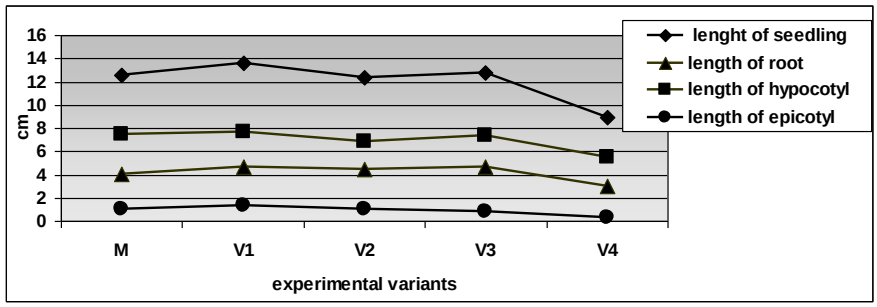

Fig. 4. The length of vegetative organs of seedlings at tomatoes

In eggplants, the seedlings are hairy, the leaves are ovate-lanceolate. The epicotyl is little developed. The root is pivoting. The average length of the hypocotyl is smaller than the one of the root with the exception of the variant V4 (figure 5, 6). We notice the fact that the ultrasound treatment with the frequency of 48 kHz, exposal time of 1 minute and 36 kHz, exposal time 2 minutes has a tendency of stimulating the seedlings growth in both analyzed species.

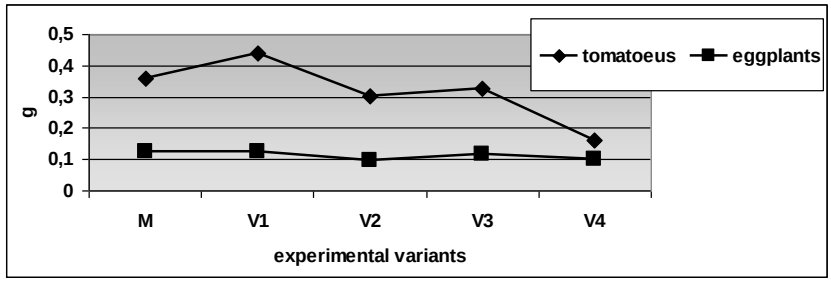

Fig. 5. The fresh mass of seedlings at tomatoes / eggplants

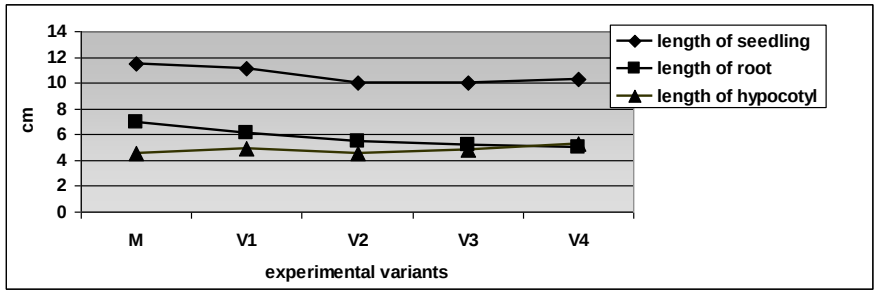

Fig. 6. The length of vegetative organs of seedlings at eggplants

CONCLUSIONS

The ultrasounds with the frequency of 48 kHz, exposal time 2 minutes, stimulate germination of seeds in both analyzed species. The short-time exposal to ultrasounds favorably influences the growth of seedlings in the two test species.

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EVALUATION OF AGROBIOLOGICAL POTENTIAL OF PLUM SELECTIONS IN ORDER TO IMPROVE NATIONAL ASSORTMENT

EVALUAREA POTENŢIALULUI AGROBIOLOGIC AL UNOR SELECŢII DE PRUN ÎN VEDEREA ÎMBUNĂTĂŢIRII SORTIMENTULUI NAŢIONAL

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Abstract. *Genetic breeding of plum varieties is a basic concern of fruit research activity in Romania, given the importance of this species, which owns more than 40% of the total fruit production of the country. Taking into account that a permanent renewal of plum assortment is needed, aiming the consumers and farmers requirements, we proposed in this paper the study of 9 plum selections, regarding their phenology, yielding potential, fruit quality and susceptibility to Plum pox virus, in order to improve the actual plum assortment. The results show that, the HL 12/9 P selection has high productions, good fruit quality and tolerance to Plum Pox Virus and was registered at the State Institute for Variety Testing and Registration (ISTIS) to be named.*

Key words: plum, selections, evaluation.

Rezumat. *Ameliorarea genetică a soiurilor de prun este o preocupare de bază a cercetătorilor pomicultori din România, dată fiind importanţa acestei specii, care deţine peste 40% din producţia totală de fructe a ţării. Ţinând cont de faptul că se cere o înnoire permanentă a sortimentului de prun, în funcţie de cerinţele consumatorilor, precum şi ale producătorilor, în această lucrare ne-am propus studiul a nouă selecţii de prun din punct de vedere al parcurgerii fenofazelor de fructificare, potenţialului agroproductiv, calităţii fructelor şi susceptibilităţii la Plum Pox Virus în vederea completării sortimentului actual. În urma observaţiilor şi determinărilor efectuate în microcultura de concurs, din cadrul laboratorului de Genetică şi Ameliorare s-a evidenţiat selecţia HL 12/9 P prin producţii mari şi constante, fructe de calitate superioară şi toleranţă la Plum Pox Virus şi a fost înscrisă la Institutul de Stat pentru Testarea şi Înregistrarea Soiurilor în vederea omologării.*

Cuvinte cheie: prun, selecţii, evaluare.

INTRODUCTION

In Romania, the plum is the major fruit species owing to its high ecological adaptation expressed by the rusticity of the local and bred cultivars and by the various ways of fruit marketing (Cociu, 1997).

The local varieties used mainly in the distillation industry were predominantly but however valuable cultivars with mixed utilization such as 'Tuleu gras', 'Grase romanesti', 'Vinete romanesti' were also grown (Dragoi, 1999, 2000).

The higher market requirements imposed the modernization and improvement of the plum assortment by developing new autochtonous cultivars and introducing foreign cvs. with superior organoleptic features. Therefore, to reach such objectives, the breeding work was started in the 1950's and it is still going on.

In the long run of the plum genetic breeding, over 60 years, more than 2,000,000 flowers were pollinated resulting thousand hundreds of hybrids which thanks to their genetic variability allowed us to select new valuable genotypes for the commercial use. As a result, 37 newly bred autochtonous plum cultivars were registered. It can be still possible to select new genotypes with valuable traits having in view the large amount of biological material in the selection fields, microcrops and field trials (Butac, 2008).

Taking into account that a permanent renewal of the plum assortment is needed aiming at the consumers and farmers needs we have studied 9 plum selections with regard to their phenology, yielding potential, fruit quality and Plum Pox Virus susceptibility, in order to enrich the present assortment.

MATERIAL AND METHOD

The investigations were carried out during 2007 – 2009, involving the following 9 promising plum selections: H 12/9, H 5/40, H 3/15, H 8/13, H 5/44, H 67/28, H 2/73, H 9/11, H 17/77 versus the control, Anna Späth cv. All these selections are in the plum microfield trial within the Genetic and Breeding Lab. at Research Institute for Fruit Growing Pitesti. There are 6 year old trees grafted on wax cherry tree, 10 trees per selection, planted at 4 m spacing between rows and 2 m between trees along the row, trained as free palmette, and designed as linear blocks.

The blooming phenophases were assessed according to Fleckinger system (Fleckinger, 1960). Thus, in full blooming, it was recorded: blooming start – when the first flowers open; blooming end – when the petals had fallen from the last flowers; blooming length – days from the beginning till the end; blooming intensity – on a scale from 0 (none) to 5 (very plentiful). To be statistically measured the data of blooming release were turned in number of days from the first of February, the approximate date for deep dormancy end, to the blooming start (Drăgoi, 1996). There were regarded the following statistical points: average, amplitude, mean deviation and variation coefficient.

To determine the fruit production, the yield in kg per tree was recorded over the 3 year period and then the average was calculated.

The morphological and chemical features of fruit were assessed according to the mean samples of 25 fruit, each, as follows: fruit weight by weighing all fruit of a sample and then calculating the mean weight (g/fruit); the fruit dry weight was determined by means of the digital refractometer (Brix grades); the fruit and flesh colour was visually settled by means of some colour codes.

The results were statistically measured by the variance analysis (Botu, 1997).

The plum cultivars response to Plum Pox Virus was ranked on the scale (after Genres 61 Project; EPDB descriptors), as follows: 1 – resistant; 2 – very slightly susceptible; 3 – slightly susceptible; 5 – intermediate; 7 – susceptible; 8 – very susceptible; 9 – extremely susceptible.

RESULTS AND DISCUSSIONS

The „blooming start" phenophase has yearly the same evolution regardless the climatic conditions at the beginning of growing season, being a genetic trait which is not connected to the ripening season. Even if the blooming period was earlier or later, the blooming order of the studied selections was the same, all of them showing the same changes. Thus, the earliest blooming selection was H 12/9 and the latest ones were H 3/15 and H 17/77 – all these blooming at the same time with the control cultivar, Anna Späth (table 1).

The average date of blooming start in case of the 9 selections (Maracineni area – table 2) was April 11, almost normally for this area which is mid April. In 2008, following rather high temperatures in February and March, it was recorded an earlier blooming, early April (2 – 9). The variation of blooming date was low, the standard deviation being 1.47 and the variation coefficient had also low values ranging between 1.36% (2009) and 3.22% (2008) proving that this phenophase is homogenously for all the studied selections. On average, the earliest blooming period during 2007 – 2009 in Maracineni area was on April 2, 2008 and the latest on April, 15, 2007 and 2009, having an amplitude of 13 days meteorologically determined while the average amplitude (2007 – 2009) related to varieties was only 4.67 days (table 2). The blooming length of these selections was 7 – 8 days (table 1). Over the investigation period, the blooming intensity was high, the selections getting 4 and 5 grades, namely plentiful and very plentiful (table 1).

Table 1

The phonological stages studied at Pitesti, Maracineni (2007 – 2009)

No.	Genotype	Blooming start (date)			Blooming end (date)			Blooming length average	Blooming intensity (note)
		2007	2008	2009	2007	2008	2009		
1	H 12/9	11.04	2.04	12.04	20.04	10.04	20.04	8	5
2	H 5/40	13.04	5.04	13.04	21.04	11.04	21.04	7	4
3	H 3/15	15.04	9.04	14.04	22.04	15.04	23.04	7	5
4	H 8/13	15.04	8.04	14.04	22.04	13.04	22.04	7	4
5	H 5/44	13.04	5.04	14.04	21.04	11.04	23.04	7	5
6	H 67/28	13.04	5.04	14.04	22.04	11.04	23.04	8	5
7	H 2/73	14.04	6.04	15.04	22.04	12.04	23.04	7	5
8	H 9/11	14.04	6.04	15.04	21.04	12.04	23.04	7	4
9	H 17/77	15.04	8.04	15.04	22.04	13.04	23.04	7	4
10	Anna Späth - Control	15.04	8.04	15.04	22.04	13.04	23.04	7	3

Table 2

Statistical indexes regarding „blooming start" phenophase for the plum selections studied (2007 – 2009)

Years/Statistical value	2007	2008	2009	Average (2007 – 2009)
Arithmetic average				
As days	72.8	65.2	73.1	70.37
As dates	14.04	6.04	14.04	11.04
Minimum (the earliest blooming value)				
As days	70	61	71	67.34
As dates	11.04	2.04	12.04	8.04
Maximum (the latest blooming value)				
As days	74	68	74	72.00
As dates	15.04	9.04	15.04	13.04
Amplitude between the minimum and maximum (days)	4	7	3	4,67
Variation coefficient (%)	1.80	3.22	1.36	2.13
Standard deviation	1.31	2.10	0.99	1.47

Regarding the fruit ripening season, one can see that all the studied hybrids were earlier than Anna Späth control, the fruit ripening 21 -44 days earlier. Thus the earliest selections were: H 67/28, H 8/13 and H 12/9 (table 3).

The 10 genotypes under study showed that under the some climatic conditions, the average yield varied from one selection to another and only 3 of the 9 selections were more productive than Anna Späth control, namely: H 12/9, H 9/11 and H 3/15 (9.87 kg/tree; 9.50 kg/tree and 8.40 kg/tree versus 8.00 kg/tree with Anna Späth, the yield differences being statistically unmeasured (table 3).

Table 3

Ripening season and fruit yield of the studied selections (Pitesti, Maracineni; 6 years old trees; 2007-2009)

No.	Genotype	Ripening time	Difference compared to control (days)	Fruit yield (kg/tree)*	Difference compared to control *
1	H 12/9	1.08	-33	9.87	+1.87
2	H 5/40	8.08	-25	5.73	-2.27
3	H 3/15	8.08	-25	8.40	+0.40
4	H 8/13	23.07	-41	2.18	-5.82
5	H 5/44	12.08	-21	3.50	-4.50
6	H 67/28	20.07	-44	5.34	-2.66
7	H 2/73	30.07	-34	6.00	-2.00
8	H 9/11	25.07	-39	9.50	+1.50
9	H 17/77	5.08	-28	3.44	-4.56
10	Anna Späth (Control)	2.09	-	8.00	-

* 5% LSD = 6.737 kg/tree; 1% LSD = 9.155 kg/tree; 0.1% LSD = 12.410 kg/tree.

The mean fruit weight of these genotypes varied from 38.13 g (H 5/44) to 60.60 g (H 17/77). Among the hybrids studied have noted the following: H 17/77 (60.60 g), H 2/73 (59.40 g) and H 12/9 (58.73 g), between these hybrids and control exist very significant differences. Soluble dry weight content varied from 13.5% (H 5/40) to 23.3% (H 5/44), most selections present a higher content than controls (table 4).

Table 4

Fruit weight and soluble dry weight of the studied selections (Pitesti, Maracineni; average 2007 - 2009)

No.	Genotype	Fruit weight (g)	Soluble dry weight (%)
1	H 12/9	58.73 **	16.4
2	H 5/40	52.87 *	13.5 ^{o}
3	H 3/15	38.50	15.2
4	H 8/13	43.04	16.2
5	H 5/44	38.13	23.3 ***
6	H 67/28	54.50 *	18.9 **
7	H 2/73	59.40 **	17.6 **
8	H 9/11	41.27	14.7
9	H 17/77	60.60 ***	15.6
10	Anna Späth (Control)	43.17	15.2

Fruit weight: 5% LSD = 9.081 g; 1% LSD = 12.340 g; 0.1% LSD = 16.729 g.
Soluble dry weight: 5% LSD = 1.706 %; 1% LSD = 2.319 %; 0.1% LSD = 3.143 %.

We had in view the major fruit physical characteristics such as: shape, skin and flesh colour, stone adherence. Regarding the fruit shape of these genotypes they showed various shapes like: ovoid, spherical, ellipsoidal. The skin colour varied from reddish (H 5/40) to blue with the most of genotypes meeting the consumers preferences. The flesh of the most genotypes was yellow coloured and free stone (table 5).

Table 5

Major fruit physical features of the studied selections (Pitesti, Maracineni)

No.	Genotype	Fruit shape	Fruit colour	Flesh colour	Stone adherence
1	H 12/9	Ovoid	Dark blue	Yellowish	Free stone
2	H 5/40	Spherical	Reddish	Yellowish	Free stone
3	H 3/15	Ellipsoidal	Blue	Greenish	Free stone
4	H 8/13	Ovoid	Reddish blue	Yellowish	Free stone
5	H 5/44	Spherical	Light blue	Yellowish	Clingstone
6	H 67/28	Ovoid	Dark blue	Yellowish	Semi clingstone
7	H 2/73	Ovoid	Dark blue	Yellowish	Free stone
8	H 9/11	Ellipsoidal	Blue	Whitish	Free stone
9	H 17/77	Ovoid	Blue	Yellowish	Free stone
10	Anna Späth-Control	Spherical	Reddish	Verzuie	Free stone

The genotypes response to Plum Pox Virus is mainly related by their heredity but it may also be influenced into a certain extent by the cultural management of the orchard. Comparing the response of these selections to PPV attack, one can see that only one (H 3/15) showed a more severe attack versus the control (5 – mid attack), the other ones being slightly damaged or at all. As regards the fruit damage, these genotypes showed no symptoms (table 6).

Table 6

Selections response to Plum Pox Virus (Pitesti, Maracineni)

No.	Genotype	Response to PPV	
		Damage on leaves	Damage on fruit
1	H 12/9	1	1
2	H 5/40	1	1
3	H 3/15	5	1
4	H 8/13	1	1
5	H 5/44	1	1
6	H 67/28	2	1
7	H 2/73	3	1
8	H 9/11	3	1
9	H 17/77	3	1
10	Anna Späth (Control)	3	1

Note: 1 – resistant; 2 – very slightly susceptible; 3 – slightly susceptible; 5 – intermediate; 7 – susceptible; 8 – very susceptible; 9 – extremely susceptible.

CONCLUSIONS

1. H 12/9 selection came off by its high yield, large qualitative fruit and PPV tolerance; it is proposed for registration at the State Institute for Variety Testing and Registration.

2. The other selections will be utilized as genitors in the further breeding work, as follows: H 3/15 – for high productivity; H 67/28, H 8/13, H 9/11 – for earliness; H 5/40, H 67/28, H 2/73 – for the fruit size; H 5/40, H 8/13, H 5/44 – for PPV tolerance.

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STUDY ON PROPAGATING TECHNOLOGY FOR SOUR AND SWEET CHERRY VARIETIES IN AREA RADUCANENI IASI

STUDIU PRIVIND TEHNOLOGIA PRODUCERII MATERIALULUI SĂDITOR LA CIREŞ ŞI VIŞIN, IN ZONA RADUCANENI IASI

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Abstract: *The production of horticultural planting material is a very profitable industry and market opening to competition, has as result the appearance of a complete range conveyer. Since the material provided until recently have the first destination establishment of intensive orchards or super intensive is appreciated that some producers began to refer also to the market share, so far ignored, represented by the gardens of the population. Grafting trees on seedling rootstock's will lead to an increase in the number of trees sold and thus in the next few years, an increasing amount of fruit to be marketed in peasant markets. For reasons mentioned above we have allowed a limited study of commercial planting offered by some private companies, benefiting in this respect by the material support of SC Vinifruct-Copou, Raducaneni Nursery.*
Key words: private nursery, planting material, seedling rootstock.

Rezumat: *Producerea materialului săditor pomicol este un segment horticol deosebit de profitabil, iar decahiderea pietei libere a avut ca efect aparitia unui conveer diversificat. Daca pana acum materialul de plantat avea ca primă destinatie înfiițarea de livezi intensive şi superintensive, este de apreciat ca o parte din producători au inceput să se adreseze segmentului, pana acum ignoarat, reprezentat de gradinile populației. Altoirea pomilor pe portaltoi franc va conduce la cresterea numarului de pomi valorificati şi de asemenea, la creşterea cantității de fructe ce va fi valorificată pe piață.*
Cuvinte cheie: pepinere private, material de plantat, portaltoi franc

INTRODUCTION

Production of fruit-growing seedlings in Romania is not limited by law only to state, in recent years, besides nurseries research stations converted former company, there are other licensed nurseries, especially on the production profile and less decorative material fruit-growing as an adaptation to current market requirements

The latter, however occupy small areas, and some traders dealing permitted only seed and planting material (especially ornamental) imported.

Given the fluctuating demand and planting new orchards more than amateurs trade system, but does not provide an increase significant quantity of fruit-growing seedlings in the coming years.

MATERIAL AND METHOD

The material studied is made up of two cherry varieties namely Schattenmorelle, Crişana 2 grafted on mahaleb and two varieties of cherry: Stella, Van grafted on cherry rootstock.

The aim is to research and develop technology for improving a functional way to define parameters in fields I and II of the school of trees in Iasi County - Raducaneni district.

Intended purpose was achieved by studying the trees STAS biometric indicators aiming at: The diameter of the graft area and over the graft area, in the area of first ramification, tree height,the length of annual growth; the number of buds on trees, root length and main pivot.

RESULTS AND DISCUSSIONS

A. Biometric data regarding on sour cherry

Analysing Table 1 can be seen as the sour cherry species, lower density of trees has resulted in a more pronounced compared with other graft rod variables considered in the study. To witness, the variety Schattenmorelle separately recorded significant positive difference density of 0.21 m at 58 800 plants / ha. Variety Crisana 2 recorded a significant negative difference from the control (mean) of -0.23 m.

In table 2 on tree diameter in the grafting point it appears that both varieties, lower density resulted in a graft diameter in the engrafting point about variety Crisana 2 40.9 mm, respectively 34.61 mm in Schattenmorelle variety.

The same phenomenon continues along the entire graft yards so that tests carried out at 25 cm from the grafting point values recorded was 17.63 mm Crisana 2 variety and 16.89 mm to variety Schattenmorelle. In the area of first ramification (about 70 cm from the point of grafting), extreme values ranged from 11.15 mm for the density of 87,700 plants / ha and 13.16 mm for the density of 58,800 plants / ha in variety Schattenmorelle.

Regarding the average length of annual growth can be seen that the lower density of both species resulted in the formation of annual growth and more vigorous variety Schattenmorelle namely 68 cm and 60 cm Crisana 2 variety and higher density resulted decrease of this indicator (table 3)

Studying the total number of buds per tree is highlighted that the variety Crisana 2 presents a number of 96-97 pcs / tree, and variety Schattenmorelle a number of 135-137 pieces / tree. From the control values recorded very significant variety Schattenmorelle positive difference +19 - 21 pieces and the variety it ranks Crişana2 negative significant differences -19 - 20 pcs.

To obtain concludent results on behaviour in nursery seedlings were analysed Raducaneni aspects about rootstock biometric system on the tree.

Studying pivot length can be seen that mahaleb rootstock had the greatest length of this indicator for grafting the variety Crisana 2 and at Schattenmorelle variety values obtained were low.

Table 1

Biometrical data on sour cherry varieties growth

Variants	Seeding density (plants/ha)	Scion high (cm)	Signification	Difference to the control (m)	Grafting success percentage (%)
Crisana2/ *Prunus mahaleb*	58800	152.10	XX	0.05	83
	87700	124.03	OOO	-0.23	90
Schattenmorelle / *Prunus mahaleb*	58800	168.02	XXX	0.21	84
	87700	144.12	O	-0.03	91
Average (Control)		147.20			

DL 5 %= 0.34 m DL 1%= 0.52 m DL0,1%=0.82 m

Table 3

Biometrical data on sour cherry varieties growth

Variants	Seeding density (plants/ha)	Annual growth length (cm)	Signif.	Diff. to control (cm)	Total number of buds per tree (pcs.)	Signif.	Diff. to control (pcs.)
Crisana2/ *Prunus mahaleb*	87700	48.75	O	-6.37	96	O	-20
	58800	60	X	4.88	97	O	-19
Schattenmorelle /*Prunus mahaleb*	87700	43.75	OO	-11.37	135	XX	19
	58800	68	XXX	12.88	137	XX	21
Average (Control)		55.12			116		

DL 5 %= 4.82 cm DL 5 %= 2.49 pieces
DL 1%= 7.23 cm DL 1%= 3.78 pieces
DL 0.1%= 11.61 cm DL 0.1%= 6.07 pieces

The total length of roots was 425 cm between the density of 87,700 plants/ha and 445 cm at lower density in variety Schattenmorelle and respectively 166 cm in density higher than 225 cm if the density of 58,800 plants / ha in variety Crisana 2

B:Biometric data regarding on sweet cherry

Analysing table 7 can be seen as the cherry species, trees lower density resulted in higher growth of grafted rod compared with other variables considered in the study. To witness the variety Van recorded a significant positive difference of 0.19 meters separate the density of 58,800 plants / ha. Stella variety recorded a significant negative distinct difference from the control (average) of 0.20 m

In table 5 regarding on tree diameter in the grafting point can be seen that the density of smaller diameter resulted in the grafting point of about 33.92 mm Stella variety with a distinct difference from the control significant positive and 33.27mm in Van variety. Measured by tree diameter at 25 cm from the grafting point highlighted that higher densities of both species have produced a rod thickness by 16.62 mm at Stella variety and 14.27 mm for Van varieties. Lower densities were obtained distinct differences from control significant negative.

Table 2

Biometrical data on sour cherry varieties

Variety/ rootstock	Planting density (plants/ha)	Scion offshoot diameter at sour cherry varieties								
		Diameter in the grafting area (mm)	Signif.	Difference to the control	Diameter above the grafting area (mm)	Signif.	Difference to the control	Diameter in the area of first ramifications (mm)	Signif.	Difference to the control
Crisana2/*Prunus mahaleb*	**87700**	33.61	-	-1.59	16.73	-	0.13	11.38	-	-0.57
	58800	40.92	XXX	5.71	17.63	-	1.03	12.10	-	0.15
Schattenmorelle/*Prunus mahaleb*	**87700**	31.68	OO	-3.52	15.12	O	-1.48	11.15	-	-0.82
	58800	34.61	-	-0.59	16.89	-	0.29	13.16	X	1.21
Average (Control)		35.20			16.60			11.95		
		DL 5 %= 1.83 mm DL1%=2.73mm DL 0.1%=4.33 mm			DL 5 %= 1.01 mm DL1%=1.52mm DL 0.1%= 2.43 mm			DL 5 %= 1.02 mm DL1%= 1.54 mm DL 0.1%= 2.52 mm		

Table 5

Biometrical data on sweet cherry varieties

Variety/ rootstock	Planting density (plants/ha)	Scion offshoot diameter at sweet cherry varieties								
		Diameter in the grafting area (mm)	Signif.	Difference to the control	Diameter above the grafting area (mm)	Signif.	Difference to the control	Diameter in the area of first ramifications (mm)	Signif.	Difference to the control
***Stella*/Seedling sweet cherry**	**87700**	29,48	OO	-3,46	16,62	OOO	-0,35	7,36	OOO	-2,81
	58800	38,92	XXX	5,98	19,66	XXX	2,69	13,26	XXX	3,09
***Van*/ Seedling sweet cherry**	**87700**	30,11	O	-2,83	14,27	OOO	-2,7	9,32	OO	-0,85
	58800	33,27	-	0,33	17,34	XXX	0,37	10,76	X	0,59
Average (Control)		32,94			16,97			10,17		
		DL 5 %= 2.01mm DL 5 %= 0.11 mm DL 5 %= 0.53 mm			DL 1%= 3.21 mm DL 1%= 0.12 mm DL 1%= 0.74 mm			DL 0.1%= 4.93 mm DL 0.1%= 0.23 mm DL 0.1%= 1.13 mm		

Table 4

Biometrical data on sour cherry varieties growth

Variants	Seeding density (plants/ha)	Pivot length (cm)	Signif.	Difference to control (cm)	Main roots length (cm)	Signif.	Difference to control (cm)
Crisana2 / *Prunus mahaleb*	87700	27	OO	-6.67	166	OOO	-144
	58800	30	-	-3.76	205	OOO	-105
Schattenmorelle / *Prunus mahaleb*	87700	37	XX	3.24	425	XXX	115
	58800	41	XXX	7.24	445	XXX	135
Average (Control)		33.76			310		

DL 5 %= 1.14 cm
DL 1%= 1.73 cm
DL 0.1%= 2.78 cm

DL 5 %= 19.8 cm
DL 1%= 29.6 cm
DL 0.1%= 47.5 cm

Table 6

Biometrical data on sweet cherry varieties growth

Variants	Seeding density (plants/ha)	Scion high (cm)	Significati on	Diff. to control (m)	Grafting success percentage (%)
***Stellal* PF.Pietroase negre**	58800	179,15	-	0,03	58
	87700	156,09	OOO	-0,2	64
***Van* / PF.Pietroase negre**	58800	195,22	XXX	0,19	59
	87700	174,14	O	-0,02	65
Average (Control)		176,00			

DL 5 %= 0,12 m DL 1%= 0,16 m DL0,1%=0,21m

The diameter in the area of first ramification (about 70 cm from the point of grafting), extreme values ranged from 13.26 mm for the density of 58,800 plants / ha and 7.36 mm for the density of 87,700 plants / ha was obtained for variety Stella. Variety Van recorded intermediate values between those obtained by variety Stella.

Table 7

Biometrical data on sweet cherry varieties growth

Variants	Seeding density (plants/ ha)	Annual growth length (cm)	Signif.	Difference to control (cm)	Total number of buds per tree (pcs.)	Signif.	Difference to control (pcs.)
***Stella*/ Cireş franc**	87700	45,5	-	-0,53	44	OOO	-35
	58800	50,3	XXX	4	96	XX	17
***Van* / Cireş franc**	87700	42	OO	-4,03	76	-	-3
	58800	46,3	-	0,27	101	XX	22
Average (Control)		46,39			79		

DL 5 %= 1,72 cm
DL 1%= 2,64 cm
DL 0,1%= 4,25 cm

DL 5 %= 10,21 buc
DL 1%= 15,54 buc
DL 0,1%= 24,92 buc

Regarding the average length of annual increases can be seen that the lower density of both species resulted in the formation of annual growth more vigorous that is 50.3 cm at Stella.

Studying the total number of buds per tree to show that Stella has a number of varieties from 44 to 96 pcs. / tree and in Van variety 76-101 pieces / tree. Stella variety recorded values very positive with significant differences.

Studying pivot length (table 9) can be seen that cherry rootstock recorded longest of this indicator for the variety Van with grafting density of 58,800 plants / ha, and when Stella variety appreciation of the lowest density was obtained at 87 700 plants / ha (31 cm)(table 8).

Table 8

Biometrical data on sour cherry varieties growth

Variants	Seeding density (plants/ha)	Pivot length (cm)	Signif.	Difference to the control (cm)	Main roots length (cm)	Signif.	Difference to control (cm)
***Stella*/ Cireş franc**	87700	31	O	-3,48	272	-	26,70
	58800	35	XX	0,52	295	XX	49,71
***Van* / Cireş franc**	87700	34	-	-0,48	177	OO	-68,31
	58800	38	XX	3,52	237	-	-8,32
Average (Control)		34,48			245,3		
		DL 5 %= 1,22 cm DL 1%= 1,84 cm DL 0,1%= 2,96 cm					DL 5 %= 31,92 cm DL 1%= 48,37 cm DL 0,1%= 77,65 cm

CONCLUSIONS

1. Using high density, the percentage of bud grafting was caught in higher, due to lower growth vigour of seedlings that meet the technical conditions optimal for grafting as described in the literature.

2 Quality technical conditions of grafted trees (1 year) revealed that trees obtained are fit in the limits of quality seedlings for cherries fruit-growing species.

3. Research on graft and rootstock in nursery Raducaneni revealed that between symbiont are influences still from the early stages.

4. The analysis results can be concluded that in the nursery, varieties described as being more vigorous like Stella and Crisana 2 shows a less vigour in growth.

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BEHAVIOUR OF SOME SOUR CHERRY IN THE CONDITIONS OF NORTH-EAST REGION OF ROMANIA (I)

COMPORTAMENTUL UNOR SOIURI DE VIŞIN ÎN CONDIŢIILE DN NORD-ESTUL ROMÂNIEI (I)

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Abstract: *Sour cherry, a species always present in public gardens and orchards, has undergone continuous improvements both in technological aspects and varieties assortment. While today sour cherry culture in Europe knows a new "breath", especially by increasing the number of plants per unit surface in conjunction with obtaining rootstocks and varieties of low vigor, existing plantations can be "subject to" detailed studies to better understand the secrets of the specie. This paper comes with new information regarding at biology and fenology of some sour cherry cultivars cultivated in echo-pedo-climatic conditions from North East of Romania.*

Key words: sour cherry, cultivar, trunk cross section area, vigour

Rezumat. *Specia vişin, prezentă pretutindeni în grădinile populaţiei, şi în livezi a fost subiectul unor studii continui atât din punct de vedere al tehnologiei cât şi al îmbunătăţirii sortimentului de soiuri. În timp ce, în zilele noastre, cultura vişinului cunoaşte în Europa o "renaştere" în special prin creşterea numărului de plante pe unitatea de suprafaţă, concomitent cu obţinerea de portaltoi şi soiuri de vigoare redusă, există plantaţii care pot fi "supuse" unor studii amănunţite în scopul unei mai bune înţelegeri a "secretelor" acestei specii. Această lucrare vine cu noi informaţii referitoare la biologia si fenologia unor soiuri de vişin cultivate în condiţiile pedoclimatice din Nord-Estul României.*

Cuvinte cheie: vişin, soi, secţiune transversală a trunchiului, vigoare

INTRODUCTION

This paper aims to investigate the possibilities to quantify the influence of environmental conditions from the North-East region of the country and also anthropogenic upon sour cherry growth and development processes and to contribute to changing some technological links in order to obtain higher yields.

Worldwide trend of fruit consumption facilitates, geographical area where we are, new structural dimensions, determined mainly by the emergence of private property holdings, resize the plantations in the favorability area, experience and professional tradition.

In the current economic and social situation, sour cherry crop earns extra attention from private producers, sour cherry as fruit growing species being considered as "rustic" specie using better the areas and land unsuitable for other crops.

MATERIAL AND METHOD

To specify the behavior of some varieties of sour cherry, stationary study method was used, which refers to learning through phenological observations of tree growth and development. Biometric measurements were conducted which were interpreted according to the specific conditions of the research area.

The biological material studied included 10 existing varieties in a 28 years old plantation inside the former Farm no. 8 of SCDP Iasi. There were studied four foreign cherry varieties (Northstar, Oblacinska, Schattenmorelle, Engleze timpurii) and six Romanian varieties (Ilva, Nana, Pitic de Iasi, Scuturator, Crisana 2, Mocanesti 16) exist in the current assortment.The varieties are grafted on mahaleb rootstock and planted according to their vigor:

- planting distances: 5 m between rows and 4 m between trees on the row (500 trees/ha) for the following varieties: Scuturator, Engleze timpurii, Crisana2, Mocanesti 16, pyramidal crown shape.

- planting distances: 4 m between rows and 2 m between trees on the row (1250 trees/ha) for the following varieties: Northstar, Oblacinska, Ilva, Nana, Schattenmorelle, Pitic de Iasi, crown shape: slender spindle. Promoting the valuable varieties, well adapted to climate and soil conditions is a measure of the utmost importance to fruit growing. Research objectives were focused on the influence of the variety upon the tree vigor, aiming to: fructification organs phenology, tree height, average crown diameter, trunk cross-section area (SSTT), crown volume (V), and average length of annual growth. Experimental data were statistical processed using analysis of variance, the degree of significance between variants being played with the difference limit (DL), particularly in case of experimental variants settlement in randomized blocs (Saulescu NA, Saulescu NN, 1967, Jităreanu G., 1994).

RESULTS AND DISCUSSIONS

Fructification organs stages are specific for each biology species and the starting date and duration are related to the climatic condition of each year (tab 1.).

Table 1

Fructification stages date in climatic conditions of 2009 in Iaşi

Phenology / Variety	Fructification stages						
	The beginning of flower buds swelling	The start of bud openin g	The start of blossomi ng	Full floweri ng	The end of blossomi ng	The start of ripening	Harvest maturity
Northstar	27.03-11.04	15.04-23.04	20.04-2.05	25.04-6.05	30.04-11.05	6.07-17.07	26.07-29.07
Oblacinska	28.03-12.04	13.04-24.04	19.04-1.05	24.04-4.05	28.04-8.05	24.06-30.06	5.07-10.07
Nana	28.03-11.04	14.04-23.04	19.04-1.05	24.04-5.05	29.04-9.05	29.06-30.06	8.07-15.07
Ilva	28.03-11.04	15.04-24.04	20.04-2.05	24.04-6.05	29.04-10.05	5.07-7.07	14.07-26.07
Schattenmorelle	27.03-13.04	17.04-22.04	20.04-2.05	25.04-7.05	30.04-12.05	1.07-15.07	21.07-30.07
Pitic de Iasi	28.03-13.04	18.04-27.04	24.04-3.05	29.04-8.05	30.04-13.05	12.07-21.07	27.07-1.08
Scuturator	27.03-12.04	15.04-24.04	19.04-1.05	24.04-.5.05	28.04-.9.05	30.06-5.07	7.07-8.07

Engleze timpur	28.03-13.04	11.04-26.04	18.04-28.04	23.04-2.05	29.04-8.05	5.06-7.06	13.06-14.06
Crisana 2	26.03-11.04	16.04-23.04	19.04-30.04	24.04-5.05	30.04-10.05	27.06-1.07	8.07-19.07
Mocanesti 16	26.03-12.04	16.04-22.04	19.04-29.04	24.04-4.05	30.04-9.05	18.06-20.06	26.06-10.07

The start of flowering at studied sour cherry varieties occurred in 2009 between 18.IV and 3.V and the end of flowering between 28.IV and 13. V. Average data on flowering ongoing in 2009 in Iasi region occurred between 23.IV and 8.V. Flowering duration was between 6-12 days for 2009.

Number of days from the end of flowering to harvest maturity was between 40-50 days in sour cherry varieties with early ripening (Engleze timpurii), 50-60 days at varieties with medium ripening (Scuturator, Mocanesti 16, Crisana 2) and more than 60 days in late ripening varieties (Schattenmorelle, Ilva, Pitic de Iaşi).

Table 2

Trees average high in 28th year after planting at studied sour cherry varieties

Nr crt	VARIETY	Trees average high in 2009(m)	% to the control	Difference to the control (m)	Significat ion
Planting distances: 4 x 2 m					
1	Northstar	3.30	126.92	0.7	XXX
2	Oblacinska	2.85	107.69	0.2	X
3	Ilva	3.06	119.23	0.5	XXX
4	Nana	2.12	80.77	-0.5	OOO
5	Schattenmorelle	2.23	84.62	-0.4	OOO
6	Pitic de Iasi	1.99	76.92	-0.6	OOO
	Average (x)	2.59	100	0.0	-
DL 5% = 0.1		DL 1% = 0.2		DL 0.1% = 0.4 m	
Planting distances: 5 x 4 m					
7	Scuturător	3.95	95.24	-0.2	OO
8	Engleze timpurii	4.17	98.34	-0.1	-
9	Crisana 2	4.32	102.38	0.1	-
10	Mocanesti 16	4.55	107.14	0.3	XXX
	Average (x)	4.24	100	0.0	-
DL.5% = 0.1		DL 1% = 0.2		DL 0.1% = 0.3 m	

In the conditions of Iasi area, sour cherry fruits maturation begins generally in the second decade in June with the varieties: Engleze timpurii and ends in late July and early August with Pitic de Iaşi variety. Staggering fruit harvest of studied sour cherry varieties and hybrids provides a 40 days varietal conveyer.

Sour cherry varieties with small vigor, planted at 4 x 2 m distance, registered the highest values of tree height in year 28 after planting, at Northstar (3.30 m) and Ilva (3.06 m) varieties. There were statistically highly significant positive differences to the average variety. In case of varieties with medium-high vigor, planted at 5 x 4m distance, the highest value of this indicator was obtained from Mocanesti *16* variety (4.55 m). Scuturator variety (3.95 m) registered negative distinct significant differences to the control (the average) (table 3).

Trunk cross section area in 28th year after planting at sour cherry varieties under study, showed values between 69.19 cm^2 (Nana), and 150.46 cm^2 (Oblacinska)

when planting distances were 4 x 2 m. In case of 5 x 4 m planting at distances the trunk cross section area was between 227,79 cm^2 (Scuturator) and 281,03 cm^2 (Engleze timpurii) (table 4.). Besides height, crown diameter is an important indicator because the space between trees should be used judiciously, the crowns must occupy the space between trees per row, avoiding crown interpenetration, and the interval between the rows to allow performing the mechanical work.

Table 3

Trunk cross section area in 28th year after planting at studied sour cherry varieties

Nr crt	VARIETY	Trunk cross section area in 2009 (cm^2)	% to the control	Difference to the control (cm^2)	Signific ation
Planting: 4 x 2 m					
1	**Northstar**	138.97	128.23	30.6	XXX
2	**Oblacinska**	150.46	138.84	42.1	XXX
3	**Ilva**	122.87	113.38	14.5	XXX
4	**Nana**	69.19	63.84	-39.2	OOO
5	**Schattenmorelle**	94.59	87.27	-13.8	OOO
6	**Pitic de Iasi**	74.52	68.73	-33.9	OOO
	Average (x)	108.43	100	0.0	-
DL 5% = 1.8		DL 1% = 2.5		DL 0.1% = 3.7 cm²	
Planting distances: 5 x 4 m					
7	**Scuturător**	227.79	85.80	-37.7	OOO
8	**Engleze timpurii**	281.03	105.84	15.5	XXX
9	**Crisana 2**	277.53	104.52	12.0	XXX
10	**Mocanesti 16**	275.67	103.84	10.2	XXX
	Average (x)	265.50	100	0.0	-
DL 5% = 3.1		DL 1% = 4.7		DL 0.1% = 7.5 cm²	

Table 4

Trees crown average diameter in 28th year after planting at studied sour cherry varieties

Nr crt	VARIETY	Crown average diameter in 2009 (m)	% to the control	Difference to the control (m)	Significa tion
Planting distances: 4 x 2 m					
1	Northstar	3.01	125.00	0.6	XXX
2	Oblacinska	2.47	104.17	0.1	X
3	Ilva	2.96	125.00	0.6	XXX
4	Nana	2.03	83.33	-0.4	OOO
5	Schattenmorelle	2.34	95.83	-0.1	O
6	Pitic de Iasi	1.55	66.67	-0.8	OOO
	Average (x)	2.40	100	0.0	-
DL 5% = 0.1		DL 1% = 0.2		DL 0.1% = 0.4 m	
Planting distances: 5 x 4 m					
7	Scuturător	4.45	91.84	-0.4	OO
8	Engleze timpurii	4.43	89.80	-0.5	OO
9	Crisana 2	5.20	106.12	0.3	X
10	Mocanesti 16	5.70	116.33	0.8	XXX
	Average (x)	4.90	100	0.0	-
DL 5% = 0.2		DL 1% = 0.3		DL 0.1% = 0.6 m	

Extreme values of this index were between 1.55 m at Pitic de Iasi variety and 3.01 at Northstar variety for 4 x 2 m planting distances. Vigorous variety had an average diameter between 4.43 m at *Engleze timpurii* variety, respectively 5.70 m Mocanesti 16 variety, statistically recording positive very significant differences to the control (table 4).

Knowing the biological peculiarities of sour cherry varieties, allows a differential approach of culture technologies in terms of: green area, trees vigor and fructification type, crown shape and planting distances. Data on crown volume at studied sour cherry varieties were followed, while the maintenance and fructification pruning, intended to limit height and crown width expansion.

Table 5 presents data on tree crown volume in 28th year after planting at 10 sour cherry varieties. The largest crown volume, in case of small-medium vigor varieties, was obtained from Northstar variety (27.56 m³/tree) and the lowest crown volume was recorded at Pitic de Iasi variety (4.72 m³/tree).

Table 5

Crown trees volume in 28th year after planting at studied sour cherry varieties

Nr crt	VARIETY	Crown trees volume in 2009 (m³)	% to the control	Difference to the control (m³)	Signification
Planting distances: 4 x 2 m					
1	Northstar	27.56	180.39	12.3	XXX
2	Oblacinska	16.03	104.58	0.7	-
3	Ilva	24.80	162.09	9.5	XX
4	Nana	7.56	49.67	-7.7	OO
5	Schattenmorelle	11.25	73.86	-4.0	-
6	Pitic de Iasi	4.72	30.72	-10.6	OOO
	Average (x)	15.30	100	0.0	-
DL 5% = 4.8		DL 1% = 6.8		DL 0.1% = 9.8 m³	
Planting distances: 5 x 4 m					
7	Scuturător	60.87	64.04	-34.2	OOO
8	Engleze timpurii	75.45	79.39	-19.6	OOO
9	Crisana 2	107.70	113.25	12.6	XXX
10	Mocanesti 16	136.29	143.32	41.2	XXX
	Average (x)	95.10	100	0.0	-
DL 5% = 2.0		DL 1% = 3.0		DL 0.1% = 4.7 m³	

Between varieties with medium-high vigor, the largest crown volume was recorded at *Mocanesti 16* variety (136.29 m³/tree) and the lowest value was recorded at *Scuturator* variety (60.87 m³/tree).

The average length of annual growth was between 6.8 cm at *Oblacinska* variety with negative very significant difference to the control and 11.1 cm at *Pitic de Iasi* variety with a positive significant difference compared to the varieties average. Varieties planted at 5 x 4m distances, average length of annual growth was 9.75 cm at *Engleze timpurii* variety and 19.26 cm at *Mocanesti 16* variety (table 6).

Table 6

Average length of annual growth in 28th year after planting at studied sour cherry varieties

Nr crt	VARIETY	Average length of annual growth in 2009 (cm)	% to the control	Difference to the control (cm)	Signification
Planting distances: 4 x 2 m					
1	Northstar	7.46	78.12	-2.1	OOO
2	Oblacinska	6.8	70.83	-2.8	OOO
3	Ilva	9.7	101.04	0.1	-
4	Nana	11.4	118.75	1.8	XX
5	Schattenmorelle	11.14	115.63	1.5	XX
6	Pitic de Iasi	11.1	115.63	1.5	XX
	Average (x)	9.60	100	0.0	-
DL 5% = 1.0		DL 1% = 1.4		DL 0.1% = 2.1 cm	
Planting distances: 5 x 4 m					
7	Scuturător	11.08	81.02	-2.6	-
8	Engleze timpurii	9.75	71.53	-3.9	-
9	Crisana 2	14.6	106.57	0.9	-
10	Mocanesti 16	19.26	140.88	5.6	X
	Average (x)	13.7	100	0.0	-
DL 5% = 4.0		DL 1% = 6.1		DL 0.1% = 9.8 cm	

CONCLUSIONS

1. Analyzing trees growth vigour in the orchard, expressed by trunk section area, sour cherry varieties can be grouped in three categories of vigour: **high**, (trunk section area over 200 cm^2) Scuturator, Engleze timpurii, Crisana 2 and Mocanesti 16., **medium** vigour (with trunk section area between 100 -200 cm^2) Northstar, Ilva, Oblacinska, and **small** vigour (with trunk section area between 50-100 cm^2) Nana, Schattenmorelle, Pitic de Iasi.

2. Trees crown vigour is very much influenced by crown shape and it's correlated with fructification type, planting distances and agro-techniques applied.

3. Fructification organs development shows significant differences between varieties. Varieties order of fruit maturation it's always the same with the difference that the time interval between two successive varieties varied as climate conditions are more or less favorable for fruits ripening.

4. Ensuring proper planting distances according to varieties vigour varieties as recommended assortment includes both varieties with high and small vigour.

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ANALYSIS OF SOME MORPHO-PHYSIOLOGICAL FOLIAR INDICATORS OF BLACK CURRANT (*RIBES NIGRUM* L.*)* IN PEDOCLIMATICS CONDITIONS FROM NORTHEASTERN ROMANIA

ANALIZA UNOR INDICATORI MORFO-FIZIOLOGI FOLIARI AI COACĂZULUI NEGRU (*RIBES NIGRUM* L.*)* ÎN CONDIȚIILE PEDOCLIMATICE DIN NORD ESTUL ROMÂNIEI

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Abstract: *Precipitation and high summer temperatures are limiting factors of the currant crop in northeastern Romania. Knowledge of these stress factors influence is important in identifying resistant or tolerant varieties. Objective of the present research was to study the physiological and morphological response of four varieties of the species Ribes nigrum L. in ecological conditions in this area, in three culture technologies: with drip irrigation, soil amendment with hydrophilic polymers and natural conditions. Were determined: leaf area (cm^2), stomata number, relative water content (RWC,%).*

Key words: blackcurrant, leaf area, relative water content, stomata density.

Rezumat: *Nivelului precipitațiilor şi temperaturile ridicate din timpul verii sunt factori limitativi ai culturii coacăzului în NE-ul României. Cunoaşterea influenței acestor factori de stress este importantă în identificarea soiurilor rezistente sau tolerante. Obiectivul cercetărilor de față a fost studierea răspunsul fiziologic şi morfologic a patru soiuri ale speciei Ribes nigrum L. la condițiile ecologice din acest areal, în trei tehnologii de cultură: cu irigare prin picurare, cu amendarea solului cu polimeri hidrofili şi în condiții naturale. S-au determinat: suprafața foliară (cm^2) numărul de stomate/mm^2, conținutul relativ de apă (RWC, %).*

Cuvinte cheie: coacăz negru, suprafața foliară, conținutul relativ de apă (RCW %), densitatea stomatică.

INTRODUCTION

Major abiotic stress factors for the culture of black currant in the north-east of Romania is the level of rainfall and the high summer temperatures. The water content of plants is important in plants protection against drought and frost damage, and to regulate physiological processes (Westwood, 1993).

Water stress may result in plant organs (roots, stems, leaves and fruits) a series of reactions aimed at adapting to an unfavorable environment. So the leaves may change as the number of stoma and leaf area. Stomata are epidermis formations with important rol in the physiological processes (photosynthesis and transpiration), in

plant adaptation and productivity of plants (Brownlee, 2001). It was estimated that 99% of root absorbed water is lost through in leaves transpiration (Muruvvet Ilgin and Semih Caglar, 2009). Stomatelor density variation in response to changes of precipitation and drought was observed by several researchers (Lecoeur *et al.* 1995, Zhao *et al.,* 2001, Galme's *et al*., 2007, Yang *et al*., 2007). Moreover, several studies have shown that water scarcity has led to increased density stomatelor (Yang and Wang, 2001) and to decrease their size (Quarrie and Jones, 1977, Spence *et al.,* 1986). In contrast to these findings, Greenwood *et al.* (2003) noted that the stomatal indices of *Neolitsea dealbata* leaf (Lauraceae) in tropical forests is not sensitive to changes in climatic factors (precipitation or temperature).

In drought conditions there is a limit CO_2 şi O_2 exchange in leaves, a change the relationship between chlorophyll and carotenoid pigments (Anjum *et al.,* 2003, Faroq *et al.,* 2009). It is known that photosynthetic rate decreases with decreasing hydric potential of leaves (Lawlor and Cornic, 2002), but not yet shown, if this effect is due to close main stomata or metabolic deficiency. However it is accepted that water stress is decisive factor for the reduction of photosynthesis (Faroq *et al.,* 2009).

Differences between genotypes about morpho-physiological behavior in drought conditions were observed in a number of species (Bota and Medrano, 2001), but not black currant varieties. Therefore, the objective of this study was to examine the morpho-physiological response (stomatal density, leaf area and relative water content) of four varieties of black currant (Deea, Ronix, Abanos, Tsema,) to identify the best genotype response at existing culture conditions.

MATERIAL AND METHOD

Biological material: four black currant varieties, Deea, Ronix, Abanos, Tsema, from orchard of fruit bushes of the Horticultural Department of University of Agricultural Sciences and Veterinary Medicine Iassy in August 2009; in each decade were harvested ten leaves from the top, middle and botom of the bushes. August was chosen because the leaves have the maximum area and the level of precipitation recorded in the vegetation period.

In this study we used three types of culture technology, two of which were intended to reduce water stress in the soil for bushes. The first technology was in natural ecological conditions (A), the second option - with drip irrigation (B), and the third involved the soil with synthetic polymers (Aquasorb). The last method has sought better use of rain water.

This study aims to determine the variation of leaf parameters (leaf water status, stomata number, average leaf area) for to set the differences that arise between four blackcurrant varieties of adaptability of plants in stress climatic condition.

Leaf area: was used gravimetric method, the results are expressed in square centimeters.

Stomata density: For stomata counting was used the method of Schehter *et al.*, 1992. Number of stomata was observed for 5 microscope slides with 3 repetitions for each leaf sample by using a light microscope with a 40x and 10 magnification.

The obtained values were calculated as stomata numbers per mm^2.

Leaves water status: Relative water content (RWC) was calculeted with following equation: (FW-DW)/(SW–DW)×100, where FW is the leaf fresh weight, DW the dry weight of leaves after drying at 105 C for 8 hours, and SW is the turgid weight of leaves after being soaked in water for 4h at room temperature, approximately 20 C (Gonzalez and

Gonzales, 2001). For water content and dry weight in leaves there was used gravimetric method, by drying the probes in the drying stove at 105°C for 24 hours.

Statistical analysis: In this study using the averages and standard errors for all data. For to establish the correlation between morpho - physiological parameters we used to analyze linear regression.

RESULTS AND DISCUSSIONS

Enviroment condition

Black currant is a „moisture-loving" species that gives good results in areas with higher annual average rainfall of 700 mm (Mihalca *et al.,* 1981). Climatic conditions of North Eastern Romania is characterized by insufficient rainfall to the requirements of black currant, as in Iassy area is approx. 300-400 mm precipitation during vegetation period, compared to 500-600 mm as necessary (figure 1). Uneven distribution of the annual amount of precipitation, loss of water from precipitation through surface runoff or low capacity for holding its ground, requires finding ways to solve water shortage in the soil.

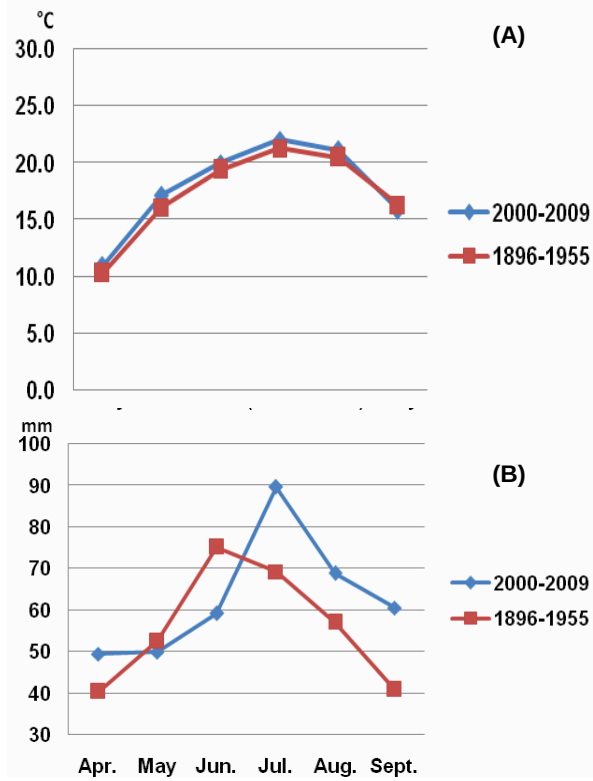

Fig. 1 Monthly average temperature (°C)(A) and the monthly total rainfall (mm/month) (B) in Iassy- Romania

Leaf morpfo-phsiological response

Stoma number per unit area can be considered a form of adaptation of genotypes to environmental conditions. It is demonstrated that the stomatal density (per/mm^2) at walnut varieties increases with altitude (Caglar *et al.*, 2004), but at the apricot in dry regions this structural parameter decreased (Olmez *et al.,* 2006).

In our researches we found a variation in stomatal density between varieties (table 1). The highest number of stoma (359.1 / mm^2, respectively 358.3 / mm^2) was found in Abanos var. and Ronix var.. Lowest stomatal density per unit leaf area was recorded in non-irrigated crops, approximately 230/mm^2.

Table 1

Leaf area, stomatal density and relativ water content of black currant genotypes

Blackcurrant genotype/ culture tehnology		Leaf area averages and standart errors (cm^2) $\overline{X} \pm S_{\overline{x}}$	Stomata averages and standart errors of leaf (*per* mm^2) $\overline{X} \pm S_{\overline{x}}$	Relative water content (RWC %) $\overline{X} \pm S_{\overline{x}}$
Deea	irrigated	21.78 ± 0.2	272.6 ± 6.8	81.7 ± 0.86
	unirrigated	7.40 ± 0.1	230.4 ± 6.7	87.4 ± 0.81
	with Aquasorb	16.56 ± 0.2	251.2 ± 6.8	84 ± 0.76
Abanos	Irrigated	10.91 ± 0.3	306.3 ± 20.8	72.4 ± 0.57
	unirrigated	10.17 ± 0.15	245.5 ± 12.15	81.9 ± 0.5
	with Aquasorb	10.58 ± 0.2	359.1 ± 20.0	74.7 ± 0.49
Ronix	Irrigated	20.19 ± 0.4	305.0 ± 15.3	79.3 ± 0.63
	Unirrigated	17.25 ± 0.7	235.1 ± 18.9	87.9 ±0.21
	with Aquasorb	18.88 ± 1.1	358.3 ± 20.5	81.8 ± 0.56
Tsema	Irrigated	8.53 ± 0.8	328.6 ± 12.2	71.2 ± 0.32
	unirrigated	6.32 ± 0.55	234.4 ± 17.6	76.2 ± 0.6
	with Aquasorb	6.87 ± 0.2	313.3 ± 20.0	74.2 ±0.44

The analysis of data on average leaf area and stomatal density with simple linear regression shows that there is less of a 0.0118% chance that the cases be due to chance (Figure 2). It is well known important role of stomata in the process of photosynthesis (for gas and water exchange, and hence the assimilate production), but our results demonstrates that a surface large leaf does not involve a hight number of stoma per unit of leaf area of black currant varieties studied (r^2=0.0102).

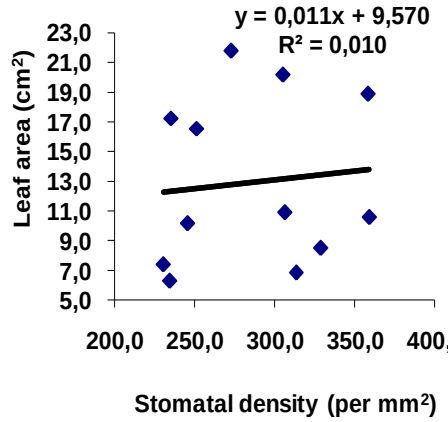

Fig. 2. Correlation of leaf area with stomatal density

Xul and Zhou, 2008, showed that moderate drought conditions inhibit the leaves growth and development, and the stomatal density increases, while severe drought leads to significant reductions in both leaf area and number of stoma. This fact, confirmed by other researchers (Ganzachian *et al.*, 2007) lead us to establish favorable technological variant for each variety. Irrigation culture of black currant ensure a superior leaf area compared with the other two types of culture technology. The results from the use of polymer Aquasorb allows us to say that it may be a

solution to reduce water shortage for Abanos var. and Ronix var., but not for Deea var., because the leaf area decrease and the number of stoma increase (251.2/mm^2 to 272.2 mm^2).

These findings may indicate the beginning of a moderate water stress. Tsema var. recorded a very low leaf area compared to other varieties studied in all technology variants analysed .

Relative water content (RCW) is a physiological indicator of plant water balance (Gonzalez and Gonzalez, 2001). Our results show no correlation between relative water content with stomatal density or with leaf area (fig. 3 and 4). These findings can be explained by the existence of different dimensions of stomata, or by the different thickness of leaves. But these issues will be a theme for future study.

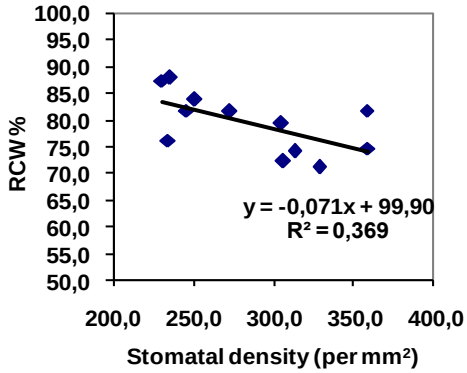

Fig. 3 Response of relativ water content content with the leaf area

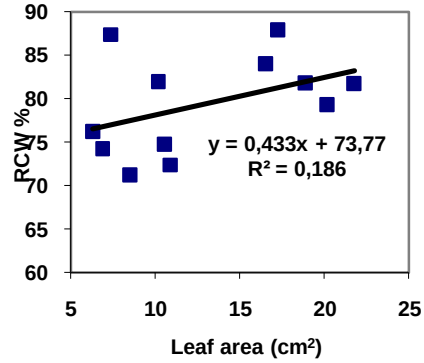

Fig. 4 Corelation of relativ water (RCW %) (RCW %) at stomatal density

CONCLUSIONS

Our study demonstrated the effects of insufficient hydric factor on some morpho-physiological foliar parameters (leaf area, stomatal density and relativ water content) for four black currant varieties (Deea, Abanos, Ronix, Tsema). Thus it is noted as a severe decrease in the number of stoma, relative water content and leaf area for plants unirrigated. The irrigation ensures at all four varieties, higher values of the parameters analyzed. The soil improved with Aquasorb can be a solution to improve the soil water reserve available to plants through a better use of water from precipitation.

Between the four black currant varieties studied, Tsema var. was recorded lower leaf area (over 50% less) in all three variants of cultivation analysis, which can reveal the poor adaptation to pedoclimatics conditions.

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CONTRIBUTIONS TO THE IMPROVEMENT OF THE ROUMANIAN PEAR VARIETIES IN THE PAST 10 YEARS

CONTRIBUŢII LA ÎMBUNĂTĂŢIREA SORTIMENTULUI DE PĂR DIN ROMÂNIA ÎN ULTIMII 10 ANI

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Abstract. *In Romania the pear genetic breeding program started in 1950 has been focused on obtaining varieties with a high yielding potential, top fruit quality, tolerance / resistance to the disease and specific pest, late ripening season and fruit good storage. Therefore, following the hybridizations carried on at the Research Institute for Fruit Growing Pitesti, Research Station for Fruit Growing Cluj and Research Station for Fruit Growing Voinesti, 13 new varieties with a wide range of ripening (from early June to late March-April) were developed. These cultivars are listed in the Romanian Official Catalogue of Varieties and Hybrids Crop Plants. This paper describes the particular characteristics of these varieties: Virgiliu hibernal, Jubileu 50, Milenium, Roşioară de Cluj, Arvena, Meda, Latina (at RSFG Cluj), Corina, Orizont, Tudor, Romcor (at RSFG Voinesti), Ervina, Paramis (at RIFG Pitesti).*
Key words: varieties, pear, characteristics

Rezumat. *Programul de ameliorare genetică a părului, început în România încă din anul 1950, şi-a orientat eforturile spre obţinerea de soiuri cu potenţial de producţie ridicat, calitate superioară a fructelor, toleranţă / rezistenţă la bolile şi dăunătorii specifici, maturare târzie şi capacitate bună de păstrare a fructelor. Prin lucrările de ameliorare efectuate la Institutul de Cercetare – Dezvoltare pentru Pomicultură Piteşti, Staţiunea de Cercetare – Dezvoltare pentru Pomicultură Cluj şi Staţiunea de Cercetare – Dezvoltare pentru Pomicultură Voineşti s-a realizat un conveer de soiuri cu maturarea fructelor de la foarte timpurie (începutul lunii iunie) până la foarte târzie (martie - aprilie), în ultimii 10 ani fiind înscrise în Catalogul Oficial al Plantelor de Cultură 13 noi soiuri. Lucrarea prezintă principalele caracteristici ale acestor soiuri: Virgiliu hibernal, Jubileu 50, Milenium, Roşioară de Cluj, Arvena, Meda, Latina (Cluj), Corina, Orizont, Tudor, Romcor (Voineşti), Ervina, Paramis (Piteşti).*
Cuvinte cheie: soiuri, păr, caracteristici

INTRODUCTION

The pear is a valuable and important fruit species owing to the productive characteristics of trees, fruit taste as well as their nourishing and therapeutic quality (Sestraş, 2004). In Romania, the studies of pear genetic breeding have a

long tradition, the first hybridizations being performed at the beginning of the 20th century (Cociu, 1992, 1999). The general objectives were similar to those worldwide with a major and continuous concern for improving the yielding potential of the varieties and increasing the fruit quality (Branişte, 2007; Budan, 2002). Starting with the 1960's, the research was focused on the development of varieties with genetic resistance to diseases like *Erwinia amylowora, Venturia pirina* and pests (*Psylla* sp.). The Romanian genetic breeding program knew a large advancement after 1968, following the breeding work carried out at the Research Stations Voineşti – Dâmboviţa by Gh. Moruju, R. Thiesz, N. Andreieş, Cluj – Napoca by M. Străulea, V. Ghidra and at Research Institute for Fruit Growing Piteşti by N. Braniţte (Andreieş, 1993).

This paper is a synthesis of the objectives and pear breeding work finalized by developing 30 new autochtonous cvs. of which 13 ones registered in the past 10 years, reaching a wide range marketing from very ripening cvs. (June) to very late ripening cvs. (March - April). (ISTIS Catalogue, 2009).

MATERIAL AND METHOD

The biological material involved in the hybridizations included a rich genetic fund: *Pyrus* species, autochtonous and foreign varieties, clonal selections, interspecific and intraspecific hybrids.

The fundamental method used to obtain a genetic variability necessary to selection and development of the new varieties was the cross pollination between the best available parents. Due to a strong heterosygoty of the most pear varieties following the controlled hybridization resulted a great number of new genic recombinations, which is phenotipically demonstrated as early as F1 generation. To improve the fruit quality, interspecific hybridizations were performed using very good genitors in the crossing like ‚the best" cv. with ,,the best" cv. Also, interspecific crosses between *P. communis* and nashi pears (*P. pyrifolia*) were done to combinate the flavour of the European pears with the firm and crispy flesh of the Asian pears. For resistance to *Venturia pirina* and *Psylla* sp. the interspecific hybridization method was used according to the scheme: valuable cv. x *Pyrus serotina,* followed by backcrossings until F4 progeny was obtained.

RESULTS AND DISCUSSIONS

To provide a great deal of breeding material with a high genetic diversity within the pear genetic breeding, cross pollinations were done as follows: 600,000 flowers at Research Station for Fruit Growing Voineşti, 250,000 flowers at Research Station for Fruit Growing Cluj and 300,000 at Research Institute for Fruit Growing Piteşti. Of the hybrid seeds resulted, thousands of hybrids were obtained of which new valuable genotypes were selected both for the commercial and breeding utilizations. To reach the objectives of the breeding program, there were used as gene resources, *Pyrus* species, autochtonous and foreign varieties listed in table 1.

Table 1

Gene sources used in the pear genetic breeding

No.	Breeding objective	Gene sources
1.	Resistance to *Erwinia amylowora*	● *P. communis* x *P. pyrifolia* (Bell, 1990) ● Magnes, Monterey, Moonglow, Orient, Tyson, Old Home, Farminngdale, Maxine, Waite, Le Conte (Van der Zwet, 1982; Quamne, 1982) ● Dawn, Harbin, Harrow Delight, Garber, Ba Li Hsiang, Chien Pa Li, Huang Sui Li, Hung Guar Li, Ta Tau Huang, Decana Krier, Galbene, Pere de iarna, Pere gutui, Tămâioase de Călineşti (Cociu et al., 1999) ● Mac (Bell et al., 1982; Braniste and Andreieş, 1990)
2.	Resistance to *Venturia pirina*	● *P. ussuriensis, P. pyrifolia, P. x bretschneideri* (Branişte and Rădulescu, 1994) ● Williams, Conference, Dr. Jules Guyot (Bell, 1990) ● Contesa de Paris, Decana de iulie, Timpurie de Trevaux, Triomphe de Vienne, Madame Levavaseur, Jeanne d'Arc, Notair Lepin, Starking Delicious, Republica, Euras, Argessis, Maria Romana (Branişte and Andreieş, 1990; Cociu et al., 1999)
3.	Resistance to *Micosphaerella sentina*	● Conference, Doyenne de Comice, Bonne Louise d'Avranche (Cociu et al., 1999)
4.	Resistance to *Psylla* sp.	● *P. betulaefolia, P. calleryana, P. fauriei, P. ussuriensis, P. x bretschneideri, P. nivalis, P. ussuriensis x P. communis, P. eleagrifolia x P. communis* (Bell, 1990) ● Honeysweet, Sierra, Tait Dropmore, Philip, John, Ure (Branişte and Andrieş, 1900) ● Krupna Bursusus, Zielinka, Karamanka, Jerisbasma, Vodenjac (Bell, 1992, 2003)
5.	Hardiness	● *P. communis, P. ussuriensis, P. pyrifolia* (Bell, 1990) ● David, John, Peter, Philip, Pioneer 3, Andrew, Thomas, Simon, Hanson Seedless, Harbin (Stushnoff and Garley, 1982)
6.	Tree low vigour and fruiting spurs	● *P. serotina x P. communis* (Cociu et al., 1999) ● Beurre Papa Lafosse, Beurre Rance, Girogile, Marguerite Marillat, Abundent, Packham's Triumph, Grand Champion, Berenthal, Beurre Hardenpont, Beurre Durondeau, Conference (Alston, 1982; Ardelean, 1986; Ghidra et al., 2001)
7.	Late bloowing	● *P. luxemburgiana* (Cociu et al., 1999) ● Frangipane, Double de Guerre, Jeanne d'Arc, Gorham, Doyenne du Comice, Favorita lui Clapp, Beurre Bosc, Napoca (Alston, 1982; Nyeki, 1982; Thibault, 1982; Cociu, 1999)
8.	High yield	● Santa Maria, Williams, Dr. Lucius, Cedrata romana, Cure, Napoca, Republica (Cociu et al., 1999)
9.	High content in vitamin C	● Alexandre Lucas, Thompson, President Drouard, Matya, Moonglow, Beurre Starckmans, Doyenne Goubolt (Branişte and Rădulescu, 1994; Cociu et al., 1999) ● Beurre precoce Morettini, Beurre Hardy, Bonne Louise d'Avranches, Haydeea (Sestraş et al., 2002)
10.	High content in sugar	● Triomphe de Jodoigne, President Carnot, Beurre d'Anjou, Bergamotte Esperen, Notair Lepin, Grand Champion (Branişte and Rădulescu, 1994; Cociu et al., 1999)

		● Doyenne d'Hiver, Contesa de Paris, Beurre Hardy, Haydeea, Williams, Beurre precoce Morettini (Sestraş et al., 2002)
11.	Nice fruit taste	● Highland, Beierschmidt, Delbarexquise d'hiver, Graslin, Napoca, Untoasa de Geoagiu, Argessis (Branişte and Rădulescu, 1994) ● Passe Crassane, Olivier de Serres, Josephine de Maline, Williams, Conference (Cociu et al., 1999)
12.	Good storage	● Păstrăvioare, Delbarexquise d'hiver, Pere de mai, Republica, Euras, Olivier de Serres (Cociu et al., 1999)

Presently, as a result of over 50 years of continous work there is an adequate material basis including a various germplasm fund in terms of the potential gene sources (350 accessions at Voineşti, Cluj and Piteşti), hundreds of hybrid plants in the selection fields as well as promising selections in the trial microfields. The successful results are obviously if we take into account the 30 new autochtonous varieties listed in the Romanian Official Catalogue of Varieties and Hybrids Crop Plants, of which 13 ones were registered in the past 10 years (table 2). Thanks to their valuable agronomic characteristics it worth to be mentioned the following varieties: Meda (fig. 1a.), Latina (fig. 1b.), Roşioară de Cluj (fig. 1c.), Arvena (fig. 1d.), Ervina (fig. 1e.), Corina (fig. 1f.).

Table 2

Pear varieties registered between 2000-2009

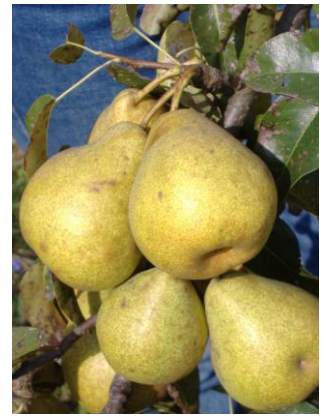
No.	Variety	Parents	Maintainer and registration year	Major characteristics
0	**1**	**2**	**3**	**4**
1	Arvena	Triomphe de Vienne (p.n.)	SCDP Cluj 2007	- autumn cv. - high yield
2.	Corina	Interspecific hybrid F3	SCDP Voineşti 2003	- tolerant to *Psylla* sp. and *Erwinia amylowora*
3.	Ervina	Interspecific hybrid F2	ICDP Piteşti 2003	- late blooming - good storage capacity
4.	Jubileu 50	Napoca x Beurre precoce Morettini	SCDP Cluj 2003	- special taste quality
5.	Latina	Cj 20-4-3 X Comtesse de Paris	SCDP Cluj 2009	- autumn cv. - high yield
6.	Milenium	CJ 16-4-12 X Comtesse de Paris	SCDP Cluj 2003	- good storage
7.	Meda	V 53-15-3 X Comtesse de Paris	SCDP Cluj 2009	- nice marketing appearance - special taste quality
8.	Orizont	Interspecific hybrid F3	SCDP Voineşti 2003	- scab resistant - tolerant to fire blight and *Psylla* sp. - good storage capacity

0	1	2	3	4
9.	Paramis	Monica x Passe Crassane	ICDP Piteşti 2008	- bear precocity - good taste
10.	Roşioară de Cluj	Red Williams x Untoasă Giffard	SCDP Cluj 2005	- bear precocity - scab tolerant - high sugar content
11.	Romcor	Interspecific hybrid F4	SCDP Voineşti 2009	- good storage - resistance to scab and fire blight
12.	Tudor	[(P. Serotina x D. d'hiver) x Passe Crassane] x TN 30-44 Angers	SCDP Voineşti 2007	- good storage - scab resistance - *Psylla* sp. tolerance
13.	Virgiliu hibernal	Passe Crassane x Comtesse de Paris	SCDP Cluj 2000	- good storage - good taste

a) Meda cv.

b) Latina cv.

c) Roşioară de Cluj cv.



d) Arvena cv.

e) Ervina cv.

f) Corina cv.

Fig. 1 (a-f). Pear varieties registered between 2000-2009 (original photo)

CONCLUSIONS

1. The new pear varieties developed at Cluj-Napoca, Voineşti and Piteşti have enriched the Romanian range of varieties.

2. The breeding work and development of new cultivars are encouraged by a further need of having high quality fruit in accordance to the consumer requirements, to provide fresh fruit to the market throughout the year and to use at the most the pedoclimatic conditions specifically to each growing area.

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BLUEHONEYSUCKLE (*LONICERA CAERULEA* VAR. *KAMTSCHATICA* (SEVAST.POJARK.*)* A VALUABLE SPECIES FOR FRUITS GROWING AND HUMAN HEALTH

LONICERA CAERULEA VAR. KAMTSCHATICA (SEVAST.POJARK) O SPECIE IMPORTANTĂ PENTRU CULTURĂ ŞI SĂNĂTATEA UMANĂ

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Abstract. *Blue honeysuckle (Lonicera caerulea var. kamtschatica (Sevast.Pojark.) introduced in Romania in 1998, proved to be a special plant for its fruit biochemical content (polyphenols, anthocyanins, vitamine C, etc. with strong antioxidant action), earliness of ripening and plant rusticity. For this species a breeding program has been launched to improve the fruits quality, productivity and growth habit. The objective of this work was the evaluation of the morphological and agronomic characteristics for 10 new elites, (resulted of the selection in the hybrids field) compared with Loni and Cera varieties, in order to select the most valuable ones and placing them into assortment. The results of these elites evaluation under phenology, yield capacity, berries physical - tasty qualities and biochemical compounds level will be presented.*

Key words: selection, phenology, berries physical-chemical properties

Rezumat. *Lonicera caerulea var. kamtschatica (Sevast.Pojark.) introdusă în ţara noastră în anul 1998 s-a dovedit a fi o plantă deosebit de valoroasă pentru conţinutul biochimic al fructelor (polifenoli, antociani, vitamina C, etc. cu efect puternic antioxidant) , timpurietatea coacerii şi rusticitatea plantelor. Pentru această specie s-a demarat un program de ameliorare pentru îmbunătăţirea calităţii fructelor, productivităţii şi habitusului de creştere. Cercetările de faţă au avut ca obiectiv evaluarea caracteristicilor morfologice şi agronomice a unor elite obţinute în urma selecţiei în câmpul de hibrizi, comparativ cu soiurile noi Loni şi Cera , în scopul selectării celor mai valoroase şi introducerii lor în sortiment. Sunt prezentate rezultatele privind evaluarea a 10 elite sub următoarele aspecte: fenologic, potenţial bioproductiv, însuşiri fizice şi organoleptice şi nivelul compuşilor biochimici din fructe.*

Cuvinte cheie: selecţie, fenologie, însuşiri fizico-chimice ale bacelor

INTRODUCTION

Blue honeysuckle originated in the eastern Russian territory, Peninsula Kamtschatka, where locals used it as a medicinal plant with a beneficial effect on the cardiovascular system and capillaries (MN Plekhanova 1994 Atalinkova M, et all, 2007). In our country it has been introduced since 1988, in the form of seeds, which

formed the basis for starting the process of breeding by hybridization followed by successive individual clonal selections (Gh. Mladin, 1977). Some of the blue honeysuckle selections were subjected to identification and determination the biochemical content of the berry fruits, such as the flavonoids and anthocyanosides (Oprea, E., et al., 2002). The paper presents the results of the behavior of 2 blue honeysuckle varieties and 10 selections under the hilly Sub-Southern Carpathians, in terms of yield, phenology and morphology of the plants and berries.

MATERIAL AND METHOD

The research was conducted at RIFG Pitesti, during 2000-2009 on a biological material consisting of two new varieties, Loni and Cera and 10 selections. There were determined the growth and fructification phases, in relation to climatic factors, the common phyto-nutrients of the fruits and the yielding potential. The experience was organized in randomized blocks, each plot with four plants in three repetitions, with total of 12 plants per variant. Location of experimental variants was a podsolic soil type, clay-textured, poorly supplied in organic matter, nitrogen, phosphorus and potassium.

RESULTS AND DISCUSSIONS

During 10 years of evaluation of the blue honeysuckle varieties and selections, it was found that the growth and fructification phases occurred with a variation of 3-8 days from one year to another, in correlation with the variation of the temperatures. Generally speaking, the onset of vegetation occurred in late February and early March, and the cessation of the shoots has occurred very early, in the last decade of June. The bloom started at the end of the second decade of April and ended in the early days of the first decade of May. Fruit maturation took place over a period of 5-6 days, in the second decade of May. Vegetation period showed a greater variation from one genotype to another, ranging between 218 and 325 days (table 1). Plants showed slow growth, with differences from one genotype to another, with a volume of the bushes ranging between 1.12 m^3 (24-SL) and 3.04 m^3 (15 SL) - (table 2). Yielding potential, during 10 years, ranged between 398 g and 1,474 g $plant^{-1}$, in direct correlation with the vigour of the plant. Loni and Cera varieties and selections SL 57, SL 43 and SL 15 have had a steady upward trend of fruit production recorded over 10 years (fig. 1).

Morphological and organoleptic characteristics of the fruits shown in the table 3, highlighted the fact that fruit had a more or less elongated cylinder shape and their taste varied from intensely bitter to sweet-tart flavor. The fruits of Loni and Cera varieties and of the SL 15, SL 57, SL 22 and SL 28 selections are suitable for fresh consumption. The main phytochemical compounds of the fruits showed a variation from one genotype to another, with significant differences in the vitamin C content (from 39.6 to 93.8 mg%), total sugars (from 6.37 to 10.32%) and total solids (from 13.54 to 19.43%) (table 4).

Table 1

Unfolding of the growth and fructification phases of the honeysuckle genotypes

No.	Genotype	Bud break	Leafing	Start of shoots growth	Cessation of growth	Blooming start	Blooming end	Fruit ripening	Physiological fall of the leaves	Duration of vegetation
1	Loni	25II-3III	12-15III	29III-5IV	24-28VI	20-28IV	26IV-2V	12-17V	29IX-5X	218-320
2	Cera	25II-4III	13-17III	30III-7IV	23-28VI	22-26IV	28IV-2V	13-17V	30IX-2X	234-320
3	SL-43	3-7III	20-24III	25III-3IV	18-22VI	20-25IV	30IV-10V	22-25V	2-6X	240-324
4	SL-46	2-6III	14-18III	27III-2IV	19-26VI	21-27IV	30IV-8V	17-22V	3-7X	235-325
5	SL-62	2-6III	13-17III	26III-2IV	20-26VI	21-27IV	28IV-5V	17-23V	2-6X	239-324
6	SL-55	26II-5III	11-16III	25-31III	19-25VI	21-27IV	27IV-4V	18-24V	2-6X	242-324
7	SL-57	25II-4III	11-15III	25-30III	18-26VI	18-26IV	27IV-3V	16-20V	30IX-3X	243-321
8	SL-15	28II-5III	13-17III	26-31III	20-27VI	26-30IV	2-5V	17-21V	3-7X	241-324
9	SL-24	26II-4III	14-19III	27III-3IV	22-29VI	19-26IV	26IV-2V	12-18V	28IX-1X	242-319
10	SL-34	27II-3III	14-18III	27III-3IV	18-25VI	18-25IV	26IV-5V	12-18V	28IX-1X	241-319
11	SL-28	1-4III	15-19III	28III-4IV	21-28VI	21-28IV	29IV-6V	18-24V	30IX-3X	240-321
12	SL-22	2-5III	16-19III	27III-5IV	24-30VI	2027IV	28IV-5V	17-23V	30IX-2X	235-320

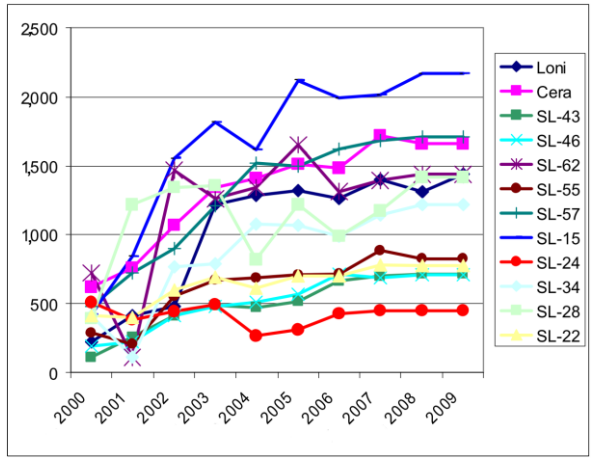

Fig. 1. Evolution of the bio-yielding potential of 12 *Lonicera caerulea* var. *kamtschatica* genotypes

Table 2

The vigour of the 14 years old bushes blue honeysuckle genotypes

No.	Genotype	Mean diameters of bush (cm)	Mean height of bush (cm)	Volume of bush (m^3)*)
1	Loni	110	140	1.82 NS
2	Cera	120	160	2.32**
3	SL-43	90	125	1.42^{0}
4	SL-46	90	130	1.50 NS
5	SL-62	110	140	1.82 NS
6	SL-55	90	140	1.68 NS
7	SL-57	120	160	2.32**
8	SL-15	150	180	3.04***
9	SL-24	80	110	1.12^{000}
10	SL-34	90	120	1.34^{00}
11	SL-28	110	160	2.23 NS
12	SL-22	110	130	1.64 NS
Mean		105.83	141.25	1.85

**) DL 5% = 0.401; DL 1% =0.545; DL 0.1% = 0.730

*) Volume = $\frac{(D+d)^2}{2}$ x h x 0.416

Table 3

Fruits characteristics of some blue honeysuckle genotypes

No.	Genotype	Fruit shape			Fruit taste (organoleptic panel test)
		Height (mm)	Thickness (mm)	Shape index*)	
1	Loni	12.8	7.9	1.62	Slightly tart-sweet flavor
2	Cera	17.4	9.8	1.77	Sweet-sour-flavored
3	SL-43	19.3	7.9	2.44	Sweet-sour
4	SL-46	17.2	6.6	2.60	Bitter-almond-sour
5	SL-62	16.3	8.1	2.01	Intensely bitter
6	SL-55	14.3	6.1	2.34	Bitter-almond-sour
7	SL-57	22.3	7.0	3.18	Slightly tart-sweet flavor
8	SL-15	19.5	6.7	2.91	Slightly tart-sweet flavor
9	SL-24	15.9	7.4	2.14	Bitter intensively
10	SL-34	21.2	8.1	2.61	Bitter intensively
11	SL-28	18.1	10.2	1.77	Sweet-tart
12	SL-22	17.8	7.7	2.31	Sweet-tart

*)DL5%=0.087; DL1%=0.118; DL0.1%=0.158

Table 4

Level of phytochemical compounds in fruits of blue honeysuckle genotypes

No.	Genotype	Vitamin C mg %*)	Total sugars g%	Total acidity g%	Tanoide substances g %	Pectic substances g %	Mineral substances g %	Dry matter g%
1	Loni	60.08	6.70	1.84	0.254	0.328	0.697	16.20
2	Cera	55.70	6.37	1.79	0.301	0.337	0.706	12.90
3	SL-43	61.20	8.79	1.96	0.478	0.330	0.684	18.10
4	SL-46	56.40	9.69	2.02	0.852	0.342	0.701	19.43
5	SL-62	62.30	10.32	2.50	0.640	0.327	0.694	17.40
6	SL-55	44.00	8.40	2.06	0.192	0.376	0.730	14.55
7	SL-57	61.00	7.09	2.02	0.258	0.350	0.680	14.27
8	SL-15	93.80	6.72	1.88	0.300	0.340	0.679	14.60
9	SL-24	44.00	7.81	2.46	0.558	0.290	0.680	14.70
10	SL-34	78.60	7.11	1.91	0.248	0.296	0.637	16.90
11	SL-28	44.00	7.41	2.46	0.218	0.597	0.570	13.54
12	SL-22	39.60	7.52	2.71	0.236	0.467	0.800	17.07
	Mean	58.36	7.82	2.13	0.378	0.365	0.688	15.55
	DL 5%	1.291	0,308					0.117
	DL1%	1.754	0.418					0.158
	DL0.1%	2.349	0.560					0.212

Table 5

Level of the anthocyanins in fruits of *Lonicera caerulea* var. *kamtschatica*

No.	Genotype	Total anthocyanins (mg kg^{-1})	Of which:		
			Fruit flesh (mg kg^{-1})	Fruit skin (mg kg^{-1})	Fresh juice (mg kg^{-1})
1	Loni	5,534	542	4,870	122
2	Cera	5,132	732	4,274	126
3	SL-43	5,243	751	4,376	116
4	SL-46	5,158	652	4,388	118
5	SL-62	5,442	556	4,765	121
6	SL-55	2,199	309	1,780	110
7	SL-57	4,643	715	3,812	116
8	SL-15	4,881	585	4,176	120
9	SL-24	3,910	791	3,001	118
10	SL-34	2,825	754	1,960	111
11	SL-28	3,747	673	2,960	114
12	SL-22	4,562	744	3,955	118
	Mean (total)	4,439	650.35	3,693.08	117.50
		DL 5%	20.256	52.009	4.615
		DL 1%	27.532	70.692	6.273
		DL 0.1%	36.873	94.677	8.401

Anthocyanins level was the highest in the skin of the fruit, with variation from 1,960 mg kg^{-1} (SL 34) to 4,870 mg kg^{-1} (Loni) and lower in the flesh of the fruit (309-791 mg kg^{-1}) and in fresh juice (110 - 126 mg l^{-1}), with statistically assured differences between variants (table 5).

CONCLUSIONS

1. Blue honeysuckle genotypes showed an early starting of the vegetation and an earliest cessation of the shoots growth.

2. Plant vigor was influenced by genotype and bushes had a slow growth tendency over the 10 years.

3. Bio-yielding potential of the blue honeysuckle genotypes was intensively correlated with plants vigor and showed a high variation from year to year, depending on the adaptability of genotypes to the climatic conditions.

4. Size, shape and taste of berry-fruits were different from one genotype to other, generally being of cylindrical shape, more or less elongated, with bitter taste to a sweet-tart flavor.

5. For the fresh consumption the following genotypes: Loni, Cera, SL 15, SL 57, SL 22 and SL 28 are suitable.

6. Genotypes SL 15, SL 34, SL 62 and SL 43 have noted a higher content of vitamin C, sugars and total solids.

7. The skin of the fruit accumulated the highest amount of anthocyanins with a powerful antioxidant action that will be taken into account for the extraction of these compounds.

8. Alongside Loni and Cera varieties, SL 15 and SL 57 selections were highlighted to be approved and extended in production for both fresh consumption and for food and pharmaceutical processing.

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PRELIMINARY RESULTS ON THE ORGANIC GROWING OF SOME SMALL FRUITS SPECIES

REZULTATE PRELIMINARE PRIVIND CULTURA ÎN REGIM ORGANIC A UNOR SPECII DE ARBUŞTI FRUCTIFERI

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Abstract *Studies were conducted during 2008 – 2009 period and had two objectives: 1) determining the effect of inoculation with mycorrhizal fungi on the blueberry plants for optimizing growth and fruiting conditions and 2) to determine the effect of biological, ecological and low risk products, acceptable for organic farming, on blackcurrant and raspberry pests and diseases control. To study the colonization with mycorrhize were used inoculi of the fungi Glomus intraradices. To study the disease control, were applied 5 treatments with products based on copper and two treatments for aphids and mites with Bionid ecological product (5%). In addition, for black currant Sesia tipuliformis control, pheromone traps, AtraSyn T type (8, 10 and 12 traps ha^{-1}) were dispersed in plantation. Mycorrhizal inoculation induced a significant increase of plants growth in the first year after application. All treatments for pests and diseases control had a good effect, without any phytotoxicity symptoms.*

Key words: mycorrhize pest, disease, control, ecological product

Rezumat *Cercetările s-au desfăşurat în perioada 2008- 2009 şi au avut două obiective : 1. stabilirea efectului inoculării cu micorize asupra plantelor de afin în scopul optimizării condiţiilor de creştere şi fructificare, şi 2. stabilirea efectului unor produse de combatere biologică şi a produselor cu risc redus, acceptate pentru cultura organică, asupra bolilor şi dăunătorilor coacăzului negru şi zmeurului. Pentru studiul colonizării cu micorize s-au folosit innoculi de Glomus intraradices . Pentru studiul combaterii bolilor s-au aplicat câte cinci tratamente cu produse pe bază de cupru, iar pentru afide şi acarieni două tratamente cu produsul biologic Bionid (5%). În plus, la coacăzul negru pentru Sesia tipuliformis s-au utilizat capcane cu feromoni tip AtraSyn T (8 şi 12 capcane /ha). Innoculul cu micorize a indus o creştere semnificativă a plantelor în primul an după aplicare. Tratamentele au avut efect bun şi fără simptome de fitotoxicitate.*

Cuvinte cheie: micoriza,dăunători, boli, combatere, produse ecologice

INTRODUCTION

Highbush blueberry, as any species belonging to the *Ericacaee* family manifest mycorrhiza phenomenon, a symbiotic association between plant root system and some saprophytic fungi, fungus providing to the plant nutrients readily available, which they extracted from soil organic matter (1).

For many species under organic culture, using symbiotic fungi has become a common practice. High nitrogen requirements of the blueberry may

be provided by additional use of mycorrhiza fungi, which, by decomposition of soil organic matter, provides plant nutrients in readily accessible form.

The present research tries to establish the influence of such fungi on vegetative growth of blueberry plants.

The organic culture precludes the use of anorganic products and organic chemical synthesis plant treatments. To combat diseases and pests are allowed only organic products and those of copper and sulfur, considered "low risk" and accepted by the concept of organic culture. For black currant and raspberry crop research, the main objective was to determine the efficacy of copper fungicides on specific pathogens, of organic insecticide Bionid on the specific pests and of sex pheromone traps for black currant cane borer.

MATERIAL AND METHOD

Experiment 1. For studying the influence of mycorrhiza on the vegetative growth of highbush blueberry plants, an experiment with plants of Bluecrop variety, aged two years was performed. The plants were planted in pots with acid peat substrate, with the following variants: V1-expanded clay 10% + 90% peat; V2-innoculi of *Glomus intraradices* 10% + peat 90% and V3-acid peat 100%, version control. For each variant were used three plants in three repetitions, the plots being randomized. There were determined the amount of vegetative growths, the number of annual shoots and the length of shoots when applied the treatments, December 15, 2008, and after one year of vegetation, December 15, 2009.

Experiment 2. For the control of raspberry pathogens four variants were applied: V1-Alcupral 50 PU 0.3%, V2- Bordeaux mixture 0.5%, V3-Standard (Vondozeb 0.2%) and V4-untreated control. All three variants were applied repeatedly in four phenological phases: 1. green tip, 2. two fruit-binding, 3. after harvest time and 4. 10 days after the last treatment. Observations were made during October 15 to 30 and consisted in: the frequency and intensity of attacks on leaves and stems, in which: Frequency - determination by measurements; intensity - ”+” sign means few spots (1-5), 1. ¼ quarter of observed area, 2. ½ of leaf or stem surface; 3. ¾ of leaf or stem surface and 4. entire surface with symptoms of attack.

Experiment 3. For black currant diseases have applied the same options as the raspberry, copper-based products compared with standard products and version control, untreated: V1 - Alcupral 50 PU 0.3%, V2 - Bordeaux mixture 0.5%, V3-Standard (PU Topsin 70 0.07% and PU Vondozeb 80 0.2%) and V4 - Untreated. Treatments were applied four times: 1.when 75% of the fruit sets, 2. first fruits colored on the strig, 3. after harvest and 4. 10 days after the last treatment. Observations and determinations on attack frequency and intensity were made between September 15 and 30.

Experiment 4. For biological control of black currant cane borer (*Sesia tipuliformis* sin. *Synanthedon tipuliformis*), were applied sex pheromone traps in increased doses, type AtraSyn T, the choice being of 8, 10 and 12 traps ha^{-1}. Installation of pheromone traps was achieved in early May and adults was twice weekly flight tracking of setting. Attacked shoots were observed and the number of larvae inside them was determined.

Experiment 5. For controlling black currant pest (aphids, mites and cane borer) and raspberry aphids and mites, an organic product - Bionid was used. It

was applied at a dose of 50 l in 1000 l solution ha^{-1} at two dates: May, 22th and July, 20th and comments were made on September 3. The attack was assessed by grades, 0-4, where: 0 - default attack, 1 - weak attack, 2-middle attack, strong attack 3 and 4 –powerful attack.

RESULTS AND DISCUSSIONS

Experiment 1. In the first year after application of *Glomus intraradices* innoculi (V2) it was found that a significant amount of vegetative growth was induced, providing statistical differences compared with variants V1 and V3 (table 1). V1 clay substrate induced the lowest vegetative growth of the plants.

Table 1

The influence of the planting substrate on vegetative growth of blueberry plants

Variants	Time of measurements						
	December 2008			December 2009			The difference in the shoots length sum (cm/plants)
	Shoots length sum (cm/plant)	Number of shoots /plant	Average length of shoots (cm)	Shoots length sum (cm/plant)	Number of the shoots/plant	Average length of the shoots (cm)	
V1- expanded clay 10% + peat 90%	93.5	5.75	16.8	246.5	15.5	21.05	153.00
V2- innoculi of *Glomus intraradices* 10 % + peat 90%	74.0	5.25	15.8	291.7	14.2	22.32	217.75
V3-peat 100%	73.5	5.0	15.3	258.2	13.2	19.87	184.75
DL 0,05%							0.118

Experiment 2. The data in Table 2 reveals that PU Alcupral 50 0.3% and Bordeaux mixture 0.5% had a very good effect compared with untreated control variant. Also, compared with the alternative products applied, both products had similar efficacy or even better versus the standard one (*Mycosphaerella*, *Didymella*, *Botrytis* and *Erwinia*). Even if the pathogen *Botrytis cinerea* had a higher frequency of attack (F% = 20) compared with standard products (F% = 10), the intensity of this attacks was quite low (I = 1) and similar with V3.

Experiment 3. By applying the same products for black currant leaf diseases control, were recorded similar results and even better than standard

products. The results were obtained both for control of rust, powdery mildew on leaves and shoots and in combating of the anthracnose (table 3).

Experiment 4. Regarding controlling the cane borer of black currant using increased dose of sex pheromone traps, type AtraSyn T, the results are presented in Table 5. Experimental data showed that the flight of adults began on May 19th and lasted until June, 29th, the flight lasting approximately 42 days.

The flight peak occurred during May, 30th –June, 17th, when on captured between 23 and 11 butterflies on traps. Based on the results of monitoring pests populations with sex pheromone traps, can be seen that the level of infection was different in the three experimental plots, the amount of butterflies captured in traps oscillating between 52 and 138 males. *Sesia* larvae attack frequency was from 5.7% in the variant with 10 traps ha^{-1} and 9.0% with 8 and 12 traps ha^{-1}.

Experiment 5. Results obtained by organic insecticide Bionid 5% application, presented in Table 5, showed a good performance in raspberry, both for aphids and mites, compared with untreated control variant. In black currant, by the application of 2 key treatments with the product Bionid, the class attack was 0 for aphids and 1 for mites. The larvae attack rate of cane borer larvae was only 1%.

Table 2

Frequency and intensity of the pathogens attack by the application of the copper and standard products for disease control in raspberry

VARIANT /PRODUCT /DOSE	*ELSINOE VENETA* (ANTHRACNOSE OF THE SHOOTS)		*PHRAGMIDIUM RUBI-IDAEI* (RASPBERRY RUST)		*MYCOSPHAERELLA RUBI*		*DIDYMELLA APPLANATA*		*BOTRYTIS CINEREA* (GREY MOLD)		*ERWINIA AMYLOVORA* (FIRE BLIGHT	
	F %	I	F %	I	F %	I	F %	I	F %	I	F %	I
V1- Alcupral 50 PU 0,3	4.6	+	0	_	0	_	0	_	20.0	1	0	_
V2- Bordeau mixture 0.5	4.6	+	0	_	0	_	0	_	20.0	1	0	_
V3- Standard	2.4	+	0	_	5.0	+	10.0	1	10.0	1	10.0	1
V4-Control	95.0	4	10.0	+	50.0	2	100.0	3	100.0	3	80.0	3

F% = determination using measurements, Intensity: +. = few spots (1-5 spots), 1. = ¼ of the surface, 2.= ½ of the surface area , 3.=+ ¾ of the surface area, 4. = entire surface.

Table 3

The effect of copper products application on pathogens attack frequency and intensity compared with standard one, in black currant

VARIANT /PRODUCT /DOSE	*PSEUDOPEZIZA RIBIS* (ANTHRACNOSE)		*CRONARTIUM RIBICOLA* (RUST)		*SPHAEROTHECA MORS-UVAE* (MILDEW)			
	Attack on leaves		Attack on leaves		Attack on leaves		Attack on shoots	
	F %	I	F %	I	F %	I	F %	I
V 1-Alcupral 50 PU 0,3	21.4	+ _ 1	2.7	+	0.7	+	16.0	+
V2 – Bordeaux mixture 0,5	26.2	1	4.5	+	2.0	+	16.0	1
V 3-Standard	36.0	+	14.0	+	1.2	+	16.0	1
V 4-Control	81.0	2-4	75.8	3	8.6	2	62.0	3

Table 4

The number of captured adults and larvae attack frequency *Sesia tipuliformis* by the application of the pheromone traps to black currant.

Variant (traps/ha)	Total no. of adults during the flight	Number of observed shoots	Of which:				Frequency of the attack %
			Healthy shoots	Attacked (with larvae):			
				1 larvae	2 larvae	3 larvae	
8 traps/ha	52	500	456	37	5	2	9.0
10 traps/ha	116	500	471	29	0	0	5.7
12 traps/ha	138	500	453	45	1	1	9.0

Table 5

Effectiveness of Bionid in raspberry and black currant pests' control

Variant	Crop	Class of attack (note)		Frequency of the attack (%)
		Aphids	Spider mites	Cane borer
V1-Bionid 5 %	Raspberry	0	0	-
V2-Control		1	5	-
V1-Bionid 5 %	Black currant	0	1	1
V2-Control		4	5	15.3

CONCLUSIONS

1. After just one year after application, blueberry plants inoculated with the fungus *Glomus intraradices* 10% + peat 90% induced a higher vegetative growth, providing statistical differences compared to plants inoculated only with expanded clay or acid peat.

2. 50 PU treatments Alcupral 0.3% and Bordeaux mixture 0.5 %, applied repeatedly had a good efficacy and similar to those standard products against fungi and bacteria in raspberries culture, as well as the main pathogen of black currant.

3. Application of sex pheromone traps in dose of type T AtraSyn of 10 traps ha^{-1} had the best effect on decreasing the number of larvae in the shoots, i.e. a frequency of only 5.7% of the pest.

4. Repeated treatments with organic insecticide Bionid, concentration of 5%, led to reduction up to eliminate the pests of aphids, spider mites and cane borer type, in black currant and raspberry.

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QUALITATIVE ATTRIBUTES OF NEW RELEASE PEACH CULTIVARS GROWTH IN CONDITIONS OF RESEARCH STATION BANEASA

CARACTERISTICILE CALITATIVE ALE UNOR SOIURI DE PIERSIC NOU OMOLOGATE CULTIVATE IN CONDIŢIILE STAŢIUNII DE CERCETARE BĂNEASA

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Abstract. *Expansion of peach consumption will depend on marketing, quality consistency, and the cost of the fruit. Market trends that are impacting peach consumption are the globalization and need for year round supplies of produce. These pressures have renewed interest in production systems to extend the harvest season, to reduce chemical inputs, and to ensure consistent fruit quality. Therefore our efforts were focused on developing new varieties with high quality of peach fruit, higher levels, a greater diversity of fruit types to market, and adaptation to climate changes occurring lately. We studied in this paper some characteristics of Dida and Triumf peaches with yellow flesh, Eugen and Congres peaches with white flesh. Dida and Eugen varieties emphasized over the check through fruit weight, firmness, soluble solid and dry matter. According to the results obtained we can support the extension of consumption period through introduction of new peach varieties Dida and Eugen which have higher potential quality over varieties already growth.*

Key words: peach, fruit quality, mineral nutrition

Rezumat. *Creşterea consumului de piersici depinde de comercializarea, calitatea la recoltare precum şi costul fructelor. Tendinţele pieţei care au impact asupra consumului de piersici sunt globalizarea şi necesitatea suplimentării cu produse proaspete tot timpul anului. Aceste presiuni au reînnoit interesul în sistemele de producţie pentru a extinde perioada de recoltare, pentru a reduce inputurile chimice, precum şi pentru a asigura o calitate superioară a fructelor. Prin urmare, eforturile noastre s-au concentrat pe obţinerea de noi soiuri de piersic cu calitate superioara a fructelor, niveluri de producţie ridicate, o diversitate mai mare de tipuri de fructe pe piaţă şi adaptarea la schimbările climatice care au apărut in ultimul timp. In această lucrare am studiat caracteristicile calitative ale unor soiuri de piersic cu pulpă galbena Dida şi Triumf, si a unor soiuri de piersic cu pulpă albă Eugen şi Congres. Soiurile noi de piersic Dida şi Eugen s-au evidenţiat faţă de martori prin greutatea fructelor, fermitate, substanţă uscată totală si substanţă uscată solubilă. Conform rezultatelor obţinute putem susţine extinderea perioadei de consum, prin introducerea soiurlor noi de piersic Dida şi Eugen, care au potenţial calitativ mai mare, faţă de soiurile deja cultivate.*

Cuvinte cheie: piersic, calitatea fructelor, nutritie minerala

INTRODUCTION

Peach (*Prunus persica* L. Batsch) is one of the most important fruit species. Peach is ranked third for its production in the world. The relatively short time, as compared to other fruits, between early project and obtaining of marketable products, and the consistent interest in new cultivars makes it an interesting model fruit species for describing a quality oriented breeding approach (Byrne, 2003). The introduction of new varieties on the market is vital for fruit industry to get better products and to attract consumers with innovative fruit types. However, in an extremely competitive market as the present the path from field selection to commercial production is becoming always more uncertain and expensive. Breeding and marketing should find closer relationships to allow new released varieties to maintain long-term premium prices (Infante et al., 2008; Ivascu,1993). Crisosto et al. (1997) suggest that varieties should be classified in organoleptic groups and promote and promote the development of a minimum quality index within different groups, rather than accepting the commonly used generic minimum quality index based on ripe soluble solids content. Mineral nutrition of peach trees and fruit quality characteristics depend upon plant mineral used, as well as the soil climatic factors prevailing in the area (Bertsch et al.,1996). For normal plant growth and development, peach trees require large amounts of nutrient elements.

The objective of this paper was study of quality attributes of new peach varieties and influence of main soil characteristics on fruit quality.

MATERIALS AND METHODS

The biological material consist of four new peach varieties cultivated in the experimental: Dida and Triumf (Control) varieties peach with yellow flesh, Eugen and Congres (Control) peach with white flesh. The trees taken in study was planting at 3 x 4 row spacing, being grafted on peach franc and having the crown form vase, applied technology is a classic culture.

Study was developed in conditions of two years, being observed the following:

- fruits quality: weight, firmness, soluble solid, titratabile acidity and dry matter;
- mineral nutrition: pH, content of humus, mineral nitrogen ($N\text{-}NO_3$ mg/100 g soil), mobile phosphorus (P_2O_5 mg / 100 g soil), mobile potassium (K_2O mg / 100 g soil).Weight of fruit was determined using a sample of 10-20 fruit per tree, determined by weight measurement with electronic balance making it an average weight fruit. It is expressed in grams. Firmness fruit (N) has been made measuring the force required insertion of a probe with diameter of 7.9 mm in the fruit which skin was removed, with certain depth and with a certain speed. The dry matter amount was estimated by water evaporation method, through drying as some quantity of fruit for some hours at 105 ◦C until constant weight.

Titratable acidity (TA) was determined by titration of juice obtained from 10-20 fruit with 0.01 N NaOH and expressed as percentage malic acid. The soluble solids content (SSC) were determined with a digital refractometer (Atago) and expressed in ◦Brix.

The sample were taken at each site lands from experiment field Research Station Baneasa. The basic characteristics of soil sample were determined by standard methods. pH of the soil solution in water extract (ratio 1:25) was determined potentiometrically. Humus was determined by wet oxidation according to Walkely – Black modified by Gogoasa. Available Potassium has been determined through extraction with AL solution (method by Engner – Riehm) and their quantification was realized by flame photometry. The phosphates

slightly soluble was determined in AL solution extract by Egner- Riehm method and quantified by colorimetry.

RESULTS AND DISCUSSIONS

Data in table 1, show that variety Triumf has lowest fruit weight (112 g), and Dida has the highest fruit weight (148 g). It is evident from data in table 1, that variety Eugen has the highest fruit weight (180 g) compared with the control Congres (157.5 g). To look at yield variety Dida recorded 22 kg/tree was higher, compared with the control Triumf (20.5 kg/tree).The variety Dida about yield (to/ha) have the higher value registred 13.75 to/ha.

Table 1

Variation of biometric and yield attributes of varieties studied

Variety	Mean fruit weight (g)	Yield	
		Kg /tree	To/ha
Triumf- control	112	20.5	**10.33**
Dida	148	22	**13.75**
Congres- control	157.5	12	**9.08**
Eugen	**180**	**19.5**	**12.06**

Fruit firmness data on two seasons, show that variety Eugen had the highest mean value of 2.84 kg f/cm^2, was better than control Triumf and Congres (tab.2). Results obtained for content of dry matter (g%) in a fruit variety studied looks that variety Eugen (14.9 %) and Dida (15.3 g%) registred the highest content in dry matter. The lowest content in dry matter was at the control Triumf (13.79 g %) and Congres (12.63 g %).

Table 2

Physico chemical characteristics of peach varieties studied

Variety	Firmness (Kg/cm^2)	Dry matter g%	Soluble solid (SSC ◦ Brix	Titratable acidity (TA) mg malic acid/100mLextract
Triumf- control	1.82	13.79	11.05	**0.86**
Dida	2.79	15.3	11.9	**0.94**
Congres- control	1.88	12.63	10.5	**1.05**
Eugen	**2.84**	**14.9**	**11.6**	**1.15**

* The results presented are average of two years

Content in soluble solid do not differ significantly among the varieties and control evaluated except is the control Congres which has a lower content in soluble solid. Results obtained for titratable acidity (TA) in a fruit peach, look like this time, variety Eugen stand out with the highest value (11.9) than other varieties taken in study. Analytical results presented in table 3, emphasize the fact that the soil of plots cultivated with peach variety studied, show that pH values is situated within the optimal range claim by peach species (7-8), variety Dida present a pH value by 7.55 over control Triumf with the value of 6.4. Humus content resulting in analysis of soil samples, are included in the fertile middle class. We can observe in the table 3, that the value is framed between 2.04 % (Dida) to 4.38 % (Eugen).

Table 3

Analytical results of soil samples from the varieties studied

Variety	Depth (cm)	pH	Humus (%)	$N\text{-}NO_3$ ppm	P_2O_5 ppm	K_2O ppm
Triumf- control	0-20	6.4	2.04	1.5	3.23	**19.46**
	20-40	6.35		1.27	3.91	**21.76**
Dida	0-20	7.55	3.18	0.35	14.58	**40.15**
	20-40	7.5		0.12	12.04	**45.52**
Congres-control	0-20	5.9		13.42	4.59	**27.89**
	20-40	5.9		0.81	4.08	**24.21**
Eugen	0-20	7.35		0.35	14.44	**43.99**
	20-40	**7.55**	**4.38**	**0.12**	**6.96**	**40.15**

Insurance status with mineral nitrogen is medium, to good, a low content in this element are registred at the depth of 20-40 cm, which means that the plant were used largely nitrogen from the deep, this is a consequence of the fact that most species have fruit roots developed soil profile since the depth. From point of view of mobile phosphorus content, soil the supply situation of the mid to variety Eugen- 6.96 and very weak to variety Triumf-3.23. Average values (in depth 0-40 cm) of cell potassium content demonstrate that all analyzed soil samples show values highlight a good insurance with this item.

CONCLUSIONS

1. The highest yield and content in dry matter, soluble solidand a low content of titratable acidity, had the variety Dida, the highest fruit weight – Eugen, the highest firmness had the variety Eugen. Variability of yield and fruit quality were influenced by cultivar. In addition, variability of those characteristics was significantly conditioned by pedoclimatical factors and interaction between genotype and environmental factors.

2. Regarded mineral nutrition, the variety Dida and Eugen, registred highest value of pH, humus, mobile phosphorus, mobile potassium.

3. According to the results obtained we can support the extension of consumption period through introduction of new peach varieties Dida and Eugen which have higher potential quality over varieties already growth.

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EFFICIENCY OF THE *IN VITRO* ROOTING IN TWO INTERGENERIC HYBRIDS *FRAGARIA X POTENTILLA*

CAPACITATEA DE ÎNRĂDĂCINARE *IN VITRO* A UNOR HIBRIZI INTERGENERICI *FRAGARIA x POTENTILLA*

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Abstract. *As an important stage in micropropagating ornamental strawberry, in vitro rooting of microshoots on media containing different concentrations of auxins was investigated in two intergeneric hybrids Fragaria x Potentilla, respectively "Pink Panda" and "Serenata". IBA at either 0.25 or 0.5 mg/l, and IAA at 0.5 mg/l concentration, were added to solidified Murashige and Skoog (1962) basal medium containing half strenght macroelements and half Lee-Fossard microelements. In all treatments, 0.1 mg/l of GA_3 was also added to the basal medium. IBA was found to be the most effective auxin in promoting rhizogenesis, with the concentration 0.25 mg/l giving the highest rooting rates for both varieties, respectively 100% for "Pink Panda", and 96% for "Serenata".*

Key words: in vitro culture, root induction, auxins, intergeneric hybrids *Fragaria x Potentilla*.

Rezumat. *Întrucât exprimarea la un nivel ridicat a capacităţii de înrădăcinare constituie o condiţie foarte importantă pentru orice biotehnologie de înmulţire clonală, am efectuat studii privind potenţialul de înrădăcinare in vitro, pe medii cu diferite concentraţii de auxină, a unor hibrizi intergenerici Fragaria x Potentilla, respectiv varietăţile "Pink Panda" şi "Serenata". La mediul de bază solidificat, conţinând ½ macroelemente Murashige and Skoog şi ½ microelemente Lee-Fossard, s-au adăugat auxinele AIB în concentraţie de 0,25 sau 0,5 mg/l şi AIA în concentraţie de 0,5 mg/l. Pentru toate variantele, mediul de înrădăcinare a fost suplimentat cu 0,1 mg/l acid giberelic. Cea mai înaltă rată de înrădăcinare a fost obţinută în condiţiile cultivării pe mediu conţinând AIB în concentraţie de 0,25 mg/l, atât pentru varietatea "Pink Panda" (100%), cât şi pentru varietatea "Serenata" (96%).*

Cuvinte cheie: cultura in vitro, înrădăcinare, auxine, hibrizi intergenerici *Fragaria x Potentilla*.

INTRODUCTION

Taking into consideration that large-scale micropropagation laboratories are providing millions of plants for the clonally-propagated crop and ornamental market, for many crops continued optimization of tissue-culture protocols is still required (Brown and Thorp, 1995). Because the conventional propagation of ornamental strawberry *Fragaria x Potentilla* does not allow the obtention of high number of stolons of guaranteed authenticity and biological value in a very short

time, the *in vitro* micropropagation and succesfully rooting and acclimatization of shoots in a nursery environment is the first choice.

To ensure rapid rooting of micropropagated shoots in strawberry, omission of cytokinin is recommended (James and Newton, 1997; Boxus, 1999). However, Kaur et al. (2005) reported that maximum *in vitro* rooting was induced on 1/4 MS medium supplemented with IBA 1.0 mg/l in *Fragaria x ananassa* cv. "Chandler". Also, satisfactory rooting can take place on full strength culture media, but is a very common practice to transfer shoots to be rooted from high strength media to less concentrated solution. This practice is used for herbaceous plants as well as for woody ornamentals, fruit trees or forestry species (Mancousin, 1988; George, 1996). The favourable effect of a diluted mineral solution on rooting can be explained by the reduction of nitrogen concentration (Driver and Suttle, 1987).

Knowing the fact that compromised rooting often results in excessive losses at this stage which are costly and inconvenient, and many plants with scientific interest remain unavailable as they are not able to be rooted and acclimatised reliably, we initiated a study aiming at the elaboration of an reliable protocol for the high *in vitro* rooting rate of the ornamental strawberry.

MATERIAL AND METHODS

The research work was carried on within Biotechnology Laboratory, at the Research Institute for Fruit Growing, Pitesti - Maracineni. Two varieties of ornamental strawberry (*Fragaria x Potentilla*), named "Pink Panda" and "Serenata", respectively, were established in the *in vitro* culture starting from meristems and then subcultured successively on Lee and Fossard (1977) medium supplemented with various combinations of growth regulators (table 1).

Table 1

The combinations and concentration of growth regulators added to LF medium 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
MM1	LF	0.5	0.1	-	0.1	-
MM2	LF	1.0	0.2	-	0.1	-
MM3	LF	0.5	-	0.5	0.1	-
MM4	LF	1.0	-	1.0	0.1	-
MM5	LF	2.0	-	1.0	-	-
MM6	LF	1.0	-	-	2.0	0.5

After four subcultures, shoots which regenerated from *Fragaria x Potentilla* explants were separated from the micropropagation basal media, when they were approximately 2-3 cm long, and placed on a medium suitable for root growth. Root growth was stimulated by supplementing the solidified Murashige and Skoog (1962) basal medium, containing half strenght macroelements and half Lee-Fossard microelements, with the auxins IBA and IAA at different concentrations. In all treatments, 0.1 mg/l of GA_3 was also added to the basal medium (table 2). 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 intensi ty of about 40 μmol m^{-2} s^{-1}.

To avoid major statistical errors, at least 5 conical flasks (each with 30 ml of culture medium and closed with cotton-wool bungs and tinfoil) with 6 shoots per flask were used as repetitions in each of the experimental treatment investigated. In order to establish the efficiency of each treatment, the rooting rate, average root number and root length, were determined. Statistical analysis of the data obtained with ”Pink Panda” and ”Serenata” varieties respectively, on basal media containing different concentrations of auxins for *in vitro* rooting, were performed using Windows SPSS 16.0 program (SPSS, 2007) at $p < 0.05$.

In vitro rooting was followed by acclimatization to *ex vitro* conditions, plantlets being transfered in perlite in greenhouse conditions.

Table 2

The combinations and concentration of growth regulators added to basic medium, tested in order to establish an efficient protocol for the *in vitro* rooting of *Fragaria x Potentilla* varieties

Culture medium code	Basic medium	Growth regulators used and their concentration in the culture medium for *in vitro* rooting (mg/l)		
		IBA	IAA	GA_3
RM1	Macroelements MS 1/2 n, Microelements LF 1/2n, Vitamins MS n	0.25	-	0.1
RM2	Macroelements MS 1/2 n, Microelements LF 1/2n, Vitamins MS n	0.5	-	0.1
RM3	Macroelements MS 1/2 n, Microelements LF 1/2n, Vitamins MS n	-	0.5	0.1

RESULTS AND DISCUSSIONS

After four weeks in culture, the percentage of microshoots rooted, number of roots and length of roots per culture was influenced by the different types and concentrations of auxins added in the rooting media and hormonal composition of the basal media used for explants micropropagation.

In “Pink Panda” variety, rooting induction of the shoots started about 10 days after the initiation of culture. A 100% rooting rate, was recorded on media containing IBA at 0.25 mg/l and GA_3 at 0.1 mg/l concentration (RM1) for shoots micropropagated in basal media supplemented with various concentration of IBA and IAA (MM1-LF, MM3-LF, MM5-LF, MM6-LF).

By increasing IBA concentration from 0.25 mg/l to 0.5 mg/l (table 2), a decrease of the rooting rate was observed, irrespective of the basal medium used for explants micropropagation (fig. 1).

In the medium containing IAA at 0.5 mg/l concentration, a maximum rooting rate (100%) was obtained only for those shoots formed on LF medium supplemented with 1.0 mg/l BAP, 1.0 mg/l IAA and 0.1 mg/l GA_3 (fig. 1).

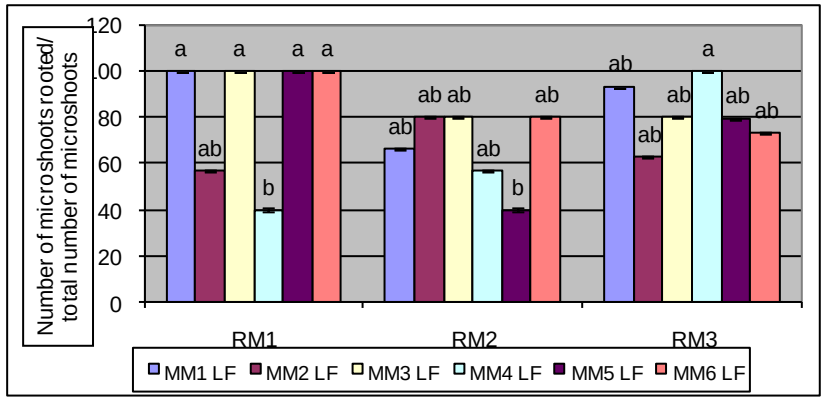

Fig. 1. The rooting rate of "Pink Panda" variety.

As compared to "Pink Panda", the "Serenata" variety of *Fragaria x Potentilla* rooting induction of the shoots started about 16 days after the initiation of culture and responded by a lower rate of rooting on all the three variants of culture media. Excepting the shoots obtained by treatment with 1.0 mg/l BAP, 1.0 mg/l IAA and 0.1 mg/l GA_3, no other combinations of growth regulators added to the LF basic medium resulted in significantly different rate of shoots rooting. The highest rooting rate (96.6%) calculated for "Serenata" variety (fig. 2) was obtained on RM1 medium (table 2). Shoots obtained on MM6-LF failed to induce rhizogenesis. In "Serenata" variety, a significantly lower value of the rooting rate was obtained in treatment with IAA at 0.5 mg/l and GA_3 at 0.1 mg/l concentration (RM3), irrespective of the basal medium used for explant micropropagation (fig.2).

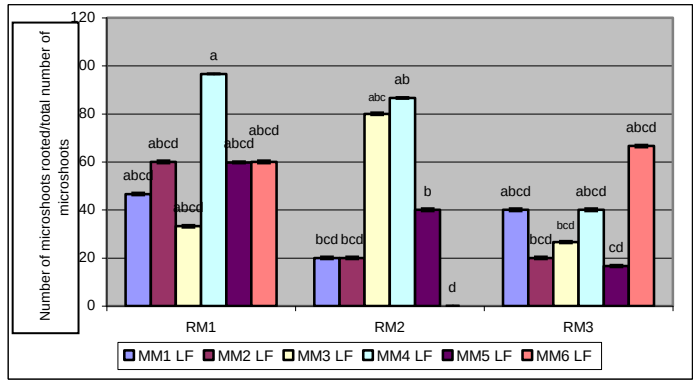

Fig. 2. The rooting rate of "Serenata" variety.

In "Pink Panda" variety, the mean root number per shoot varied between 2.1 and 7.36 (fig. 3), and the average length of the roots between 3.26 and 14.2 mm (fig. 5). Highest values were calculated for the RM1 (table 2) rooting medium and for shoots cultured on MM3-LF (table 1). By increasing IBA concentration from 0.25 mg/l to 0.5 mg/l, or using IAA at the same concentration, a decrease in the mean root number and average roots length was observed, irrespective of the basal medium used for explant micropropagation (fig. 3 and 5).

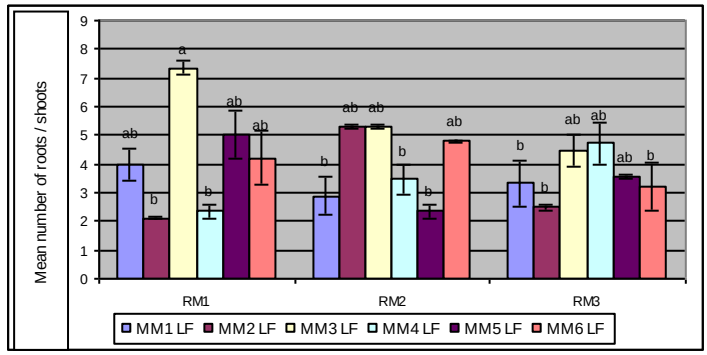

Fig. 3. The mean number of roots per shoot in"Pink Panda" variety.

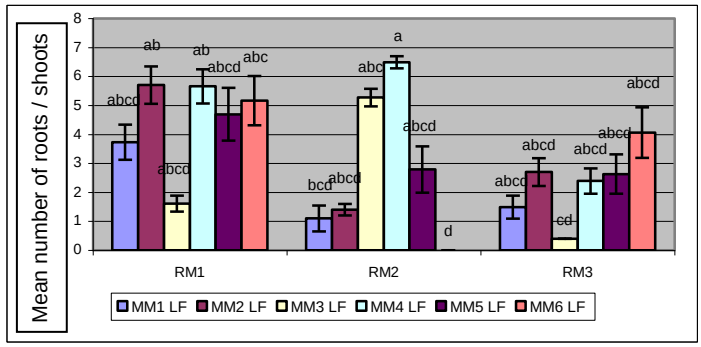

Fig. 4. The mean number of roots per shoot in"Serenata" variety.

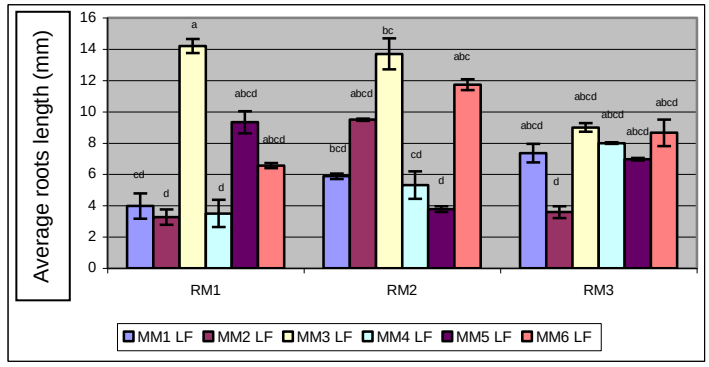

Fig. 5. The average length of the roots in"Pink Panda" variety.

As compared to the "Pink Panda", the "Serenata" variety of *Fragaria x Potentilla* responded by a lower average number of roots formed per shoot (fig. 4). The statistical analysis revealed that the highest mean root number per shoot (6.49) and the highest average length of the roots (9.53) was induced in this variety by the combination 0.5 mg/l IBA and 0.1 mg/l GA_3, for those shoots cultured on MM4-LF variant of medium (fig. 4 and 6).

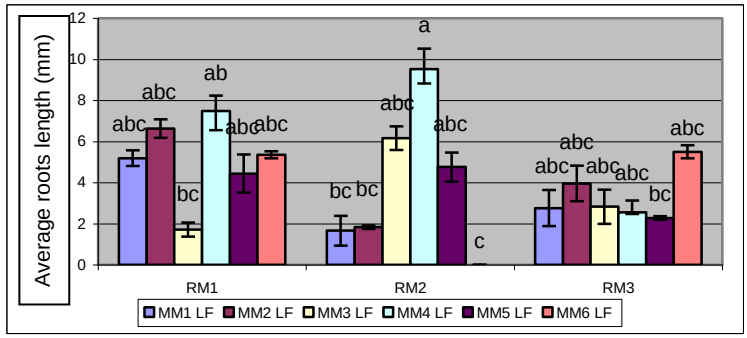

Fig. 6. The average length of the roots in"Serenata" variety.

CONCLUSIONS

1. In "Pink Panda" variety, an exceptional rooting ability of shoots occurred on medium containing 0.25 mg/l IBA and 0.1 mg/l GA_3. The same variety responded by slightly lower rates of rooting when IBA concentration was higher (0.5 mg/l), or this auxin was replaced with IAA (0.5 mg/l). Root elongation was stimulated at both IBA levels, while the mean root number was higher on RM1. Shoots cultured on MM3-LF responded by higher values for all three rooting caracteristics analysed.

2. In "Serenata" variety, a fairly good rate of rooting was promoted in treatment with 0.25 mg/l IBA and 0.1 mg/l GA_3, but average root number and root elongation were singnificantly higher when IBA concentration was higher. The shoots cultured on MM4-LF responded by higher values for all three rooting caracteristics analysed.

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PRELIMINARY EXPERIMENTS OF THE INFLUENCE OF LASER RADIATION UPON THE GROWTH AND DEVELOPMENT OF SOME ANNUAL FLOWER SPECIES

EXPERIMENTĂRI PRELIMINARE ALE INFLUENŢEI RADIAŢIEI LASER ASUPRA CREŞTERII ŞI DEZVOLTĂRII UNOR SPECII FLORICOLE ANUALE

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Abstract. *Within the framework of the experiments made throughout the year 2009 a model of ecologic and stressless experimental treatment of mature flower plants was made. This experiment based on a laser radiation field was applied to three flower species: carnations chabaud (Dianthus caryophyllus`Chabaud`* L.*), petunia (Petunia hybrida var. grandiflora Vilm.) and marigold (Tagetes patula L.), using as irradiation source a 200 mW nominal power semiconductor laser device with continuous laser radiations. The necessary treatment dosage for the plants was calculated taking into account the distance from the irradiation source to the irradiated surface, for transplants and mature plants. There have been made observations and measurements regarding the evolution of morphological and biological parameters of flower plants during the vegetation period and also regarding the influence of laser irradiation treatment upon their growth and development. Statistical processing of the results indicated significant differences regarding the plants' size, growth rhythm and development.*

Key words: annual flower, laser radiation, stressless ecologic model, plant growth

Rezumat. *În cadrul experimentărilor efectuate pe parcursul anului 2009 a fost realizat un model experimental de tratament ecologic şi nestresant al plantelor floricole mature, bazat pe câmp de radiaţie laser, la trei specii floricole anuale: garoafe chabaud (Dianthus caryophyllus `Chabaud` L.), petunii (Petunia hybrida var. grandiflora Vilm.) si crăiţe (Tagetes patula L.). Ca sursă de iradiere s-a folosit un laser cu semiconductori, având putere nominală în regim continuu de 200 mW. Doza de tratament pentru plante s-a calculat ţinând cont de distanţa dintre sursa de iradiere şi suprafaţa de iradiat, pentru răsad şi plante mature. Au fost efectuate observaţii şi determinări privind evoluţia parametrilor morfologici şi biometrici ai plantelor floricole, în cultură, pe parcursul perioadei de vegetaţie şi influenţa tratamentului cu radiaţie laser asupra creşterii şi dezvoltării acestora, prelucrarea statistică a rezultatelor indicând diferenţe semnificative în ceea ce priveşte talia plantelor, ritmul de creştere şi de dezvoltare al acestora.*

Cuvinte cheie: flori anuale, radiaţie laser, model ecologic nestresant, creşterea plantei

INTRODUCTION

Living organisms are open systems that interact with the environment (receiving and issuing information, energy and substance), being constantly under the influence of low-intensity electromagnetic fields. Unfavorable environmental conditions, increased cloudiness, pollution cause a lower utilization of solar radiation by plants. This is reflected in lower productivity and lower resistance to plants. Therefore, plants need a larger amount of energy produced per unit of fresh substance. Laser radiation interaction with biological environment has specific features due to laser radiation characteristics, its study involving physical and biological aspects (Anghel S. et al., 1999, Calugareanu M. et al. 1999, Chita Anca Monica, 2004). Many authors emphasize the importance of red light in the development of plant photosynthetic activity (G. Vasilevsky, D. Bosev, 1997). In experiments with continuous laser light and laser light modulated at audio frequencies (P. Niculita et al. 2006), found that when laser radiation is in addition to conventional radiation, there are sufficient doses up to 2 J/cm^2 irradiation plant.

The purpose of this experiment was to determine the effect of irradiation with laser light modulated synchronous at audio frequencies on biological material (seedlings) and the influence of this treatment on growth and subsequent development, in culture, the annual flower species. Thus may open new ways of research into vegetable and flower, allowing synchronous modulated laser light for environmental and not stressed stimulating growth.

MATERIAL AND METHOD

Between 2008-2009, the Research and Development Station for Vegetables Growing Buzau, under contract of research no. 52-136/2008 experiments were conducted on irradiation plant in the early stages of development (seedlings) with modulated fields of laser radiation and acoustic experiments were chosen for three species of annual flower plants, carnations 'Chabaud' (*Dianthus caryophyllus* L. 'Chabaud'), petunia *(Petunia hybrida* var. *grandiflora* Vilm.*)* and french marigold *(Tagetes patula* L.*)*

Irradiation was done with a diode laser irradiation device comprising: laser head, clamping support - arm system, power source (fig. 1).

Fig.1 Diode laser irradiation device

Laser head consists of 19 laser diodes in a cylinder aligned so that light emitted from them to overlap so as to generate a uniform illumination on the surface of exposure.

The connection type "mobile arm" allows the adjusting of the distance between laser diode system and the exposure area.

The device is independent and it can sit on a surface where it can be exposed plants to be treated. Surface exposure is selected depending on the size of plants to be irradiated and it is adjustable with mobile arm. **Main supply** is at a plug of 220V and 50 Hz .

Depending on the size of plants subject to irradiation and irradiated area, there were established five experimental variants, with different doses of radiation compared to an untreated control. Time of exposure and the height of the source of radiation varied in correlation with plant size (table 1).

Table 1

Treatment dose and exposure time depending on the illuminated area

Var.	Species	*Dianthus caryophyllus* L. `*Chabaud*`		*Petunia hybrida var. grandiflora Vilm.*		*Tagetes patula L.*	
	Radiation dose j/cm2	**The average height of the plant from package cm**	**Average exposure time min.**	**The average height of the plant from package cm**	**Average exposure time min .**	**The average height of the plant from package cm**	**Average exposure time min .**
V1	Martor	11.00	-	18.80	-	20.00	-
V2	0.02	15.00	1.00	22.80	1.30	20.01	1.00
V3	0.04	15.40	1.80	18.85	2.00	21.06	2.00
V4	0.08	11.10	3.00	21.45	4.30	22.96	4.67
V5	0.16	18.40	8.20	22.45	9.00	21.28	8.67
V6	0.30	19.80	16.40	21.35	17.20	20.94	16.67

Calculation example: for a dose of 1.2 J/cm^2, initially chosen time of lighting for an area of 50 cm^2 was 10 minutes, while for an area of 100 cm^2 was 20 minutes and for 200 cm^2 time of exposure came just to 40 minutes. For a planting irradiation with the results statistically assured there were sufficient doses up to 0.3 J/cm^2.

We assumed that laser biostimulation could have positive effects on plant development with measurable results: the rooting percentage,, the rhythm of development, plant size (their size), number of shoots issued, the diameter of shrubs and flower quality.

Irradiated seedbed was planted in the experimental field of S.C.D.L. Buzau, in randomized blocks, in six variants of four repetitions, each variant totaling an area of 11.2 m^2. Maintenance works were performed according to conventional technology. The experimental lots were set up on May 26, 2009, and there were made monthly observations and biometric measurements, on variations and repetitions by the end of the growing season.

RESULTS AND DISCUSSIONS

Data collected were processed and statistical interpretation of results was obtained. Results are presented both as values and the percentage deviation between laser irradiated version and untreated variant.

In tables 2 and 3 are experimentally determined numerical values and statistical interpretation of results. These data refer to dynamic growth and change of cams floral number of shoots formed in the studied species: carnations "Chabaud", petunias, marigold, the variations of radiation compared with witness variant (VI).

Based on these results we can state that there is a positive, significant separately influence of the irradiation with low doses of 0.04 (V3) and 0.08 (V4) J/cm^2 at species of carnations "Chabaud" and petunias. Plants have a higher waist, grow in an accelerated rhythm and form a larger number of shoots, compared with the control. In one case, at the carnations "Chabaud" it could see a reduction of plant waist, as a result of irradiation, the V5 version 0.16 J/cm^2 dose, reduction offset by an increase in the number of shoots emerged. From Table 2 it is apparent that there was a sharp increase in strain, 3-4 times faster, at V3 and V4 comparing with witness, for petunias and carnations 'Chabaud', and for marigold variants V2 and V5.

Regarding parameters of floral stem height and diameter of flowers, they grow slightly without statistical significance at carnations "Chabaud" and petunias and significantly reduce marigold species, according to data from table 4.

There are also shown the limit percentage differences (%) for all parameters determined in three annual flower species under study.

Table 2

Influence of radiation dose on the dynamics of stem growth and number of shoots formed

Var.	Species	*Carnation „Chabaud"*		*Petunias*		*Marigold*	
	Date	The dynamic of strain growth	Number of shoots	The dynamic of strain growth	Number of shoots	The dynamic of strain growth	Number of shoots
V1	30.07.2009	13.25	4.75	8.38	2.25	23.00	6.75
V2		19.25	13.00	10.88	6.75	32.00	9.75
V3		21.00	12.00	31.63	8.00	21.25	7.00
V4		14.88	10.50	25.50	6.25	23.25	5.25
V5		5.00	18.75	17.50	8.00	26.50	8.50
V6		16.25	9.75	30.25	4.75	30.25	8.75

Table 3

The statistical significance of the influence of radiation dose on the dynamics of stem growth and number of shoots formed at flower species studied

Var.	Species	Carnation „Chabaud"		Petunias		Marigold	
	Date	The dynamic of strain growth cm	Number of shoots	The dynamic of strain growth	Number of shoots	The dynamic of strain growth cm	Number of shoots
V1	30.07.2009	-	-	-	-	-	-
V2			xx		x	xx	
V3		x	xx	xxx	xx		
V4			x	xx	x		
V5		0	xxx		xx		
V6				xxx		xx	

Dianthus „Chabaud"

The dynamic of strain growth (%) Number of shoots formed (%) No flowers formed (%)

DL 5% = 41.0 DL 5% = 44.8 DL 5% = 58.9

DL 1% = 62.1 DL 1% = 81.5

DL 0,1% = 85.7 DL 0.1% = 112.5

Petunia

The dynamic of strain growth (%) Number of shoots formed (%) No flowers formed (%)

DL 5% = 44.9 DL 5% = 57.4 DL 5% = 53.2

DL 1% = 62.2 DL 1% = 79.4 DL 1% = 73.7

DL 0,1% = 85.9

Tagetes

The dynamic of strain growth (%) Number of shoots formed (%) No flowers formed (%)

DL 5% = 19.3 DL 5% = 47.2 DL 5% = 25.6

DL 1% = 26.7 DL 1% = 65.4 DL 1% = 35.4

Table 4

Influence of radiation dose on plant height and flower diameter

Var.	Species	*Carnation „Chabaud"*		*Petunias*		*Marigold*	
	Date	Floral stem cm	Flower diameter cm	Floral stem cm	Flower diameter cm	Floral stem cm	Flower diameter cm
V1	30.07.2009	18.00	4.16	2.25	4.93	11.19	4.23
V2		22.00	4.28	3.67	5.52	4.70	3.54
V3		25.00	4.00	2.30	5.69	4.56	3.60
V4		23.00	4.00	2.25	5.05	5.10	3.96
V5		25.00	4.00	2.93	5.52	5.50	4.19
V6		21.00	3.83	3.00	4.73	4.50	4.13

Line 18 of marigold, used as biological material in the experiments, it was created and stabilized by selection for positive individual from the local population at Buzau S.C.D.L. and it was entered in 2010 for D.U.S testing, for approval, under contract of research PN II 52-136 at I.S.T.I.S. Bucharest.

Fig. 2 - *Tagetes patula* – Line 18

CONCLUSIONS

1. Irradiation plants cause significant changes in waist plants and the doses used as ecologic and not stressed treatment proving its efficiency.

2. For carnations "Chabaud" and petunias the most efficiency doses of radiation are those with 0.04 J/cm^2 (V3) and 0.16 J/cm^2 (V5). These differences led to significant positive differences regarding the growth rate, size of plant, number of shoots formed and number of flowers formed.

3. Dose of 0.08 J/cm^2 (V4) determines also at petunias, a significant acceleration of plant growth rate and increase of shoots and flowers.

4. The maximum dose of irradiation used of 0.3 J/cm^2 (V6), significantly influence the growth of plants and petunias and crăiţe as well as the number of flowers formed for carnations "Chabaud".

5. Flower diameter shall be modified in the way of decreasing with increasing of radiation dose at carnations "Chabaud" and compared with the control and in the way of growth at petunias.

6. Of all the species treated with laser radiation, petunias and carnations "Chabaud" proved to be species with a rapid response as phenotypic manifestation in vegetation. Depending on the dose of radiation, speed and amplitude of the response the plants were remarkable.

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RESEARCHES ON THE INFLUENCE OF THE PERIOD OF PRELEVATION ON THE PROPAGATION THROUGH CUTTINGS OF SUCCULENT PLANTS

CERCETĂRI PRIVIND ÎNFLUENŢA EPOCII DE PRELEVARE A BUTAŞILOR ASUPRA ÎNMULŢIRII PLANTELOR FLORICOLE SUCULENTE

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Abstract. *Propagation through cuttings is one of the most used methods of propagation of the succulent flower plants. In this work there are presented the results of the observations concerning the influence of the sampling period of cuttings (of shoots and leaves) on the multiplication of nine species of succulent plants .The observations and the measurements taken in three different period (November, April, August) aimed the rooting as well the evolution of increasing the rooted cuttings (at 30 and respectively 60 days from their planting in pots). From the researches made we observed that the period of sampling the cuttings influences the time of rooting (to all species for both types of cuttings), the percentage of rooting (for cuttings of leaves), but also the growth dynamic, the positive results obtaining on spring (April) and summer (August).*
Key words: succulents, propagation, cuttings, period

Rezumat. *Înmulţirea prin butasi este una din cele mai utilizate metode de inmultire a plantelor floricole suculente.În lucrarea de faţă sunt prezentate rezultatele observaţiilor privind influenţa epocii de prelevare a butaşilor (de lăstari şi frunze) asupra înmulţirii a nouă specii de plante floricole suculente. Observaţiile si măsurătorile efectuate în trei epoci diferite (noiembrie,aprilie şi august) au vizat atât procesul de inradacinare cât si evoluţia cresterii butaşilor înrădăcinaţi (la 30 respectiv 60 de zile de la plantarea la ghiveci). În urma cerceţărilor efectuate s-a observat că perioada de prelevare a butasilor influentează timpul de înrădăcinare (la toate speciile şi pentru ambele tipuri de butaşi), procentul de înrădăcinare (pentru butaşii de frunze), dar şi dinamica cresterii, rezultate pozitive obţinându-se primăvara (aprilie) şi vara (august).*
Cuvinte cheie: suculente, înmulţire, butaşi, epoci

INTRODUCTION

At present, 90% from the succulent flower plants commercialized are propagated in the profile greenhouses, specially on vegetative way (Grovers H.N. and collab. 2004).

From the methods of vegetative propagation the most effective is the propagation through cuttings, this representing a series of advantages, from the technical and economical point of view (Anton Doina, 2003). The vegetative organs used in cutting propagation differs, depending on the species, but the most frequently are used the cuttings of shoots and leaves.

The studies carried on demonstrate the fact that the propagation by cuttings for the succulent flower plants from the interior can be achieved throughout the year (Stephenson R., 2002).

The purpose of this study was represented by establishing the influence of the period of cuttings prelevation (shoots and leaves) on the rooting and the dynamic of plants growing (during 60 days) of nine species of succulent flower plants and the prominence of existing differences between different species.

MATERIAL AND METHODS

The researches expand in the greenhouse of the Floriculture discipline at the Faculty of Horticulture of Craiova.The biological material used was represented by cuttings that bellonged to nine species of succulent flower plants (*Crassula lycopodyoides, Crassula rupestris ssp. marnieriana, Sedum linearum, Sedum mexicanum, Sedum morganianum, Sedum pachyphyllum, Senecio kleiniformis, Senecio piramidatum, Senecio rowleyanu*s).

For establishing the influence of the period of cuttings prelevation upon the rooting cuttings they were reaped in three different periods (period I-November 2008, period II-April 2009, period III- August 2009). For the rooted cuttings it was used a standard substratum for the cactaceae and other succulent plants, employing containers of small dimensions with a diameter of 6 - 8 cm. After a week of planting the cuttings we carried out the observations concerning the formation of radicular system, which were performed regularly within two-three days, for catching out the rooting moment for each species (time and percentage of rooting). For the evaluation of the dynamics growth and development of rooted plants there were made some initial measurements after the planting into pots and afterwards every 30 and 60 days.

RESULTS AND DISCUSSIONS

The observations performed on rooting the cuttings of shoots have shown that the period of rooting was considerably lower for the cuttings sampled in April (period 2) and August (period 3), in comparison with November (period 1).

In period 2, the duration of root cuttings, was less than nine days (*Senecio kleiniformis, Senecio piramidatum*) until 27 days (*Crassula rupestris ssp. marnieriana*), compared with period 2. Between period 1 and 3 the differences were of six days (*Senecio kleiniformis, Senecio piramidatum*) until twenty-seven days (*Senecio rowleyanus*), in favour of period 3. For the periods 2 and 3, the rooting time was the same (*Crassula lycopodyoides, Sedum mexicanum*) or it varied with three days (to *Senecio kleiniformis and Senecio piramidatum, Senecio rowleyanus*) up to six days (to *Crassula rupestris ssp. marnieriana, Sedum pachyphyllum),* alternately for a period or other (fig.1). The rooting percentage for the cuttings of shoots was high (90%-100%), regardless the sampling period, for the species studied.

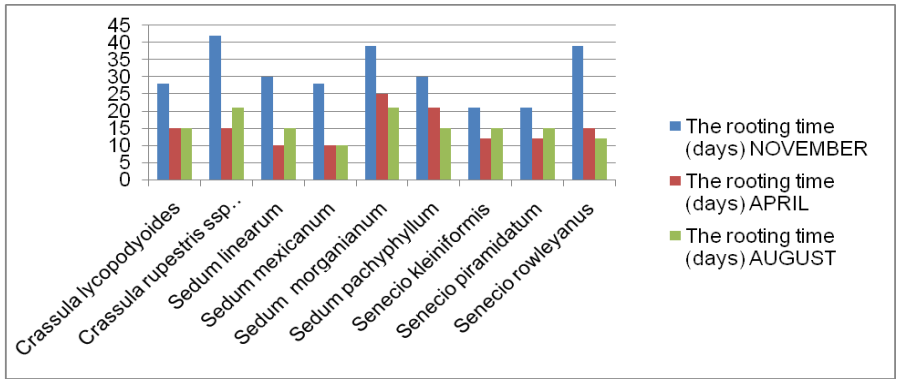

Fig.1. The rooting duration of the shoots cuttings

The dynamic of growing was also influenced by the period of cuttings sampling. The observations made at 30, respectively 60 days show that the speed of growing was twice bigger in the period 2 and period 3, for *Crassula lycopodyoides, Sedum linearum, Sedum mexicanum and Sedum pachyphylum*

For example, to *Crassula lycopodyoides*, the measurements carried on at 60 days indicates a growing of 0,9 cm in period 1, in comparison with 2,35 cm in period 2 and 2,2 cm in period 3.

Smaller differences registered to *Crassula rupestris ssp. marnieriana, Sedum morganianum* and *Senecio rowleyanus*. For *Senecio kleniformis* and *Senecio piramidatum* the evolution of cuttings after rooting were alike, regardless the period of prelevation (fig. 2,3,4). A better evolution of the cuttings of shoots planted in August, in comparison with April, have shown *Sedum mexicanum* and *Senecio piramidatum*. They root rapidly and have a fast grow, regardless of the period they prelevation, the cuttings of shoots at *Senecio kleiniformis and Senecio piramidatum;* root more difficultly and grow slowly the cuttings of shoots of *Crassula rupestris ssp. marnieriana, Sedum morganianum, Sedum pachyphyllum and Senecio rowleyanus* (fig. 2,3,4).

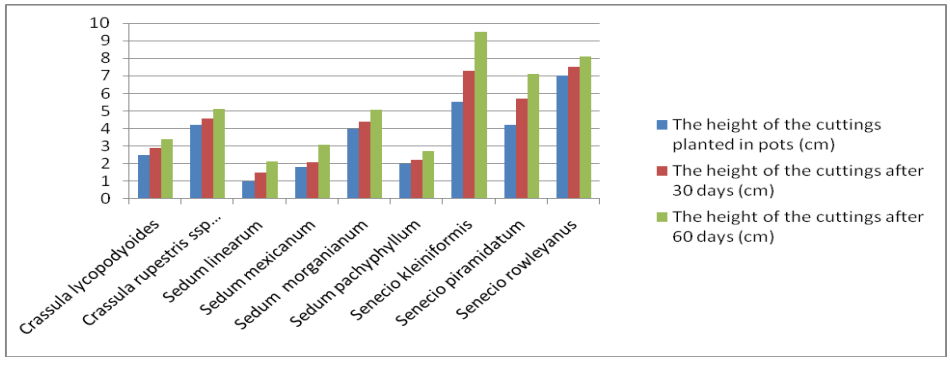

Fig.2. The growth dynamic of the shoots cuttings - NOVEMBER

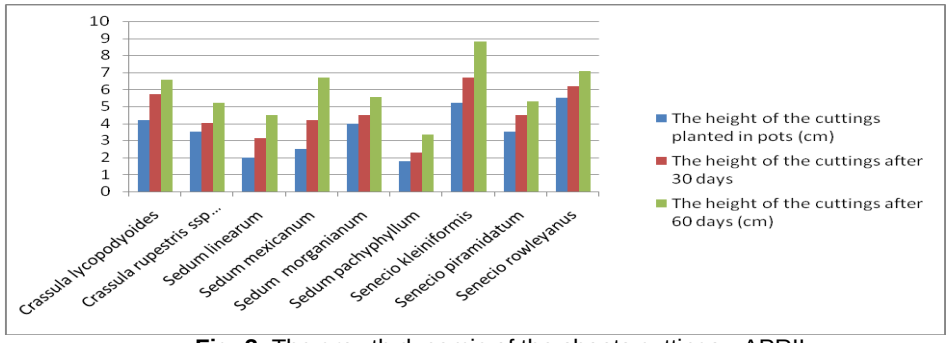

Fig. 3. The growth dynamic of the shoots cuttings - APRIL

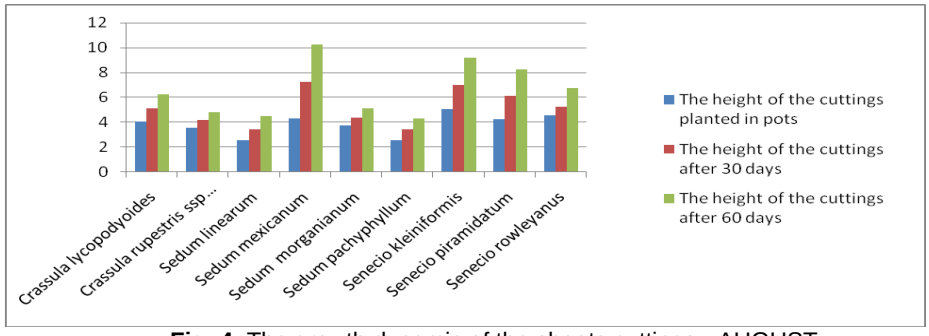

Fig. 4. The growth dynamic of the shoots cuttings - AUGUST

The rooting period for the cuttings of leaves was bigger in comparison with that of cuttings of shoots, but the reference to the three period is alike(fig. 5)

The cuttings of leaves of *Crassula lycopodyoides and Sedum mexicanum* did not root, and after their planting in the pots, their evolution was satisfying only to the species *Sedum morganianum*, *Sedum pachyphyllum and Senecio rowleyanus.*

The rooting percentage was small, varying, in period 1, from 10% (*Sedum linearum*) to 60% (*Senecio rowleyanus*), and in periods 2 and 3 between 20% (*Sedum linearum*) and 80% (*Sedum pachyphyllum*) (fig 6).

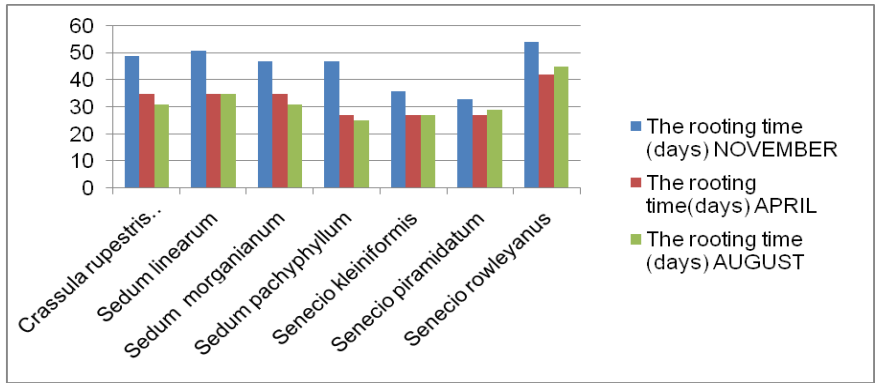

Fig.5. The rooting duration of the leaves cuttings

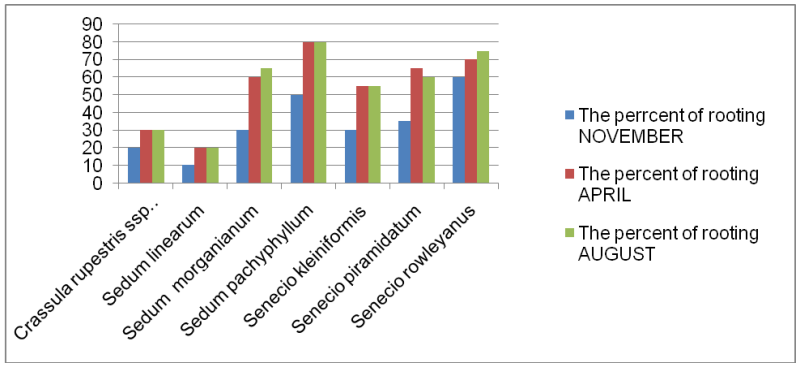

Fig. 6. The rooting percentage of the leaves cuttings

The dynamic of plants growth for the three species was slow, values slowly higher we can observe for the plantlets that come from leaves that are put to rooting in periods 2 and 3.

At one year, the plantlets of *Sedum morganianum* measures 2,05 cm (period 1), 2,2 cm (period 2) and 2,25 cm (period 3), those from *Sedum pachyphyllum* 1,82cm (period 1), 1,89 cm (period 2), 1,82 cm (period 3), and those from *Senecio rowleyanus* 1,34 cm (period 1), 1,46 cm (period 2), 1,4 cm (period 3) (fig. 7,8,9).

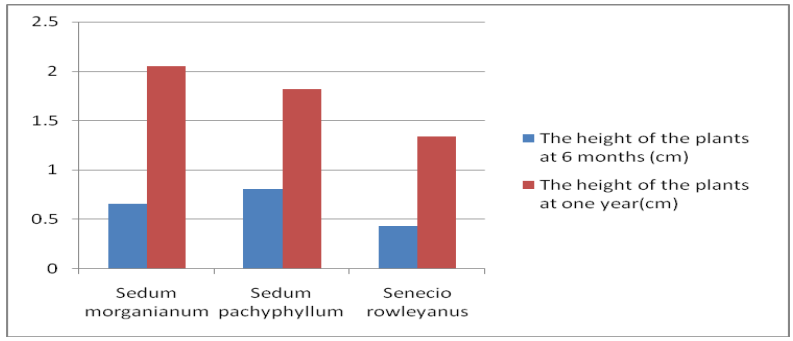

Fig.7- The growth dynamic of the leaves cuttings – NOVEMBER

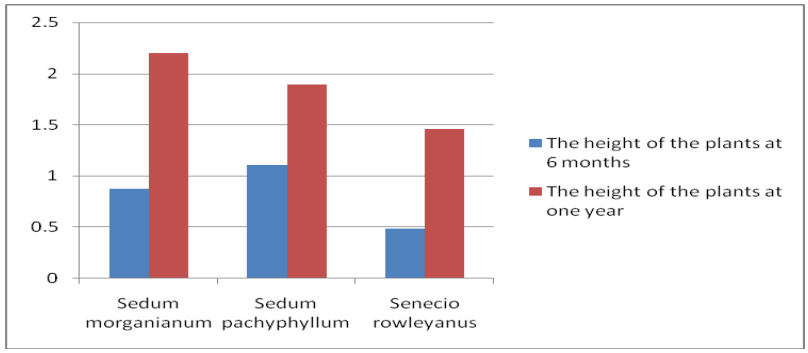

Fig. 8. The growth dynamic of the leaves cuttings – APRIL

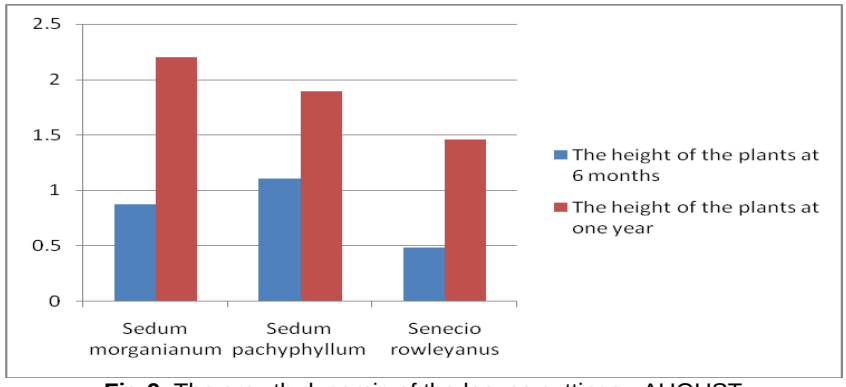

Fig.9. The growth dynamic of the leaves cuttings– AUGUST

CONCLUSIONS

1. Propagation by cuttings at succulent plants can be carried out all along the year, but with different efficiency, the periods April and August being a lot more favourable as for cuttings rooting but also for the subsequent plants evolution.

2. Cuttings of shoots at *Senecio kleiniformis* and *Senecio piramidatum* root easily and have a fast growth, regardless the period of prelevation .

3. Have a heavier rooting and a slow growth the cuttings of shoots at *Crassula rupestris ssp. marnieriana, Sedum morganianum, Senecio pachyphyllum* and *Senecio rowleyanus.*

4. The small percentaj of rooting and the slow growth of plants does not recommend the propagation by cuttings of leaves of the species studied for obtaining merchantable plants, but it can be used as an alternative method when there is not enough vegetal material for propagation by cuttings.

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VERTICAL GREENHOUSE - ECONOMICAL AND ECOLOGICAL ALTERNATIVE FOR HIGH-ENERGY CONSUMPTION PROTECTED SPACES

SERA VERTICALĂ - ALTERNATIVĂ ECOLOGICĂ ŞI ECONOMICĂ A SPAŢIILOR PROTEJATE ENERGOFAGE

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Abstract. *In the framework of a CEEX research-development project accomplished by the SCDL Buzau collective, has been realized an experimental model of a vertical greenhouse which was also patented. This type of protected space ensures proper environment for growing flowers, medium size vegetable transplants, good work conditions for the personnel, multiplies the surface used at ground level and also reduces the energy consumption. The enclosed space consists in a metallic structure that comprises a servicing enclosure and a technological enclosure, inside of which is a chain transporter with swing where the plants are cultivated. The ensemble has a slow ascending-descending movement. For vegetable growing, the metallic structure is covered by a transparent material, glass or an insulating material. The heat/air conditioning source is mounted under the technological enclosure. On the inferior part there are aeration windows and the roof is foldable so it allows natural as well as artificial aeration.*

Key words: vertically developed greenhouse, transplants production, seeds drying, seed production vegetables

Rezumat. *În cadrul proiectului CEEX/2005 al SCDL Buzău a fost realizată o seră dezvoltată pe verticală, brevetată în anul 2008. Acest tip de spaţiu protejat asigură condiţii optime pentru dezvoltarea plantelor, multiplică suprafaţa la nivelul solului, reduce consumurile de energie termică, creează condiţii mai bune de muncă pentru personal. Spaţiul protejat se compune dintr-o structură metalică care cuprinde o incintă de deservire şi o incintă tehnologică de tip turn cu un transportor cu cupe cu mişcare ascendent-descendentă lentă în care sunt cultivate plantele, acestea fiind expuse la lumină şi temperatură optime. Structura metalică a serei este acoperită cu material transparent - sticlă sau policarbonat. Climatizarea serei se face cu o sursă de căldură poziţionată sub transportorul cu cupe, în perioadele cu temperaturi ridicate se creează un curent de aer prin deschiderea ferestrelor de la baza serei şi a acoperişului rabatabil. Circulaţia aerului este forţată prin acţionarea ventilatorului de la baza serei.*

Cuvinte cheie: seră verticală, producere de răsaduri, uscare seminţe, producţie de seminţe de legume

INTRODUCTION

The regular greenhouses list a number of disadvantages, apart from the economical efficiency that is specific to the enclosed spaces: the thermic efficiency is low especially for low stem vegetables because the heat sources

placed on the lower part and on the sides of the greenhouse ensure only a small part of the heat that is necessary in order for the plants to grow, because most of the heated air will rise toward the top of the greenhouse. Another drawback is that when the outside temperature is high, due to the greenhouse effect, the temperature inside the greenhouse grows very much, and the ventilation systems can't reestablish the proper temperature regime and it puts the plants through significant thermical stress.

MATERIALS AND METHOD

The project we are proposing is a greenhouse that ensures a multiplied germinative bed surface for plant growing on the same ground level surface, and that creates proper light and heat conditions for the plants. The vertical greenhouse fills in a void in the enclosed space domain. It is meant to be used for flower and vegetable growing, low stem flowers and seed drying **(**Roman Gh., Dumbravă M., 1998). It also has the advantage that it can be used all throughout the year.

Fig. 1. Vertical greenhouse

The vertical greenhouse, which is a CEEX research-development project accomplished by the SCDL Buzau collective, is conceived so that it solves this technical issue and eliminates the disadvantages of the existing enclosed spaces: it consists of frame made up of pipe pillars and steel beam frame, with bezels for windows , which form an enclosure that develops vertically and is functionally correlated with a vertical transportation system with an ascending-descending movement, triggered by an electric engine through an electronic motor speed control.

RESULTS AND DISCUSSIONS

The transportation system consists of:

- the support ensemble located at the top of the greenhouse. It has two bars that are anchored on the frame of the greenhouse, with four bearings mounted on them that sustain four special chain wheels through four axes.

- the gearing ensemble situated at the lower part of the greenhouse consists of an electric engine triggered by an electronic motor speed control. This speed control imprints the movement to a worm reducer and the movement goes to the chain drive that activates two of the special chain wheels from the lower part of the greenhouse.

- the rocker conveyer is made of two chains, arranged on the aisles of the greenhouse.

Fig. 2. The transportation system

Fig. 3. The gearing ensemble

The chains have some parallelepiped beakers mounted on them that are arranged symmetrical and are fixed with some anchoring devices. On the lower part of the greenhouse are also two stretching devices mounted on the greenhouse bars that act on the inferior arms of the two conveyer chains. The greenhouse climatization is made up of the windows, situated at the low level of the greenhouse, of the folding roof, which is activated by two lifting jacks, of the heating devices and of the cooling fans, situated in a tank, under the bucket carrier. Adjusting the heat range: in case the atmospheric temperature is low, the heating devices must be switched on; in case the atmospheric temperature is high, the windows situated at the low level of the building must be opened, as well as the folding roof, and in case it is required, the cooling fans may be switched on, as well. Adjusting the temperature must be performed taking into consideration the breeds of plants which are to be grown, as well as their growth/development status; thus, for the emergence status the temperature must be higher, while during the growing status the temperature is to be adjusted function of the moment of sowing.

Fig. 4. The rocker conveyer

In case the sowing conditions are not met, although the calendaristic date indicates a proper time, by lowering the temperature, the development of the plants is slowed down, triggering an effect of higher resistance to inappropriate conditions. For the procedure of drying vegetable and flower seeds, the heating and cooling systems must be activated, in order to diminish humidity.

By changing the number of spaces which are assembled inside the rectangular buckets, the installation conveys the possibility to adjust the light, function of the species which is to be grown, as well as its development status.

The installation may adjust the speed of the bucket carrier, managing to successively expose the plants to different intensities of light and temperature, at different time ranges. In case of proceeding to drying seeds, the installation can control the heating and cooling ranges, so that the germination is not affected, regardless of the atmospheric conditions.

Assembling the installation: to be performed on a North-South direction, taking into consideration the moving direction of the bucket carrier. The greenhouse is to be equipped with ventilation windows, heating devices and cooling fans, properly sized to correspond to the growth conditions of the plants.

Our assessed objective has been achieved, that is, the construction of a greenhouse which, starting from a certain given ground surface, offers an enlarged surface of germinative layers for plants and conveys proper conditions for a better use of the light and heat inside its precinct. The vertical greenhouse has been tested to produce vegetable and flower seedlings, low stem flowers and dry vegetable and flower seeds.

The data referring to the use of the vertical greenhouse for the production of seedlings has been collected subsequent to the experiments performed within S.C.D.L. Buzau, on five vegetable species – tomato, green pepper, eggplant, cabbage and salad, as well as on four flower species - *Tagetes, Petunia, Salvia, Dahlia*. The tests have been performed in a classical, horizontal greenhouse, designed and subdivided with the purpose of seedling production and in a vertical greenhouse, a patent of S.C.D.L. Buzau, designed for the production of seedling production and vegetable seeds drying.

The vegetable seedlings have been produced in alveolar pallets, divided into 4.5/4.5 cm cells, the flower seedlings in pallets with 4/4 cm cells, while the nutrient was disinfected and treated peat coal. Thus, 12750 seedlings have been produced under this process, during one cycle.

Observations have been recorded, on the temperature inside the spaces where the seedlings were produced, by recording the temperature ranges every 4 hours. The speed of development and growth has been observed as well, by daily measuring the temperature at the high level inside the building, throughout the testing period. The phenological data have been recorded as well, subsequently calculating the phenophase ranges.

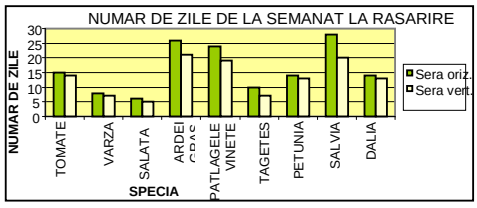

Fig 5. Number of days between sowing and emergence

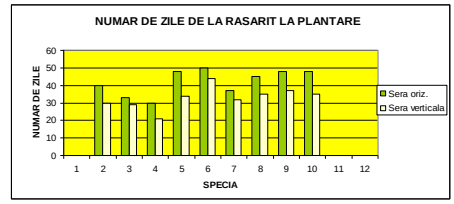

Fig 6. Number of days between emergence and planting

With all the species under study, the time range between sowing and emergence and the time range between emergence and planting is shorter, in the

case of vertical greenhouse, compared to the horizontal greenhouse, due to the proper microclimate for the emergence and the growth of plants, which is created inside such a type of greenhouse. This proper microclimate is based on the upward circulation of the warm air and the fast uniformization of the temperature, as well as on the vertical movement of the plants, by means of the 10 especially designed buckets, a movement which conveys a higher firmness of the plants at the moment of planting and prevents the seedlings from elongating their stems.

Fig. 7. Seedlings in vertical greenhouse

Further testing has been performed in order to determine the efficiency of the vertical greenhouse for the process of drying vegetable seeds (Gapşa F. şi colab., 1995, Gheorghe Florica, Burnichi Floarea şi col., 1996**).** The tests have been performed on vegetable marrow seeds, (variety: Hapy). The seeds have been extracted, washed and subject to drying on the same day. Under the classical procedure, there was an amount of 50 kg of seeds subject to natural drying, on textile base, inside a non-ventilated room, initial humidity = 35%, final humidity = 11%, exposure time = 28 hours. The second procedure was performed inside the vertical greenhouse, with an amount of 50 kg of vegetable marrow seeds, while the cooling fans were functioning. The seeds were placed inside the buckets, on sieves.

CONCLUSIONS

The vertically developed greenhouse brings added value to the seedling and low stem flowers production technology in enclosed spaces using a more efficient system, economically and also environmentally wise. According to this project, the greenhouse has a number of advantages:

1. Ensures a multiplied germinative bed surface for plant growing without needing extra ground level surface. The experimental model covers an area of 12 m2 at ground level, and the cultivated surface is 48 m^2, which means it's four times the ground level area;

2. The rocker conveyer helps gradually expose all the plants equally to natural light. The vertical construction of the greenhouse leads to a more efficient use of the heat coming from a cooling fan in the lower part of the installation, because the warm air circulates towards the roof, and the heat is absorbed by the biological material and also by the installation, so that the temperature of the air that gets to the upper part of the greenhouse is much lower than in the case of regular greenhouses. It's easier to control the humidity and temperature for the vertical greenhouse through windows and vents, because in case of sunstroke and high humidity level, the air circulation covers the entire space of the installation;

3. Using the vertical greenhouse for seedling and flower production ensures a reduction in the germination interval (the time range between the sowing and the emergence) by 17.93% and also in the interval of growth and development of the biological material in order to set up the crops (the time range between the emergence and the cultivation) by 21.63%. The daily medium growth rate of the vegetative unit at tomatoes in a vertical greenhouse is 0.74 cm. The request for flower transplants and flowerpot flowers has increased during the past years and the vertical greenhouse is very fit for this use;

4. This greenhouse solves the vegetable seed drying issue that is currently performed in improper conditions because of the material cleanliness and the lack of efficiency. The seed drying is presently made in open air: this involves a lot of manual labor, the risk of contamination, the risk of damage during bad weather, therefore the germination loss risk. The exposure time reduction means a saving of 40 hours/100 kg dried seeds, with a value of 1.75 lei/kg, corresponding to 54.7%.

5. The energy consumption needed to activate the rocker conveyer is minimum, because the two arms of the installation are balanced and the only energy needed is just to handle the frictions;

6. The labor conditions for the personnel are much better than in the rest of the enclosed spaces: the work posture is better, the working temperature is bearable, and the air is purified more efficiently in case of chemical treatment;

The greenhouse test model is the first phase of the research conducted in order to improve the performances of enclosed spaces. The research engineers from S.C.D.L. Buzau collective want to have the vertical greenhouse prototype produced and commercialized by a specialized company.

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THE BUD LOAD INFLUENCE ON THE QUALITY AND QUANTITY OF THE YIELD FOR PINOT GRIS VARIETY IN COPOU WINE CENTRE – IAŞI VINEYARD

INFLUENŢA ÎNCĂRCĂTURII DE ROD ASUPRA CANTITĂŢII ŞI CALITĂŢII PRODUCŢIEI LA SOIUL PINOT GRIS ÎN CONDIŢIILE CENTRULUI VITICOL COPOU – PODGORIA IAŞI

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Abstract. *The bud load is the main factor that determines the expression of the agro-productive characteristics of the vine varieties, as well as biological equilibrium between vegetative development - fruitiness and quatinty – quality proportion. Increasing the bud load assures the augmentation of the yield up to a certain limit, beyond that the yield remain stable indifferent by the number of the buds left on the vine canes. The quality of the yield is a more variable parameter, this being influenced by numerous factors including bud load. The results of the experiences effectuated on Pinot Gris variety in Copou wine-growing centre – Iaşi vineyard, shows the complexity of the bud load – yield relationship: the quantity of the yield depends not only by the grapes number developed on the vine but also by their size, while the quality of the yield is determined above all by the exposed leaf area and in secondary by the number and size of the grapes of the vine.*

Key words: vineyard, pruning, bud load, grapes yield, sugar.

Rezumat. *Încărcătura de rod reprezintă factorul de care depinde exprimarea însuşirilor agroproductive ale soiurilor de viţă de vie şi realizarea echilibrului biologic în relaţiile creştere-fructificare şi cantitate-calitate. Amplificarea încărcăturii de rod permite creşterea producţiei până la un anumit nivel, după care, indiferent de numărul de muguri lăsaţi pe butuc, aceasta se menţine constantă. Calitatea strugurilor este un element mult mai mobil, fiind influenţată de un întreg complex de factori, în rândul cărora încărcătura de rod deţine un rol determinant. Rezultatele experienţelor efectuate la soiul Pinot gris în condiţiile centrului viticol Copou, relevă o dată în plus complexitatea relaţiei încărcătură de rod – producţie de struguri: mărimea producţiei depinde nu doar de numărul de struguri formaţi pe butuc ci şi de mărimea acestora; calitatea producţiei este condiţionată în primul rând de suprafaţa foliară expusă a butucului şi în mai mică măsură de mărimea producţiei.*

Cuvinte cheie: podgorie, tăiere de rodire, încărcătură de rod, producţie de struguri, zaharuri.

INTRODUCTION

The widely known Pinot Gris grapevine variety has been recently authorized (2004) for cultivation in the north-eastern vineyards from Moldavia region, in order to produce white quality wines. The high resistance of this variety to frost (- 22…-24 ºC) and its short vegetative period (160 – 170 days) recommends it as one of the most suitable grapevine varieties for this region,

characterized by frosty winter, medium vegetative period (170 – 180 days) and relatively low annual average temperature (Oşlobeanu et.al,1991). Because of its biologically advantages this variety has been cultivated in the vineyards from this region on very restricted areas and it have been encountered as an impure in many plantations. But because of the legal restriction and especially because its limited productivity it haven't been promoted and extended in the vineyards. Also the are few research regarding the behavior of this variety in the Moldavian vineyards (Piţuc P. et al.,1974). Because of these reasons nowadays is required to study, to elaborate optimum technologies and to promote the growing of this worthwhile variety in Moldavian Viticultural region. Through this work paper we presents the results of some observations made in 2008 in Ampelographic Collection of Horticultural Faculty from Iaşi.

MATERIAL AND METHOD

The experiences have been organized in 2008 on Pinot Gris variety in Ampelographic Collection of Horticultural Faculty from Iaşi. The trellising form is Cazenave Cordon with height of stem by 0.75 m, the planting distances by 2.2 m between the rows and 1.1 m between the vines on the row and monoplane trellising system. There were four experimental variants, each of them with a different bud load distributed on short canes of five winter buds: V_1 = 16 winter buds/vine; V_2 = 22 winter buds/vine; V_3 = 28 winter buds/vine; V_4 = 36 winter buds/vine. We have done the next analysis and determinations: *the number and the length of the shoots, total foliar surface, the exposed foliar surface, the fertility coefficients of the vines, the size of the grapes, the quantity of the yield, sugar content* and *acidity of the grapes.*

RESULTS AND DISCUSSIONS

1. Vegetative development of vines. Pinot Gris is a low vigorous grapevine variety, with generally short and thin shoots, especially in meager soils. The Copou wine-growing centre soils are generally fertile, with a 2.82 % of humus content that stimulate the development of the shoots and sustain the vegetative development of the vines. This fact assures an increase of the bud load in order to obtain bigger yields. The number of shoots on the vine is directly correlated with the bud load left at pruning; when the bud load is lower, under the biological potential of the vine, a supplementary number of shoots appear from the dormant buds, as a tendency of the vine to create a the biological equilibrium between the root system and the vegetative system (Irimia L., Ţârdea C., 2001). The average length of the shoots is negatively correlated with their number: the longest ones are at the first variant and the shortest at the fourth variant (table 1).

The total leaf area developed by the vines was directly correlated with the bud load and the number of shoots developed on vines: the lowest total foliar surface was 2.20 m^2 at V_1 experimental variant, and the largest 3.70 m^2 at V_4 experimental variant. The exposed leaf area characteristic for the trellising system is 2.58 m^2 on the vine (Irimia, Ţârdea C., 2007).

Table 1

The influence of the bud load on the development vegetative parameters of the vines at Pinot gris variety

Specification	Variant/Bud load			
	V_1/16	**V_2/22**	**V_3/28**	**V_4/36**
Number of shoots / vine	24	29	34	39
Supplementary shoots	8	7	6	3
Average length of shoots (m)	1.36	1.28	1.12	0.88
Total leaf area (m^2)	2.20	2.86	3.42	3.70
Exposed leaf area (m^2)	2.58			
Foliage excess (m^2)	0.00	0.28	0.84	1.12
Foliage exposure degree (%)	100	90.2	75.43	69.72

The foliage excess is registered at the second, third and the fourth experimental variants. These register also a lower foliage exposure degree: 90.2% at V_2, 75.43 % at V_3 respectively 69.72 % at V_4. A rather optimum foliage exposure assure V_2 variant with 90.2% %, while V_1 doesn't use the entire extent offered by the trellising system. The vegetative development could be considered optimum at the V_2 experimental variant, with a normal development of shoots and parameters of the foliage; V_1 variant doesn't valorize the entire extent assured by the trellising system, while the third and fourth variants has a dense foliage that is partly exposed at direct solar radiation: 75.43 % at V_3 and 69.72 % at V_4.

2. Fertility of the vines. The percent of fertile shoots for the experimental variants is not influenced by the bud load left on pruning, being comprised between 82 % at the first variant and 79% at third variant (table 2); in fact there is the shoot fertility resulted after the differentiation process from the previous year.

Table 2

The influence of the bud load on the fertility characteristics of the vines at Pinot gris variety

Specification	Variant/Bud load			
	V_1/16	**V_2/22**	**V_3/28**	**V_4/36**
Fertility of shoots (%)	82	78	79	80
Relative fertility coefficient (Cfr)	0.82	0.94	1.24	1.47
Absolute fertility coefficient (Cfa)	1.24	1.36	1.45	1.68

A different situation is registered regarding the fertility coefficients: the increase of bud load determine an increase of fertility coefficients: the highest values of fertility coefficients is registered at V_4 with Cfr = 1.47 and Cfa = 1.68; the lowest values are at V_1 with Cfr = 0.82 and Cfa = 1.24. The phenomenon is determined by the numerous shoots formed from dormant buds on V_1 variant. The lower bud load turn to advantage the fertility of this variety by forming many inflorescences on the shoots, because of the abundant resources catered by the foliage that assure a good sustenance of the vegetative and generative organs.

3. Productivity of the vines. Pinot Gris is a low productive variety due to the small grapes, especially when the vines are cultivated on the meager soils. The increase of bud load determine the decrease of the grapes' weight, as it follows: the weighty grapes with an average of 0.103 g are at V_1 experimental variant

while the smallest are at V_4 variant, with 0.078 g. The productivity of this grapevine variety is better valorized at a 16 bud load per wine (V_1) where upon the number of grapes per bud is 1.12; this value decrease at 1.09 grapes per bud at V_2 and 0.88 grapes per bud at V_4 (table 3). The best improvement of productivity is registered at the lower bud load of V_1 and V_2.

Table 3

The influence of the bud load on the productivity of the vines at Pinot gris variety

Specification	Variant/Bud load			
	V_1/16	**V_2/22**	**V_3/28**	**V_4/36**
Number of grapes per vine	18	24	29	32
Number of grapes per bud	1.12	1.09	1.01	0.88
Weight of the grapes (g)	0.103	0.097	0.90	0.078

4. The quantity and the quality of the yield. Productive potential of the Pinot Gris variety is low because of its small grapes; with the training system used in this wine-growing region (2.2 m/1.2 m; 3787 vines/ha; Cazenave Cordon), the yield varies between 5 and 13 t/ha. The bud load experimented determined a significant variation of the yield; the smallest yield, by 1.85 kg grapes/vine registered at V_1 and the weightiest of 2.61 kg/vine at a 28 buds/vine (V_3). The yield for one *ha* varies similarly with the yield on the vine: the biggest yield is registered at V_3 with a 9.86 t/ha and the lowest at V_1 with 7.0 t/ha.

Table 4

The influence of the bud load on the quality and quantity of the yield at Pinot Gris variety

Specification	Variant/Bud load			
	V_1/16	**V_2/22**	**V_3/28**	**V_4/36**
Yield (kg/vine)	1.85	2.32	2.61	2.49
Yield (t/ha)	7.0	8.76	9.86	9.41
Sugar content, g/l	194	222	188	182
Acidity, g/l H_2SO_4	3.24	4.02	4.15	4.32

The quality of the yield was nearly under the biological qualitative potential of this variety, that can accumulate up to 230 sugar g/l. The best sugar content of the must is registered at V_2 variant with 222 g/l while the lowest at V_4 with 182 g/l. We can observe an negative correlation between the bud load and sugar accumulation, the biggest bud load determining the lowest sugar contents. Acidity of the must had the lowest level of 3.24 g/l H_2SO_4 at V_1, a very small acidity to assure the obtain of a fruity, balanced wine; the highest acidity, but not excessive registered at V_4 variant with 4.32 g/l H_2SO_4, while the V_2 and V_3 variants had balanced acidity of 4.02 g/l H_2SO_4 respectively 4.15 g/l H_2SO_4.

5. Correlations between bud load, vegetative development and yield characteristics. The bud load assure an increase of the yield but in the same time the quality of the grapes is significantly diminishing; the sugar content registering an important decrease, while the must acidity could became excessive in the rainy years.

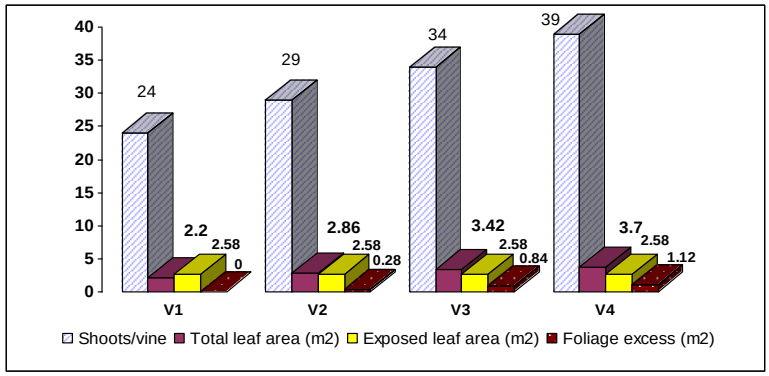

Fig. 1. The variation of number of shoots, total leaf area, exposed leaf area and foliage excess determined by bud load size, at Pinot Gris variety

The increase of bud load determines the increase of the number of shoots per vine and also an enlargement of the total leaf area; while the exposed leaf area maintains constant there results an augmentation of density of canopy because the training system doesn't permit the exposure of the entire foliage to direct solar radiation. This diminish the photosynthetic productivity of the foliage and the accumulation process of the glucides in shoots and berries. An approximate biological balance registers to V_2 variant which has an optimum leaf area, with an minimum foliage excess (figure 1).

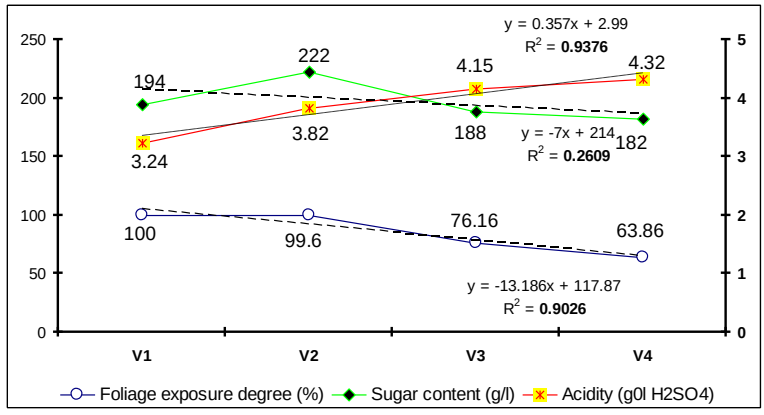

Fig. 2. Correlation between bud load, foliage exposure degree, sugar content and acidity at Pinot gris variety

Correlations between vegetative parameters and quality of the yield reveal an important influence of the foliage on the sugar accumulation and level acidity. The decrease of foliage exposure determines the diminution of sugar content and the increase of acidity (figure 2). The augmentation of the canopy denseness negatively correlates with sugar content (figure 3). From these correlations results that the bud load that assure an optimum valorization of qualitative potential of Pinot Gris variety in Copou wine-growing centre is 28 buds on the vine.

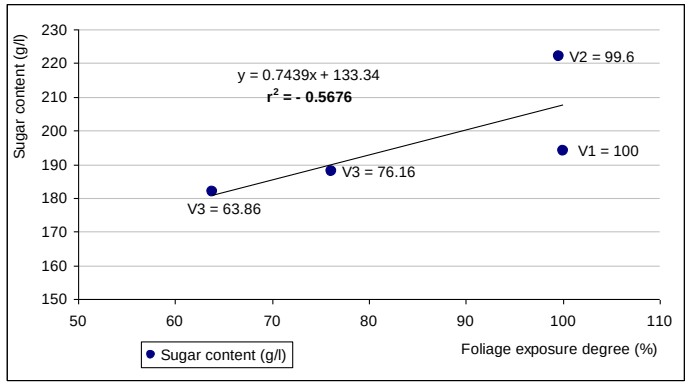

Fig. 3. Correlation between foliage exposure degree and sugar accumulation in the berries for Pinot Gris variety

This determine the development of a totally leaf area that can be entirely exposed to direct solar radiation and creates to leaves canopy an optimum microclimate conditions that stimulate the sugar accumulation and total acidity.

CONCLUSIONS

1. In Copou wine-growing centre, Iasi vineyard, on Cordon Cazenave training system and 3787 vines/ha density of plantation, the biological vegetative equilibrium of Pinot Gris variety is achieved with a bud load of 22 winter buds per vine.

2. The optimum 22 winter buds/vine determine the development of 2.86 m^2 exposed leaf area that is rather entire exposed to direct solar radiation (90.2%) and assure an optimum microclimate for the grapes and leaves.

3. The highest yield by 9.86 t/ha is achieved with a 28 bud load/vine, but the sugar accumulations in this situation are very low, by 182 g/l; the optimum 22 bud load assures a 8.76 t/ha yield, that represent an average of biologic productivity potential for this variety.

4. The qualitative potential of Pinot Gris variety is turn to advantage with a 22 bud load/vine, that assure the highest sugar accumulation in the berries, respectively 222 g/l and a balanced total acidity of 4.02 g/l H_2SO_4.

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USE OF THE RAPD (RANDOM AMPLIFIED POLYMORPHIC DNA) TECHNIQUE FOR REVEALING THE DNA MOLECULAR POLYMORPHISM IN SOME AUTOCHTHONOUS GRAPEVINE VARIETIES

UTILIZAREA TEHNICII RAPD (RANDOM AMPLIFIED POPYMORPHIC DNA) PENTRU EVIDENTIEREA POLIMORFISMULUI MOLECULAR A ACIDULUI DEZOXIRIBONUCLEIC LA UNELE SOIURI AUTOHTONE DE VITA DE VIE

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Abstract. *The molecular DNA was studied by means of RAPD markers (Random Amplified Polymorphic DNA) in 12 autochthonous grapevine varieties. DNA extracted from leaves was amplified by 32 decamer primers, which have generated polymorphic bands in the studied cultivars. The separation of the products was done in agarose gel and they were viewed through UV after the treatment with ethidium bromide. The pictures were used for identifying the polymorphism between the studied cultivars. The cultivar dendrogram was established by means of the Jaccard coefficient.*

Key words: DNA, RAPD markers, polymorphism, dendrogram, *Vitis vinifera* L., autochthonous grapevine

Rezumat. *A fost investigat acidul dezoxiribonucleic molecular cu ajutorul markerilor RAPD-Random Amplified Polymorphic DNA la 12 soiuri autohtone de vita de vie. Acidul dezoxiribonucleic extras din frunze a fost amplificat cu 32 primeri decameri care au generat benzi polimorfice la nivelul soiurilor studiate. Separarea produsilor de amplificare s-a efectuat in gelul de agaroză şi au fost vizualizaţi in UV dupa tratarea cu bromura de etidiu. Imaginile vizualizate au stat la baza identificării polimorfismului între soiurile de viţa de vie studiate, iar cu ajutorul coeficientului Jaccard s-a stabilit dendrograma soiurilor.*

Cuvinte cheie: acid dezoxiribonucleic, markeri RAPD, polimorfism, dendrogramă, *Vitis vinifera* L., soiuri autohtone.

INTRODUCTION

By using molecular markers and fragmentation techniques, the vine genome can be investigated, thus determining the genetic filiation between varieties. Identifying the DNA of varieties/cultivars is extremely useful, as it reflects directly the genotype and is not influenced by environmental conditions. A great number of DNA sequences may reveal the polymorphism and DNA can be isolated from almost any tissue. The most frequently used method is RAPD - Random Amplified Polymorphic DNA that requires extremely low amounts of DNA and the ability to show a high degree of polymorphism. It was successfully

applied in different plant species, including *Vitis vinifera* L. (Wolf *et al.,* 2001, Ryan *et al.,* 2001, Tessier *et al.,* 1999, Fanizza *et al.,* 1999, Bohm *et al.,* 1998, Pamfil, 1999). Our investigations were generally directed to the identification of the polymorphism existing in the species of *Vitis* genus/the determination of phylogenetic origin of Romanian vine varieties.

MATERIAL AND METHOD

The biological material is represented by young leaves harvested from 12 autochthonous vine varieties, which are found in the Ampelographic Collection of the Faculty of Horticulture of Iasi (table 1).

Protocol for DNA Extraction from leaves. We have used the method described by Lodhi *et al.* (1994), amended by Rodica Pop *et al.* (2003). The methods of isolating DNA have as base criteria purity, integrity and quantity of the obtained DNA.

For the DNA extraction from leaves, the following steps were:

- 0.5 g biological material is grinded in liquid nitrogen, for obtaining a coarse powder;

- About 100 mg powder is transferred and mixed carefully by reversing Eppendorf tubes and 700 µL of extraction buffer is added. Tubes are incubated at 65^0C for 25 minutes, and then are left to cool at room temperature. We add polyvinylpyrrolidone (PVP), ascorbic acid and diethyldithiocarbamic acid (DIECA). We mix it well by reversing Eppendorf tubes;

The extracted DNA can be kept for a longer period at -70^0C or -20^0C for shorter periods. In this DNA extraction protocol, the modification consists in adding the following substances in the extraction buffer: 2% polyvinylpyrrolidone (PVP), 10 mM ascorbic acid and 4 mM diethyldithiocarbamic acid (DIECA). These substances were added before using the diluted solution of DNA. The standard protocol provided by Lodhi *et al.* (1994) contained in the buffer extraction only 2% PVP and 0.2% beta mercaptoethanol.

Obtaining the RAPD reaction mixture in an Eppendorf tube with volume of 25 ml and the preparation of these was done under sterile conditions in hota flux laminar. Amplification of samples was done with the Eppendorf Mastercycler gradient, scheduled as follows:

- 3 minutes at 95^0C - predenaturation, followed by 45 cycles with the following temperature profile:

- 1 min at 93^0C – distortion;

- 1 min at 34 ^{0}C - fixing primers;

- 1 min at 72^0C – extension; Final extension, 10 minutes at 72^0C.

The amplified DNA samples were prepared in loading buffer coloured with bromphenol blue. In each Eppendorf tube, 5 mg of dye was added. In each gel vessel, 12 µL of the amplification product were pipetted. The 13th vessel was usually loaded with a standard DNA marker (100 pb DNA Step Ladder, Promega). The source power has been scheduled at 0.57 V and 0.56 mA, while the migration duration was of 2.30 hours.

The ethidium bromide loses relatively fast the UV fluorescence, so that the gels coloured with this dye cannot be preserved; photographing the UV-exposed gel is done immediately after migration.

The amplification products were viewed in UV light, while the image of gels was viewed with an Alpha Innotech video camera.

Statistical analysis of images. For the statistical analysis, only bands with a high intensity light were included. Bands were detected automatically, by using the Total Lab 100, (figures 1 and 2). After the comparison with standard DNA, we could determine the size of each amplified fragment. The same size band was noted with 1, while its absence from the studied cultivars was noted with 0.

RESULTS AND DISCUSSIONS

Elaboration of the genetic dendrogram. The genetic similarity between the twelve studied vine varieties, determined according to the matrix of genetic distances and Neighbor Joining Tree algorithm, are shown as a dendrogram (figure 3).

Table 1

Number of polymorphic and monomorphic bands obtained by using primers

No	Primer	Total number of bands	Number of polymorphic bands	Number of monomorphic bands	% polymorphism
1.	OPAB 11	12	11	1	91.6
2.	OPA 03	9	8	1	88.8
3.	OPAL 20	7	6	1	85.7
4.	OPA 01	11	10	1	90.9
5.	OPB 17	14	13	1	92.8
6.	OPA 04	15	14	1	93.3
7.	OPC 04	8	8	0	100
8.	OPO 14	11	10	1	90.9
9.	OPE 14	4	2	2	50.0
10.	OPF 04	5	3	2	60.0
11.	OPAB 18	6	3	3	50.0
12.	OPX O3	8	3	5	37.5
13.	OPA 20	4	3	0	75.0
14.	AB 11	6	3	3	50.0
15.	OPC 16	7	3	4	42.8
16.	OPC 14	4	3	1	75.0
17.	OPF 20	6	3	3	50.0
18.	OPD 19	5	3	2	60.0
19.	OPH 15	4	3	1	75.0
20.	OPC 08	4	3	1	75.0
21.	OPB 10	5	3	2	60.0
22.	OPA 09	4	3	1	75.0
23.	OPD 20	5	3	2	60.0
24.	OPG 07	4	3	1	75.0

In table 1 are shown the primers that have been used for obtaining polymorphic bands, while the polymorphism was calculated in percentages.

Choosing primers was difficult; of the number of 24 used primers, only 11 gave distinct polymorphic bands (OPAB 11, OPA 03, OPAL 20, OPA 01, OPB 17, OPA 04, OPC 04, OPO 14, OPE 14, OPF 04 and OPAB 18).

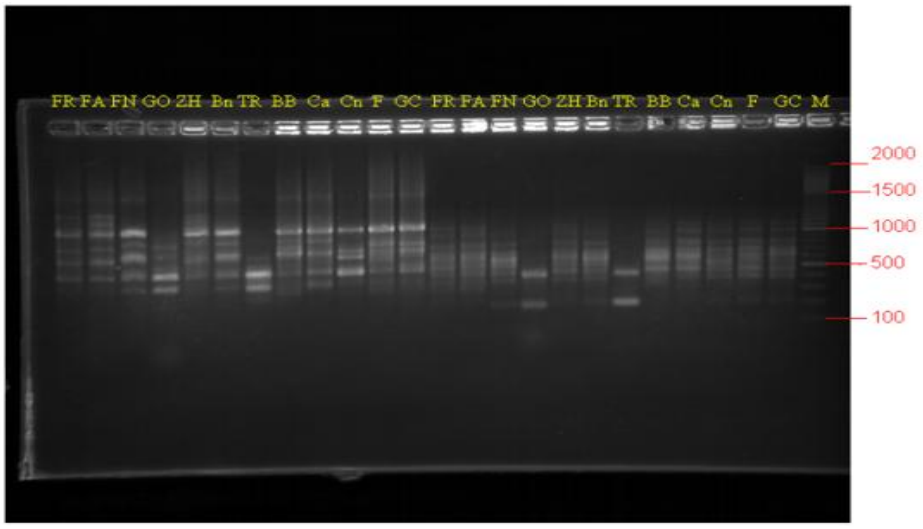

Fig. 1. Amplification products obtained with OPAB 18 and OPA 03 primers in the 12 studied varieties (polymorphic bands)

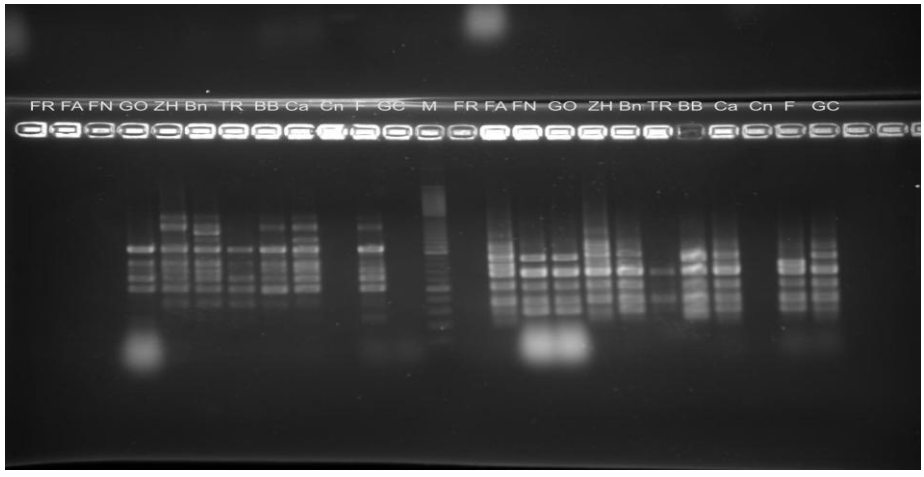

Fig. 2. Amplification products obtained with OPA 20 and OPA 01 primers in the 12 studied varieties (polymorphic bands)

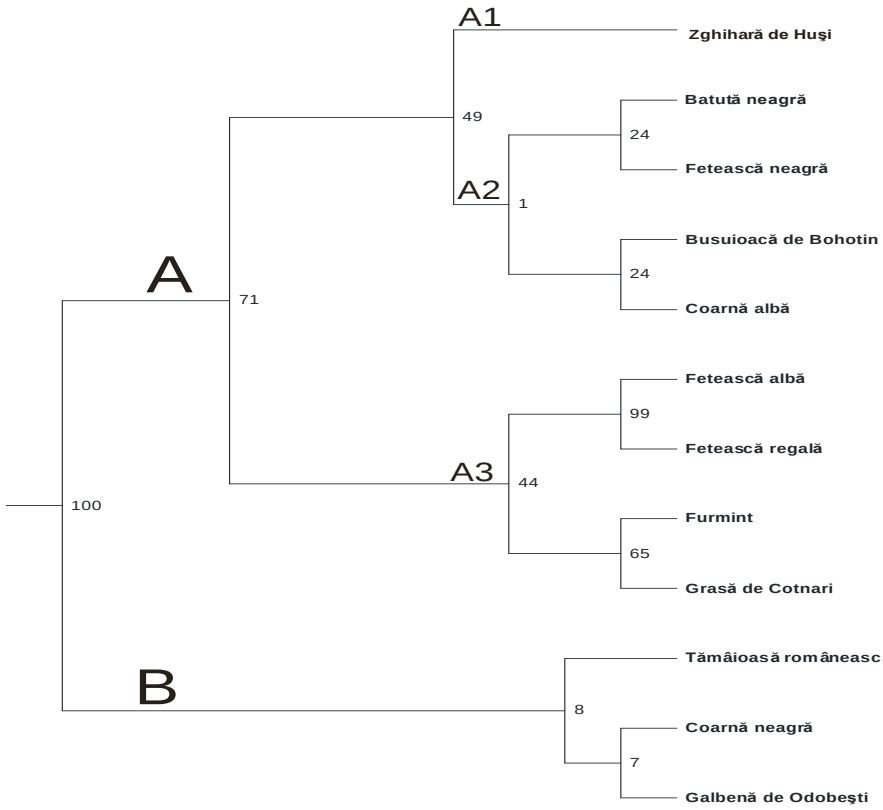

Fig. 3. Dendrogram of studied autochthonous vine varieties

The studied autochthonous vine varieties are differentiated genetically (DNA) in two distinct groups:

- **A** Group, which included Zghihară de Huşi, Bătută neagră, Fetească neagră, Busuioacă de Bohotin, Coarnă albă, Fetească albă, Fetească regală, Furmint and Grasă de Cotnari varieties.
- **B** Group, which included Tămâioasă Românească, Coarnă albă and Galbenă de Odobeşti varieties.

In the **A** Group, there are three subgroups, distinguished by phylogenetic relationship:

-A1 Subgroup with Zghihară de Huşi Variety, which is separated from the other varieties and shows a degree of remote kinship with the other studied varieties;

-A2 Subgroup, with Bătută neagră, Fetească neagră, Busuioacă de Bohotin and Coarnă neagră varieties. Fetească neagră, which resulted directly from *Vitis silvestris*, approaches to Bătută neagră black variety. Coarnă albă and Busuioacă de Bohotin varieties approach very much one another, which indicates a common Mediterranean origin.

-A3 Subgroup with Fetească albă, Fetească regală, Furmint and Grasă de Cotnari varieties, which have a high genetic similarity. Fetească albă and Fetească regală

belong to the same ecotype. Fetească regală's position in a dendrogram, between Fetească albă and Grasă de Cotnari, certifies its origin of natural hybrid, which resulted from Grasă de Cotnari and Fetească albă. The similarity between Furmint and Grasă de Cotnari varieties certifies their phylogenetic kinship.

CONCLUSIONS

1. For investigating the genome in autochthonous vine varieties, we have used the plant material young leaves. If leaves are younger, the quantity and the purity of deoxyribonucleic acid (DNA) recorded higher values. In the 12 studied species, both quantitative and purity differences were found.

2. Adding PVP at a concentration of 2% in sample amplifying buffer was also beneficial. PVP has diminished the inhibitory effect of polyphenols and facilitated the marking of bands necessary for the statistical analysis.

3. The dendogram analysis is apparent: the varieties of the same sortogrup(ex.Fetească albă, Fetească regală şi Grasă de Cotnari) are close genetically and legally.

4. Galbenă de Odobeşti and Zghihară de Huşi varieties are located at opposite poles, which suggests that they are not close phylogenetically.

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COMPARATRIVE STUDY OF SEEDLESS GENOTYPES PRESENTED IN GRAPEVINE GENOFOND OF THE REPUBLIC OF MOLDOVA

STUDIU COMPARATIV AL GENOTIPURILOR APIRENE ÎN GENOFONDUL VITICOL AL REPUBLICII MOLDOVA

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Abstract. *The results of estimation of agrobiodiversity of one fragment from the genetic resources with diverse level of seedless, accumulated in grapevine Genofond of the Republic of Moldova are presented. It was established the presence of large range of characters favorable for involving of genotypes in breeding programs: attractiveness and large size of bunch and berry; very early and late time of full maturity of the berry; advanced resistance to winter conditions. Some of cultivars have all characteristics necessary for submission to State Commission for Crop Variety Testing in order to be included in the list of cultivars admitted for multiplication and cultivation in Republic of Moldova (e.g. Apiren roz extratimpuriu, Călina). By the time of full maturity of the berry were revealed: very early and early - Apiren roz extratimpuriu, Interlaken, Perlette; medium – Călina and VIII-1-24; late - XI-37-38.*

Key words*:* grapevine, seedless, resistance

Rezumat. *În lucrare sunt prezentate rezultatele estimării agrobiodiversităţii unui fragment din resursele genetice cu grad diferit de apirenie acumulate în Genofondul viticol al Republicii Moldova. A fost stabilită prezenţa unui spectru larg de caractere favorabile antrenării genotipurilor în programele de ameliorare genetică: aspect atractiv şi mărime strugure şi bob; maturare de consum foarte timpurie şi târzie; rezistenţă avansată la condiţiile de iernare. Unele soiuri întrunesc toate însuşirile necesare prezentării în Comisia de Stat de Testare a Soiurilor de Plante în scopul includerii lor în lista soiurilor admise pentru multiplicare şi cultivare în Republica Moldova (de ex., Apiren roz extratimpuriu, Călina). După perioada de maturare de consum a boabelor s-au evidenţiat: foarte timpurii şi timpurii - Apiren roz extratimpuriu, Interlaken, Perlette; medii - Călina şi VIII-1-24; tardive –XI-37-38.*

Cuvinte cheie*:* viţă de vie, apirenie, rezistenţă

INTRODUCTION

The list of grapevine varieties admitted for multiplication and cultivation in the Republic of Moldova includes six seedless varieties (Registrul soiurilor de plante al Republicii Moldova, 2009), five of them are the creations of autochthonous ameliorators. Varieties Kishmish lucistyi, Apiren alb, Apiren roz (with early-medium time of full maturity o berries) and Kishmish moldovenesc (with late time of full maturity of berries) are used for the production of fresh grapes (Damian D. et al., 1997; Savin Gh. et al., 2007). Varieties Romulus and Apiren negru

de Grozesti have respectively medium and medium-late time of full maturity. Was established the possibility of technological processing of these varieties. Concerning the degree of resistance to abiotic and biotic unfavorable factors of environment, and especially to winter conditions, can be distinguished susceptible cultivars Kishmish lucistyi and Kishmis moldovenesc (*V.vinifera*) and varieties with relative or advanced resistance – Apiren alb, Apiren roz and Apiren negru de Grozesti. At the same time world tendency in increasing the rate of consumption of fresh seedless grapes and the necessity in diversification the products of technological processing of grapes, requires future amelioration and completion of existing assortment. Preliminary evaluation of some seedless genotypes, accumulated at the Institute, denote the possibilities to achieve these objectives.

MATERIAL AND METHOD

The estimations were performed during the 2005-2009 in Institute's Genofond, on the group of seedless varieties and elites, various by country of origin, size and aspect of bunch, color of the berries: Apiren alb, Apiren negru de Grozeşti, Apiren roz, Apiren roz Basarabean, Apiren roz extratimpuriu, VIII-1-24, XI-37-38 (from Republic of Moldova), Călina (from Romania), Centennial seedless, Flame seedless, Interlaken, Perlette, Romulus (from USA) and Mecita (from Ukraina).

Soil and climatic conditions on experimental plots corresponds to the viticulture zone Codru, characterized by mean length of period of active vegetation equal to 175-185 days, during which is accumulated the sum of effective temperatures equal to 3000-3200°C. The average temperature of the warmest month (June) is 21,0…22,0°C and of the coldest month (January) is -3,5…-4,5°C. Annual sum of atmospheric precipitations is 400-525 mm, from which 265-315 mm during the period of active vegetation. Some of the years of studies had been characterized by unfavorable climatic conditions for grapevine: the temperatures under -30°C during the winter of 2005-2006, prolonged drought and temperatures under +40°C in the summer of 2007.

Applied agrotechnical methods correspond to recommended ones for industrial vineyards. Ampelographic descriptions, agrobiological estimations were performed according the OIV Descriptor list for grape varieties and Vitis species (2009). For statistical data manipulation was used the software STATGRAPHICS Plus 5.1.

RESULTS AND DISCUSSIONS

The selection of genotypes for study was performed in order to identify the premises for diversification of existing assortment, inclusive of seedless varieties: expansion of the period of consumption of fresh grapes with both very early and late time of full maturity of the berries; multiple biological resistance to abiotic and biotic unfavorable factors of environment; ecologically pure products.

For the studied genotypes the length of the period of bud burst – physiological maturity of berries vary between 119-173 days. Bud burst begun between 14 of April and 8 of May and time of full bloom between 1 and 24 June. The very early and early time of physiological maturity of berries was established for varieties Interlaken, Apiren roz extratimpuriu, Flame seedless, followed by Centennial seedless and Kismish lucistyi (the second decade of August). The varieties Calina and Mechita begin the maturity from the third decade of August

and Romulus, Apiren roz, Apiren negru de Grozesti and elite VIII-1-24 - from the first decade of September. Elite XI-37-38 has late time of physiological maturity of berries. In table 1 the fertility and productivity of studied genotypes are presented.

Table 1

Fertility and productivity of studied seedless genotypes (mean value for 2005-2009)

Name of genotype	% of viable buds	Coefficients of fertility		Indices of productivity	
		absolute	relative	absolute	relative
Apiren alb	62,7	1,15	0,61	413,20	219,17
Apiren negru de Grozeşti	87,3	1,52	1,22	325,13	260,96
Apiren roz	71,5	1,26	0,88	475,52	332,11
Apiren roz Basarabean	79,0	1,62	1,26	435,78	338,94
Apiren roz extratimpuriu	82,6	1,21	0,78	147,02	94,77
Călina	52,8	1,32	0,65	467,15	230,04
Centennial seedless	21,1	1,25	0,60	410,25	196,92
Flame seedless	50,3	1,12	0,80	428,06	305,76
Interlaken	53,6	1,50	1,02	239,40	162,79
Kiş-miş lucistâi	32,4	1,20	0,50	378,00	157,50
Mecita	55,2	1,50	0,82	521,10	284,87
Perlette	35,3	1,21	0,60	548,86	272,16
Romulus	63,3	1,48	0,92	444,44	276,28
VIII-1-24	25,6	1,05	0,60	437,33	249,90
XI-37-38	47,2	1,17	0,72	949,69	584,42

The high resistance to winter conditions (according the % of viable buds after winter) was established (Figure 1) for homologated varieties Apiren negru de Grozesti, Apiren roz, Apiren roz Basarabean and for newly studied Apiren roz extratimpuriu. Very sensible to winter conditions are genotypes Centennial seedless, Kishmish lucistyi and VIII-1-24. The remaining genotypes have intermediary position by resistance to winter conditions, but ensure obtaining of yield in unfavorable years. Significant differences, relative to general mean value of viable buds, is attested for Apiren negru de Grozesti, Apiren roz extratimpuriu and Apiren roz Basarabean – in direction of increasing the percent of viable buds, and for Centennial seedless, Kishmish lucistyi, Perlette and VIII-1-24 – in direction of decreasing the percent of viable buds.

Concerning the weight of single bunch, the majority of genotypes have medium bunches (300-450 grams). The elite XI-37-38 have the bunches with high or very high weight (up to 812 grams), as well as medium berry (4,5 grams). The remaining genotypes have little or little-medium weight of berry.

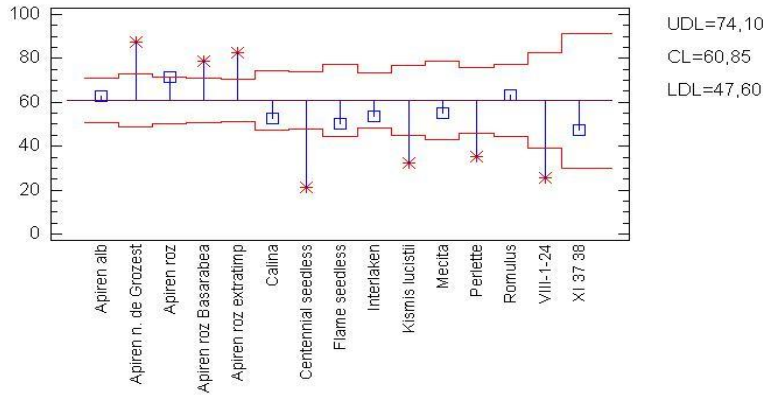

Fig. 1. Mean value (for 2005-2009) for percent of viable buds after winter

Must be noted the presence of cultivars with specific flavor of berry (slightly Muscat or other attractive specific aroma), increasing its commercial value.

CONCLUSIONS

1. The presence of wide diversity of characters, separately or in the same genotype, favorable for future amelioration of seedless grapevine assortment, was constated: very early and early time of physiological maturity of berries (Apiren roz extratimpuriu, Interlaken); advanced or relative resistance to winter conditions (Apiren roz extratimpuriu, Calina); medium – high weight of single bunch; presence of specific aroma.

2. The diversity of valuable characteristics of studied genotypes allows foundation of pre-breeding field and initiation of pre-breeding, and simultaneously or late of breeding programs in order to create new, preponderantly seedless varieties, with complex qualitative properties.

3. For varieties Apiren roz extratimpuriu and Călina the files a prepared to be passed in State Commission for Test of Plant Varieties.

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PRELIMINARY ON-FARM ESTIMATION OF OLD AUTOCHTHONOUS VARIETIES IN REPUBLIC OF MOLDOVA

ESTIMĂRI PRELIMINARE ON–FARM A SOIURILOR VECHI AUTOHTONE ÎN REPUBLICA MOLDOVA

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Abstract. *Preliminary estimations on-farm concerning the presence of old autochthonous varieties in some intracity private vineyards from Central-West zone of the Republic of Moldova are presented. The age of revealed plants was estimated between 60-70 and 100-120 years old and initial planting material was received from various sources. Was attested the presence of old autochthonous varieties Plăvaie, Coarnă neagră, Coarnă albă, Băbească neagră, as well as of some genotypes, considered autochthonous, but with the names not attested in sources (e.g. Moldovenească). Also are presented very old specimen of classical varieties as Chasselas blanc, Chasselas rose, Aligote, Madlen Angevin. At initial stage ampelographic descriptions and ampelometric measurements of mature leaf and bunch and digital photos were made in order to be compared with descriptions of similar old autochthonous cultivars from Institute's Genofond.*

Key words: grapevine, on-farm, conservation.

Rezumat. *În lucrare sunt expuse estimări preliminare „on-farm" privind prezenţa soiurilor vechi autohtone în unele plantaţii particulare intravilane din zona Centru-Vest a Republicii Moldova. Vârsta plantelor evidenţiate este cuprinsă între 60-70 şi 90-120 ani, materialul săditor iniţial fiind din diverse surse. S-a atestat prezenţa soiurilor vechi autohtone Plăvaie, Coarnă neagră, Coarnă albă, Băbească neagră, dar şi a unor genotipuri, considerate autohtone, denumirea cărora nu a fost atestată în sursele de literatură (de ex., Moldovenească). De asemenea, sunt prezente exemplare foarte vechi ale soiurilor clasice Chasselas blanc, Chasselas rose, Aligote, Madlene Angevine. În etapa iniţială s-au efectuat descrieri ampelografice şi ampelometrice la frunza adultă, strugure, date care au fost acumulate în imagini digitale şi au fost comparate cu descrierile analogice ale soiurilor vechi autohtone prezente în genofondul institutului.*

Cuvinte cheie: viţa de vie, on-farm, prezervare

INTRODUCTION

Old native grapevine varieties are characterized by a greater adaptability to local soil and climate conditions. However, during the last century the influence of various unfavorable factors (phylloxera invasion, climate accidents, and as well social-political changes) has led to a dramatic reduction of the area occupied by these genotypes, some of them even disappeared. Aiming in tracing the specimens of an older age, which were preserved in old vineyards, especially in intracity areas, particularly to identify any valuable genetic variability. The collection, preservation

and assessment of these sources were initiated, including through a regional project SEEDNet. The paper presents preliminary estimates of the genotypes detected.

MATERIAL AND METHOD

Estimations were made in four sites located in Moldova's Central West region. Climate conditions refer to Codru viticultural area and are characterized with the length of the active vegetation period of 175-185 days, which allow the adding of a sum of effective temperatures of 3000-3200°C. The average temperature of the warmest month (June) is 21.0 ... 22.0°C and the coldest (January) -3.5 ... -4.5ºC. The annual amount of precipitation is 400-525 mm.

Plants found were labeled and documented (table 1).

Tabelul 1

Old autochthonous varieties identified in some individual farms in Moldova

Code of sample	Address of sample	Name of genotype (used by owner)	Estimated age, years	Berry color	Direction of use
MDA004-01-01	Hânceşti district, Nemţeni village	Plăvaie	120	Green yellow	Wine
MDA004-01-02	Hânceşti district, Nemţeni village	Moldovenească	120	Green yellow	Wine
MDA004-02-01	Hânceşti district, Nemţeni village	Moldovenească	120	Green yellow	Wine
MDA004-03-01	Nisporeni district, Şendreni village	Coarnă neagră	80-90	Blue black	Table
MDA004-04-01	Nisporeni city	Plăvaie	120	Green yellow	Wine
MDA004-04-07	Nisporeni city	Coarnă albă	60-70	Green yellow	Table
MDA004-04-28	Nisporeni city	Coarnă neagră	60-70	Blue black	Table

The applied agro technical procedures are the traditional ones for individual households. The vine training systems are the "Moldavian Cup", having wooden stakes as a support, and the high bilateral cordon trellis. Plant health and development are satisfactory. Origin of initial biological material is diverse and not always known.

Starting with the period after the fruit set, at each site 2-3 micro expeditions were performed. On site descriptions and estimations were made, and collected biological material (adult leaves, grapes, annual shoots). The ampelographic description and ampelometric measurements were made in accordance with the OIV list of descriptors (2009). Based on ampelometric measurements (OIV 601 - OIV 617 characters) were calculated ratios, codes by Galet (1979), which together with other ampelographic characters (OIV 076, OIV 080, OIV 081 - 091 OIV, OIV 225) summed up 22 characters used in cluster analysis.

RESULTS AND DISCUSSIONS

Identified plantations are located in intracity regions of the visited localties (in the immediate neighborhood of houses or in areas affected by landslides (fig. 1). These sectors are heterogeneous both by assortment composition and by the plants age. Most of the area is planted with wine grapevine varieties, mainly Aligote and among table grapevine varieties are - Chasselas and Coarnă Neagră.

(a)  (b) 

Fig. 1. (a) General appearance of the plantation from Nisporeni city; (b) Coarnă Neagră variety, Şendreni village, Nisporeni district (estimated age 80-90 years).

Plăvaie variety was found in two of the localities visited: in Nemţeni village there is a vine, which, according to the information given by the owner, was estimateted of approx. 100-120 years old, and in Nisporeni town - four vines with the average age of 60-70 years. Coarnă neagră and Coarnă albă are the old autochthonous table grapevine varieties found on site. General characters, set mainly by mature leaves and grapes, match to the description of varieties in the sources of literature (Ampelografia Republicii Populare Române, 1959) and to same varieties from the institute's Ampelographic Collection. In the village Nemţeni we discovered a variety named by the owner „Moldovenească" existing in the plantation from the moment of its establishment (fig. 2.a).

(a)

(b)

(c)

(d)

(e)

Fig. 2. (a) Variety named „Moldovenească" (Nemţeni), (b)-(c) Coarnă neagră seeds and (d)-(e) Plăvaie seeds (comparison, Nisporeni and ampelographic collection).

We could not attest the name of this variety in literature sources or its presence in other localities. Among the specific characters, we observe full or three-lobed mature leaves, glabrous or scarcely pubescent. Petiole and main veins, to the second bifurcation, have an intense violet coloration. The same color is present on the grape pedicel. Berry is small, round, yellowish-green. Cluster is conical, medium compact single-winged.

Cluster analysis (fig. 3) shows phenotypic similarity of similar genotypes collected from various sources.

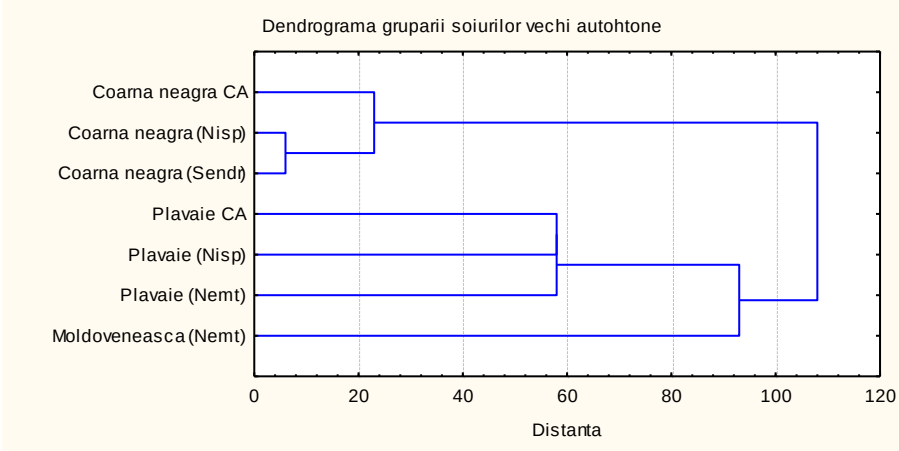

Fig. 3. Classification dendrogram of the old indigenous varieties present on-farm and in Institute's Genofond

For the variety „Moldovenească", a certain similarity was found with the old local variety Galabura, present in the ampelographic collection, but additional estimations are necessary for definitive conclusions.

CONCLUSIONS

1. In some private intracity vineyards from the center-west region of Moldova is confirmed the presence of old local varieties Plăvaie, Coarnă neagră, Coarnă albă with estimated ages between 60-70 years and 100-120 years. Is attested the presence of a variety called Moldovenească, considered native, whose name was not found in literature sources.

2. According to cluster analysis, the phenotypic similarity was established for the specimens of Coarnă neagră and Plăvaie collected from different sources.

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STUDIES ON MAINTAINING THE QUALITY OF APPLE FRUIT, IN COLD STORAGE, BY APPLYING A FILM OF WAX THEIR SURFACE

STUDII PRIVIND MENŢINEREA CALITĂŢII FRUCTELOR DE MĂR PĂSTRATE FRIGORIFIC, PRIN APLICAREA UNEI PELICULE DE CEARĂ PE SUPRAFAŢA LOR

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Abstract. *Protection films fruit in cold storage conditions, is a very comprehensive study, highly publicized, especially in countries with traditionally fruit culture. Today is seeking approval of natural products, easily assimilable, with a good quality of protection films which present a proper business appearance. As beeswax is chemically inert, is constituted by the combination of fatty acids as palmitic acid, etc. cerotic acid. alcohol, of which the most important is miricilul. Beeswax is a natural substance, stable, which does not interact with the environment. As applied to the fruit, does not affect the taste or the smell. It provides the look relatively bright to the fruit, that is very appreciated by consumers, and keeps the qualities of the products during storage.*

Key words: protection films, cold storage, quality

Rezumat. *Protejarea peliculară a fructelor, în condiţii de păstrare frigorifică, reprezintă un studiu foarte amplu, intens mediatizat, mai ales în ţările cu tradiţie pomicolă. În prezent se caută omologarea unor produse naturale, uşor asimilabile, cu calităţi de protejare peliculară, care să prezinte şi o aparenţă comercială corespunzătoare. Din punct de vedere chimic ceara de albine este inertă, fiind constituită din din combinarea unor acizi graşi ca acidul palmitic, acidul cerotic etc. cu alcooli, din care cel mai important este miricilul. Ceara de albine este o substanţă naturală, stabilă, care nu interacţionează cu mediul înconjurător. Fiind aplicată pe fructe, nu imprimă gust sau miros acestora. Ea nu oferă doar aspect relativ lucios fructelor, aspect apreciat de către consumatori, ci şi păstrează calităţile nutritive ale produselor.*

Cuvinte cheie: protejare peliculară, păstrare frigorifică, calitate

INTRODUCTION

The wax mainly constituted from the esters of a fat acid with an alcohol having a high molecular weight also contains saturated hydrocarbons, free acids, free alcohols and water and it is insoluble in water and more or less soluble in diverse organic solvents (Beceanu D. et al., 2000, 2003)

The researches effectuated so far in this field and mentioned in the specialized literature show that the wax film acted like a barrier against moisture due to the efficient closing of pores from fruits' epidermis. (M.B. Pérez-Gago C. Rojas M.A. del Río, 2003, Anghel Roxana Mihaela, 2009)

MATERIAL AND METHOD

The apples from Generos, Starkrimson, Idared and Ionagold variety were immersed into a wax pellicular solution with a concentration of 1%.

This film with this wax concentration has the optimal properties of a treatment: total cover and very good adherence to fruits.

After exterior moisture has dried out, all variants were stored in a frigorific cell having the temperature of 2^0C, relatively high moisture of 90-95% and air circulation allows a speed of at least 0.25 m/s, for a recirculation coefficient of 30 re-circulations/hour.

We monthly drew samples from each variant and variety which were then analysed in the lab of Technology of horticultural products department within USAMV Iaşi.

These samples were subjected to a series of physical determinations and chemical analyses to estimate their physiological state and biochemical content.

Thus, we determined:

- the content of soluble dry substance by the refractometric method
- titrating acidity by the titrimetric method
- breathing intensity by means of Pettenkofer device
- starch content by the iodine test
- vitamin C content by titrimetric method with 2,6 dichlorophenolindophenol
- catalasis activity by Lobeck gasometrical method
- structural-textural firmness by means of Stanhope Setta penetrometer

RESULTS AND DISCUSSIONS

In the first four months of refrigerated keeping, we registered the values presented in tables 1-8.

Ever since the first month of storage (tab. 1, 2), we notice significant differences between the two variants.

Thus, from the viewpoint of the content in soluble dry substance, the treated variant has much smaller values as compared to the blank experiment, except Starkrimson variety which registers an insignificant difference.

Titrating acidity expressed in g of malic acid/100 g product, it is by 20-45% more reduced than the treated variant as compared to the blank experiment.

Table 1

November 2009 Blank experiment

Variety	SUS	Titrating acidity	Breathing intensity	Score for iodine test	Content in ascorbic acid	Catalasis activity	Structural-textural firmness for (5 sec.)	
	^{0}Bx	g. malic acid %	cm^3CO_2/ Kg/h		mg/100 g prod.	cm^3O_2/g /h	V	A
Generos	12,4	0,62	4,72	8	3,87	2,6	7,8	1,56
Starkrimson	14,6	0,38	4,4	7	4,4	3,4	5,4	1,08
Idared	12,6	0,68	7,91	8	5,32	2,1	6,6	1,32
Ionagold	10,4	0,55	9,16	8	2,11	1,9	7,2	1,44

Breathing intensity is by 250% smaller for the variety Idared and Ionagold, the treated variant as compared to the same variety for the blank experiment.

Table 2

November 2009 Treated experiment

Variety	SUS	Titratin g acidity	Breathin g intensity	Score for iodine test	Content in ascorbic acid	Catalasis activity	Structural-textural firmness for (5 sec.)	
	^{0}Bx	g. malic acid %	cm^3CO_2/ Kg/h		mg/100 g prod.	cm^3O_2/g /h	V	A
Generos	9,2	0,44	3,26	8	3,16	1,8	6	1,2
Starkrimson	12	0,22	3,62	7	4,12	1,6	4,8	0,96
Idared	11,8	0,36	2,94	7	4,46	1,7	6,2	1,24
Ionagold	10,2	0,32	3,68	8	2,16	1,3	7	1,4

The content of ascorbic acid varies depending on the variety but not very significantly.

The catalasis activity registers lower values for the treated variant as compared to the blank experiment in case of all variety.

The values registered in terms of structural-textural firmness indicate that the treated variant has a slightly higher firmness than the blank experiment.

In the second month of refrigeration (tab. 3, 4), we also notice some differences between the treated variant and the blank experiment.

Table 3

December 2009 Blank experiment

Variety	SUS	Titratin g acidity	Breathin g intensity	Score for iodine test	Content in ascorbic acid	Catalasis activity	Structural-textural firmness for (5 sec.)	
	^{0}Bx	g. malic acid %	cm^3CO_2/ Kg/h		mg/100 g prod.	cm^3O_2/g /h	V	A
Generos	12,8	0,57	7,03	8	2,61	3,8	7,8	1,56
Starkrimson	14,8	0,36	7,49	8	2,4	6,6	5,6	1,12
Idared	13,2	0,47	6,36	8	3,35	4,5	7	1,4
Ionagold	10,8	0,36	6,96	8	3,25	3,6	7,8	1,56

Most analysed parameters show more reduced values for the treated variant as compared to the blank experiment, except the content in vitamin C where we noticed that it degraded more slowly for the treated apples as compared to the untreated ones.

A positive aspect is that both the values of breathing intensity and those of catalasis activity are more reduced for the treated variant, a fact indicating a slow metabolism of these fruits.

The physiological degradation being more reduced, losses of nutritive substances are also smaller.

Table 4

December 2009 Treated experiment

Variety	SUS	Titrating acidity	Breathing intensity	Score for iodine test	Content in ascorbic acid	Catalasis activity	Structural-textural firmness for (5 sec.)	
	^{0}Bx	g. malic acid %	cm^3CO_2/ Kg/h		mg/100 g prod.	cm^3O_2/g /h	V	A
Generos	9,8	0,41	4,36	8	3,06	1,6	6,4	1,28
Starkrimson	13,0	0,20	4,79	7	3,60	2,0	5	1
Idared	12,2	0,32	3,98	8	3,88	1,2	6,6	1,32
Ionagold	10,6	0,30	5,19	8	2,06	1,8	7,2	1,44

In the third month of storage (tab. 5, 6) we notice a slower but steady degradation of the treated fruits and smaller losses of nutritive substances as compared to the previous month. We notice that the breathing intensity for the blank experiment is higher than in the previous month, consequently these fruits have a more accelerated metabolism.

The content in ascorbic acid is higher for the treated variant, Generos, Starkrimston and Idared variety. At the same time, the data obtained through the analysis of structural-textural firmness indicate that the treated fruits have a higher firmness than the blank experiment.

Table 5

January 2010 Blank experiment

Variety	SUS	Titrating acidity	Breathing intensity	Score for iodine test	Content in ascorbic acid	Catalasis activity	Structural-textural firmness for (5 sec.)	
	^{0}Bx	g. malic acid %	cm^3CO_2/ Kg/h		mg/100 g prod.	cm^3O_2/g /h	V	A
Generos	13,4	0,52	12,05	8	2,28	4,6	8	1,6
Starkrimson	15	0,27	12,25	8	3,17	6,8	6,8	1,36
Idared	13,6	0,69	9,85	8	1,40	4,8	7,6	1,52
Ionagold	11,2	0,55	10,70	8	3,29	3,9	8,2	1,64

Table 6

January 2010 Treated experiment

Variety	SUS	Titrating acidity	Breathing intensity	Score for iodine test	Content in ascorbic acid	Catalasis activity	Structural-textural firmness for (5 sec.)	
	^{0}Bx	g. malic acid %	cm^3CO_2/ Kg/h		mg/100 g prod.	cm^3O_2/g /h	V	A
Generos	12	0,40	8,01	8	2,94	2,3	7,2	1,44
Starkrimson	14,8	0,20	7,95	8	3,45	3,4	6,6	1,32
Idared	12,8	0,27	7,82	8	3,62	2,6	6,8	1,36
Ionagold	10,8	0,26	6,66	8	2,00	2,1	7,6	1,52

In the fourth month of storage (tab. 7, 8), we notice a higher firmness of the treated fruits as compared to the blank experiment, a more reduced breathing intensity and catalasis activity, consequently a slower metabolism.

Table 7

February 2010 Blank experiment

Variety	SUS	Titrating acidity	Breathing intensity	Score for iodine test	Content in ascorbic acid	Catalasis activity	Structural-textural firmness for (5 sec.)	
	^{0}Bx	g. malic acid %	cm^3CO_2/ Kg/h		mg/100 g prod.	cm^3O_2/g /h	V	A
Generos	13,8	0,52	7,41	9	2,52	6,6	8,4	1,68
Starkrimson	15,2	0,23	9,88	8	2,05	7,4	8,4	1,68
Idared	14,4	0,64	7,81	9	3,15	5,8	8,6	1,72
Ionagold	12,2	0,46	11,10	9	2,98	4,2	8,4	1,68

This month, the breathing intensity also decreased for the blank experiment, except Starkrimson variety where this parameter still registers high values.

The content of ascorbic acid is still higher for the blank experiment, except for Ionagold variety.

Table 8

February 2010 Treated experiment

Variety	SUS	Titrating acidity	Breathing intensity	Score for iodine test	Content in ascorbic acid	Catalasis activity	Structural-textural firmness for (5 sec.)	
	^{0}Bx	g. malic acid %	cm^3CO_2/ Kg/h		mg/100 g prod.	cm^3O_2/g /h	V	A
Generos	12,3	0,44	6,98	8	2,88	2,8	7,4	1,48
Starkrimson	13,4	0,23	7,49	8	2,95	2,7	6	1,2
Idared	12,8	0,32	6,79	9	3,06	2,1	7	1,4
Ionagold	12	0,30	6,77	9	1,81	2,9	7,6	1,52

CONCLUSIONS

The pellicular treatment with wax in concentration of 1% applied to the Generos, Starkrimson, Idared and Ionagold variety helped maintaining a high quality of fruits.

Ever since the first months of refrigeration, we noticed relevant differences among the variants under study and varietty.

Thus, if at the beginning of the storage period, the treated fruits had lower values of titrating acidity, the content of soluble dry substance or vitamin C, during storage, due to a slower metabolism, they began to equal or even exceed the values of biochemical compounds of the fruits from the blank experiment.

The slower hydrolysis of starch made treated fruits have a lower content of soluble dry substance.

Losses were smaller for the variant treated with 1% wax film due to the reduction of breathing intensity and perspiration because the wax film has a selective permeability to water and gases.

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STUDIES CONCERNING THE MORPHOLOGICAL CHARACTERISTICS OF SOME BIOTYPES OF WALNUTS, FROM DIFFERENT COUNTIES OF N-E ROMANIA

STUDII PRIVIND INSUŞIRILE MORFOLOGICE ALE UNOR BIOTIPURI DE NUCI, PROVENITE DIN DIFERITE ZONE ALE N-E-ULUI ROMÂNIEI

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Abstract. *Of the total nut plants, the walnut (Juglans regia) is among the first species, in terms of potential production and world wide export. The world's largest producing countries of walnut trees are China, USA and Turkey. In Europe, France is the largest producing country, followed by Romania. The main producing counties of walnuts in Romania are: Vrancea, Bacău, Vâlcea, Iaşi, Bihor, Hunedoara, Neamţ, Gorj, Arad, Galaţi, the culture being very extended (especially in the private sector) in the NE area of Romania.*

Key words*:* *Juglans regia*, fruits, morphology, Moldavia (Romania)

Rezumat. *Dintre plantele nucifere, nucul (Juglans regia) se află printre primele specii, ca potenţial de producţie şi export, în toată lumea, statele cele mai mari producătoare fiind: China, SUA şi Turcia. În Europa, Franţa este ţara cu cea mai mare producţie de nuci, urmată de România. Principalele judeţe producătoare de nuci, din ţara noastră, sunt: Vrancea, Bacău, Vâlcea, Iaşi, Bihor, Hunedoara, Neamţ, Gorj, Arad, Galaţi, cultura fiind foarte extinsă, (mai ales în sectorul privat) în zona de N-E a României.*

Cuvinte cheie*:* *Juglans regia*, fructe, morfologie, Moldova (România)

INTRODUCTION

The walnut fruits come into a large morphological variety in terms of size, shape, color, valve surface, thickness, hardness and endocarp ornamentation. At the same time, the oil content of seeds and the chemical composition of oil vary within quite large limits from one biotype to another (Cociu V., 2003; Grădinaru G., Istrate M., 2009; FAO Statistics, 2008).

MATERIAL AND METHOD

We analysed a total number of 49 walnut sources from different localities from the east and north-eastern part of Romania, fruits that were harvested during the autumn of 2007. The heterogeneous sources were eliminated and we finally retained 29 sources more or less homogenous (tab. 1). We analysed 10 fruits for every source. The following parameters were analysed for each sample: general shape, length, equatorial diameter, colour, surface, the joining between valves, the endocarp thickness, the ratio between endocarp (peel) and seed (kernel), the easiness to take out the seed from the valves and the seed colour. Following these determinations, we

identified some homogenous sources (biotypes) with valuable morphological characteristics that might be included in the selection programmes.

RESULTS AND DISCUSSIONS

General shape of fruits. Most fruits under study have a spherical shape, but we also encountered fruits having ovoid shapes (Valea Seacă, Pascani; Urecheşti Vrancea, Ţibăneşti, Iaşi). Fruits having a spherical-flattened shape were more rarely encountered (Huşi, cartier Dric). **The point of the fruits** under study has different shapes: cut off (Tarcău, Neamţ; Săbăoani, Neamţ; Tudora, Botoşani; Burla, Suceava; Goruni, Iaşi), rounded (Rugineşti, Vrancea; Valea Seacă, Paşcani; Umbrăreşti Deal, Galaţi; Urecheşti, Vrancea), apiculate (Tătărăni, Vaslui), pointed-rounded (Cartier Dric, Huşi), cut off-emarginate (Săuceşti, Bacău). In case of some less homogenous sources, the point varies in terms of shape (Focuri, Iaşi; Andreiaşu de Jos, Vrancea; Zbereni, Cotnari) (tab. 1). **Basis of fruits** has the following shapes: cut off (Săbăoani, Neamţ; Umbrăreşti Deal, Galaţi; Goruni, Iaşi; Urecheşti, Vrancea; Săuceşti, Bacău), rounded (Tudora, Botoşani; Focuri, Iaşi; Hupca, Vaslui; Darabani, Botoşani), cut off-rounded (Tarcău, Neamţ; Burla, Suceava; Cartier Dric, Huşi) (tab. 1). **The thickness of the joining of valves** registers values between 1.6 mm (Rugineşti, Vrancea, Rafaela, Vaslui) and 4 mm (Huşi, Vaslui; Fălticeni, Suceava), with an average of 2.4 mm. The fruits coming from Ţibăneşti, Iaşi and Darabani, Botoşani have a non-prominent joining (tab. 1). **The valve surface** of the analysed fruits may be: ± smooth (Tarcău, Neamţ; Andreiaşu de Jos, Vrancea; Ţibăneşti, Iaşi; Soloneţ, Suceava) or irregular with prominences (Săbăoani, Neamţ; Sodomeni, Suceava; Goruni, Iaşi; Vânători, Neamţ) (tab. 1). **The fruit colour** comes in various hues: brownish-yellowish (Săbăoani, Neamţ; Focuri, Iaşi; Burla, Suceava; Valea Seacă, Paşcani; Sodomeni, Paşcani, Darabani, Botoşani), brownish-yellowish, reddish (Rugineşti, Vrancea), brownish-reddish (Umbrăreşti Deal, Galaţi), bright yellow (Udeşti, Suceava) (tab. 1). **Fruit length** is between 29 mm (Săuceşti, Bacău, Burla, Suceava) and 43.4 mm (Huşi, Vaslui), with an average value of 35 mm (fig. 1). **Fruits' equatorial diameter** has values between 27 mm (Andreiaşu de Jos, Vrancea; Burla, Suceava; Soloneţ, Suceava; Zbereni, Cotnari; Rafaela, Vaslui) and 38 mm (Tarcău, Neamţ), with an average value of 30 mm (fig. 1). The fruits under study have **the endocarp thickness** between 1.0 mm (Dumbrava, Gura Văii, Bacău) and 2.2 mm (Umbrăreşti Deal, Galaţi), with an average value of 1.5 mm (tab 1). **The fruit weight** under study range between wide limits: 7 g (Burla, Suceava; Soloneţ, Suceava) and 14 g (Umbrăreşti, Deal, Galaţi; Huşi, Vaslui), with an average value of 9.7 g (fig. 2). **The kernel ratio** (kernel weight (g)/fruit weight (g) x 100) is between 15% (Rugineşti, Vrancea) and 54% (Cartier Dric, Huşi), with an average value of 36%. (fig. 2). Otherwise, as it is known, the kernel content of the walnut biotypes in Romania varies between very large limits (25-60%) (Cociu V., 2003; Grădinaru G., Istrate M., 2009; FAO Statistics, 2008). The fruits considered to be valuable for consumption or to be used in confectionary must contain in min. 45% kernel (FAO Statistics, 2008). The vast majority of the walnut sources that we have studied present a kernel content of more than 35%.

Tabel 1

Walnut biotypes collected in 2007

Crt. no.	Biotype	Aspect of fruit	Kernel quality	Kernel ratio (%)	Joining line (mm)	Shell thickness (mm)	Point	Basis
1	Cartier Dric, Huşi	Irregular surface, the joining line visibly irregular on the sides, brownish colour.	The kernel is dark yellow, it is taken out very easily, whole, it fills well the cavity	54,75	2,8	1,8	pointed-rounded	cut off-rounded
2	Umbrăreşti Deal, Galaţi	Brownish-burgundy colour, the joining is irregular, proeminent	The kernel is brownish, it has a good quality, it does not have flaws and taste is normal, it may be relatively easily taken out, in halves	53,75	2,6	2,2	rounded	cut off
3	Sodomeni, Paşcani	Relatively irregular surface, small longitudinal crypts, brownish to yellow colour	The kernel is light yellow, it has a good quality, smooth epidermis, satisfying taste, it fills well the cavity, it is taken out whole	50,15	3,4	1,7	rounded	rounded -cut off
4	Darabani, Botoşani	Smooth surface, brownish to yellow colour	The kernel is light yellow, it may be easily taken out, whole, it has a good quality, satisfying taste	46,15	< 1,4	1,4	rounded	rounded
5	Dumbrava, Gura Văii, Bacău	Relatively irregular surface, longitudinal crypts, brown to red colour	The kernel has a red colour, it is taken out easily, in halves. The kernel doesn't adhere to the shell	43,95	1,9	1,0	rounded-cut off	rounded
6	Goruni, Iaşi	Irregular surface, smooth, red colour	The kernel has a golden colour, I it taken out easily, whole, it has a very good quality and satisfying taste	41,86	2,7	1,2	cut-off	cut-off
7	Hupca, Vaslui	Irregular surface, dark brownish colour	The kernel has a brownish colour, it fills well the cavity, it is taken out easily, in halves, it has a good taste	41,50	3	1,2	pointed	rounded
8	Urecheşti Vrancea	Relatively smooth surface, brownish to slightly gray colour	The kernel has a dark yellow colour, it may be relatively easily taken out, in halves, good quality and taste	41,28	2	1,2	rounded	cut-off
9	Săuceşti,	Visible longitudinal	The kernel has a brownish colour, it	40,99	2	1,3	cut-off-	cut-off

	Bacău	grooves, golden to yellow colour	may be easily taken out, in halves				emargin ate	
10	Udeşti, Suceava	Slightly irregular surface, light yellow colour	The kernel has a golden colour, it may be easily taken out, whole, it does not have flaws	39,79	3,5	1,3	rounded-cut off	rounded -cut off
11	Săbăoani, Neamţ	Irregular surface, no deeply longitudinal grooves, brownish to yellow colour	The kernel has a dark brownish colour, normal taste, it is taken out easily in halves	38,97	2	1,2	cut-off	cut-off
12	Tanacu, Vaslui	Irregular surface, with proeminences and deep grooves, brown to light red colour	The kernel has a golden colour, it doesn't have wrinkles, it may be easily taken out, good quality and pleasant taste	38,54	3,6	1,8	rounded pointed, cut-off	rounded -cut off
13	Rafaela, Vaslui	Smooth surface, very rare longitudinal crypts, brownish to yellow colour	The kernel may be taken out easily, it is brittle, it has a dark yellow colour and a changed taste	37,92	1,6	1,2	rounded-rostrate	rounded
14	Focuri, Iaşi	Slightly irregular surface, with a brownish to yellow colour	The kernel has a light brown colour, it may be taken out easily, in halves and it has a very nice taste	37,37	3,3	2,0	rounded, slightly cut-off	rounded
15	Tarcău, Neamţ	Fairly smooth surface, slightly reddish hue	The kernel has a dark yellow colour, a good flavor, it may be relatively easily taken out and whole	36,32	2	1,5	cut-off	cut off - rounded
16	Tătărăni, Vaslui	Irregular surface, with proeminences and alveoli, brownish to yellow color	The kernel has a dark yellow color, it is very difficult to taken out, in quarters, it doesn't adhere to the shell	35,79	3,5	1,7	apiculate	rounded
17	Fălticeni, Suceava	Visible longitudinal grooves, the shell has a brownish color	The kernel has a light yellow color, it is taken out easily, in halves, it has a good quality, satisfying taste	35,18	4	1,7	cut-off	cut-off
18	Valea Seacă, Paşcani	Smooth surface, brownish to yellow color	The kernel is difficult to take out, in quarters, it has a yellowish color with reddish hues and a mediocre taste	33,84	3,4	1,4	rounded	chopped -off
19	Coarnele Caprei, Iaşi	Irregular surface, slightly pointed crypts on the basis, brownish color	The kernel is difficult to be taken out, in quarters, it has a brownish color and a mediocre taste	33,18	2	1,7	rounded	rounded
20	Zbereni, Cotnari	Irregular surface, deep longitudinal alveoli,	The kernel has dark yellow color, it does not have flaws, it is easily	32,82	3,5	1,8	rounded-cut off,	cut-off, rounded

		proeminent joining	taken out, in halves, it has a good quality and a pleasant taste				cut-off	-cut off
21	Burla, Suceava	Smooth surface, brownish to yellowish color	The kernel has golden color, it does not have flaws, it is difficult to take out, in halves and it has a satisfying taste	31,85	2,9	1,8	cut-off	cut-off, rounded
22	Vânători, Neamţ	Irregular surface, light brown color	The kernel is brittle, it may be easily taken out, it has a dark yellow color and it often has flaws	31,48	2,8	1,9	chopped -off- rounded	chopped -off
23	Ţibăneşti, Iaşi	Smooth surface, brownish color	The kernel has a brown color, it may be easily taken out, in halves, it has an excellent taste	30,00	< 1,4	1,5	rounded-cut off	rounded
24	Andreiaşu de Jos, Vrancea	Smooth surface, brown to yellowish color, with no deep crypts	The kernel has a brown color, it may be easily taken out, in halves, it has a normal taste	31,38	2,7	2,0	rounded, rounded-rostrate,	cut-off-rostrate
25	Soloneţ, Suceava	Small fruits with a smooth surface, brown color	The kernel is brittle, it has a brown color, with flaws, mediocre quality, it is taken out very difficult and it has a changed taste	27,42	1,8	1,5	rounded	rounded
26	Boşteni, Paşcani	Relatively smooth surface, light brown color	The kernel has a dark yellow color, it is difficult to take out, in quarters, it has a mediocre taste	25,88	2,3	1,5	rounded-pointed, rounded	rounded -cut off
27	Tudora, Botoşani	Visible groove network, brownish to yellowish color	The kernel has light yellow color, it may be easily taken out, in halves, it has a normal taste	25,00	1,8	1,2	cut-off	rounded
28	Huşi Vaslui	Slightly irregular surface, deep longitudinal alveoli, welding on the sides, brownish to yellowish color	The kernel has dark yellow color, it is difficult to take out, in quarters, with flaws, mediocre taste, changed taste	15,69	4	1,7	cut off-rounded	rounded
29	Rugineşti, Vrancea	Slightly irregular surface, small crypts, hard epidermis with brownish to reddish color	The kernel has a yellow color, it is difficult to take out, in quarters, it has a pleasant taste	15,63	1,6	1,3	rounded	rounded -cut off

The separation of seeds from the fruit valves was generally easy, the seed being extracted in quarters or halves. There were also sources where the kernel adhered very well to the fruit skin and their extraction was very difficult (Soloneţ, Suceava; Burla, Suceava; Boşteni, Paşcani; Tătărăni, Vaslui) (tab. 1).

The kernel's color is yellowish, in most of the cases (Tarcău, Neamţ; Tudora, Botoşani; Sodomeni, Paşcani) or brownish (Săbăoani, Neamţ; Ţibăneşti, Iaşi; Dumbrava Gura Văii, Bacău; Soloneţ, Suceava). A thick and dark skin of the kernel, rich in tannin, adversely affects the taste of the kernel, making it bitter and pungent. Most of the walnut sources in our country are characterized by a weak pigmentation of the kernel skin (FAO Statistics, 2008), making them valuable from this point of view (tab. 1).

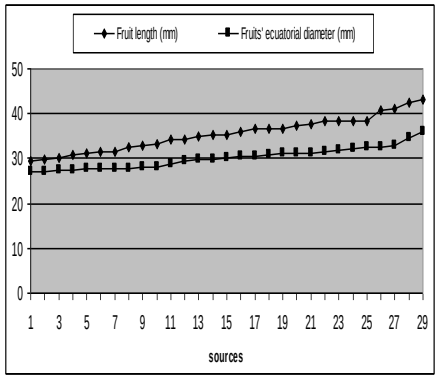

Fig. 1. Nut's length and ecuatorial diameter (1-29 running numbers of the sources from table 1)

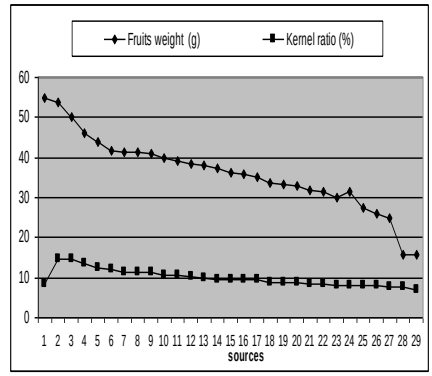

Fig. 2. Nut weight and kernel ratio (1-29 running numbers of the sources from table 1)

CONCLUSIONS

1. We analysed 29 walnut sources from different localities from the east and north-eastern part of Romania.

2. Amongst the sources we analysed, the most valuable are: Focuri, Iaşi; Andreiaşu de Jos, Vrancea; Sodomeni, Paşcani; Umbrăreşti, Deal, Galaţi; Goruni, Iaşi; Hupca, Vaslui; Dumbrava Gura Văii, Bacău; Fălticeni, Suceava; Darabani, Botoşani (the fruits are big in size, the endorcarp is of an average thickness, the fruits have an high kernel content, the separation of seeds from the fruit valves was easy and the kernel does not have flaws).

3. Considering the aspects mentioned, the walnut fruits comming from these areas can be used for consumption, but also for the extraction of the edible oil which is of a very good quality.

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RESVERATROL BIOSYNTHESIS *IN VITRO* CULTURE CONDITIONS ON GRAPEVINE (FETEASCA NEAGRA AND CABERNET SAUVIGNON) UNDER THE ACTION OF $ALCL_3$ AS ELICITOR AGENT

BIOSINTEZA RESVERATROLULUI ÎN CONDIȚIILE CULTURII *IN VITRO* A VIȚEI DE VIE (FETEASCĂ NEAGRĂ ŞI CABERNET SAUVIGNON) SUB ACȚIUNEA $AlCl_3$ CA AGENT ELICITOR

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Abstract: *Stilbenes are considered the most important phytoalexin group synthesised in grapevine (Vitis vinifera) and they are known to contribute to the protection against various pathogens. The main typical stilbenes of grapevine which show antifungical and pharmaceutical characteristics are resveratrol and his derivates. Recently study prominence also their benefit in human health by their antifungical, anticancerigen, hypolipidemic and antidiabetic properties. Present study was focused on induction of resveratrol biosyntheses in vitro vine culture conditions under effect of $AlCl_3$ as eliciting agent. Specific medium for vine in vitro multiplication (M&S, 1962 + 1 mg/L BAP +0, 5 mg/L AIA) has been supplemented with different doses of 1% $AlCl_3$ (0, 01%; 0, 03%; 0, 05%). Reservation dosage was made by high performance liquid chromatography (HPLC) with pressure liquid chromatography Merck – Lunchrom and UV detector. Using modified mediums resveratrol synthesis has been intensified at Cabernet Sauvignon cv. up to 97, 94 µg/g soluble solids in plant at the 0,05 % $AlCl_3$ concentration.*

Key words: grapevine, elicitor agent, stilbenes, resveratrol

Rezumat: *Stilbenii sunt consideraţi cel mai important grup de fitoalexine sintetizaţi de vița de vie (Vitis vinifera), fiind recunoscută contribuția lor în protecția acesteia împotriva diverşilor agenţi patogeni. Principalii stilbeni caracteristici viței de vie sunt resveratrolul şi derivatii săi, ei atrăgând atenția prin proprietățile lor antifungice şi farmacologice. Studii recente pun în evidență rolul benefic în sănătatea umană prin efectul lor anticancer, hipolipidemic şi antidiabetic, pe lângă însuşirile fungitoxice cunoscute deja. Studiul de față s-a axat pe inducerea biosintezei resveratrolului în condițiile culturii in vitro a vitei de vie, sub acțiunea $AlCl_3$, ca agent elicitor. Mediul de cultură specific multiplicării viței de vie (M&S, 1962 + 1 mg/L BAP+ 0,5 mg/L AIA) a fost suplimentat cu diferite doze de soluție 1% $AlCl_3$ (0,01%; 0,03% şi 0,05%). Dozarea resveratrolului s-a realizat prin cromatografie lichidă de înaltă performanță (HPLC), cu un cromatograf de lichide sub presiune Merck – Lachrom, cu detector UV. Biosinteza resveratrolului a avut loc cu o mai mare intensitate la soiul Cabernet Sauvignon, cantitatea de resveratrol sintetizată în plantă atingând valoarea de 97,94 94µg/g s.u., la o concentrație de 0,05% $AlCl_3$ în mediul de cultură.*

Cuvinte cheie: vița de vie, agent elicitor, stilbeni, resveratrol

INTRODUCTION

It is known that certain plants can synthesize, in response to stress (UV irradiation or a parasitic infection), natural molecules - generically defined as fitoalexines - enabling them to adapt themselves to this stress (Jeandet, 2002). The grapevine produces large quantities of fitoalexines such as polyphenols – the stillbenes being the most important – as a reaction to a physical-chemical stress (UV radiation, ozone) or a biological one (the *Botrytis cinerea, Plasmopara viticola,* etc. fungi attack). The resveratrol, as the main representative of the stillbenes, is synthesized in the leaves or the skin of the grape seeds, becoming a mediator of the plant defence stimulation, thus contributing to the development of a systemic defence of the grapevine (Iriti, 2004). By analogy, the resveratrol has antifungal properties, resisting against the development of microbial infection caused by *Botrytis cinerea*, but also by other pathogens, like *Phomopsis viticola*, *Rhizopus stolonifer* and *Plasmopara viticola*. If all the grapevine varieties of *Vitis vinifera* are capable of producing resveratrol in different quantities, some of them distinguish themselves in its biosynthesis.

Among the chemical agents able to induce the synthesis of resveratrol in the plants that are brought into contact with, the aluminium chloride is the most effective (Adrian, 1996, Adrian, 2000).

Our studies meant to determine the active $AlCl_3$ doses used for the grapevine multiplication in the *in vitro* conditions. The objective of this experiment is to identify the varieties designed to provide high quality red wines able to synthesize remarkable amounts of resveratrol, the compound involved in the defence mechanism of the grapevine against the phytopathogenic agents (*Botrytis cinerea, Plasmopara viticola, Phomopsis viticola).*

MATERIAL AND METHOD

For testing the resveratrol biosynthesis in the *in vitro* culture, under the action of aluminium chloride, two grapevine clones were selected, designed to provide high quality red wines, namely: Feteasca neagra clone 6 St. and Cabernet Sauvignon clone4 Is. To this end, cultures with additional elicitor agent ($AlCl_3$) in their medium were initiated.

Schematically, the experimental factors are:

A. The $AlCl_3$ doses:

M – Control dose (Romanian Control Variant)

A_1 - 0.01% $AlCl_3$

A_2 - 0.03% $AlCl_3$

A_3 - 0.05% $AlCl_3$

B. The grapevine variety:

B_1 - Feteasca neagra clone 6 St.

B_2 - Cabernet Sauvignon clone 4 Is.

The biological material (apexes with intense regeneration of 0,3 to 0,5 cm) used for the multiplication through *in vitro* culture, was taken from plants growing in pots under controlled vegetation conditions. The disinfection of the explants was carried out with calcium hypochlorite ($CaCl_2O_2$ 6%), under sterile

conditions in laminar flow hood for 5 minutes.

The assessment of the regeneration and multiplication processes was carried on the culture medium used for the initiation and multiplication stages and which had in its composition the Murashige-Skoog medium (M&S,1962), supplemented with 1mg/l N 6-benzilaminopurine (BA) and 0,5 mg/l β-indole acetic acid (IAA). During multiplication, the citokinine/auxine ratio changed to 1:1 (0.5 mg/l BA and 0.5 mg/l IAA), in order to balance the multiplication and elongation processes. Sucrose (20 g/l) was used as a carbon source and agar-agar in the amount of 6.2 g/l, was used for the solidification of the culture media.

According to the general recommendations for the *in vitro* grapevine multiplication, the media pH was adjusted before autoclaving to a value in the range 5.7 to 5.8. The inoculation and transfer operations on fresh media were carried out in sterile areas, in laminar flow hoods.

After stabilizing the cultures meaning three subcultures (60-65 days), the explants formed adventitious buds which developed into young shoots groups of about 1.5 - 2 cm, under the influence of hormone components in the culture medium. The young shoots selected in these groups were seized in fragments of 0,5-1cm, and were the biological material used in the culture media, supplemented with aluminium chloride.

In the experimental variants, the aluminium chloride, in 1% aqueous solution, was added in the culture medium in various doses, the final concentration of the medium in Al^{3+} being of 20 ppm (A_1), 60 ppm (A_2) and 100 ppm (A_3). After neutralization with 10% KOH, the culture medium was sterilized at a temperature of 120^oC in an autoclave for 20 minutes (pressure of 1 at).

The regeneration and multiplication processes of the biological material were conducted under controlled conditions, in growth rooms with possibility of adjusting to climate factors (temperature of 25 ± 1^0C; photoperiod and light within 16 hours of light and 3000-3500 lx).

The biosynthesis of the phenolic compounds in the plant material during intermediary metabolism was quantified by determination of the total polyphenols and resveratrol contents in the experimental variants. The presence of the resveratrol was quantitatively shown by liquid chromatography and UV detection at 306 nm.

RESULTS AND DISCUSSIONS

The observations on the vegetative formations regenerated in the explants inoculated in the *in vitro* culture, from both grapevine clones, showed that there is uniformity in obtaining the multiplication indices (adventitious buds, number of primary shoots and shoots) by using the M& S medium as the basic one, improved with 0.5-1mg/l BA and 0.5 mg/l IAA, compared with the medium variants supplemented with aluminium chloride.

The process of the young shoots proliferation was followed periodically. A strong multiplication was remarked in both clones studied (groups of 6-8 primary shoots/young shoots fragment) and a clear elongation in the A_1 variant, with the lowest aluminium salt content (0.01%). The multiplication was lower for the other two experimental variants, but with increased ascension of the young shoots.

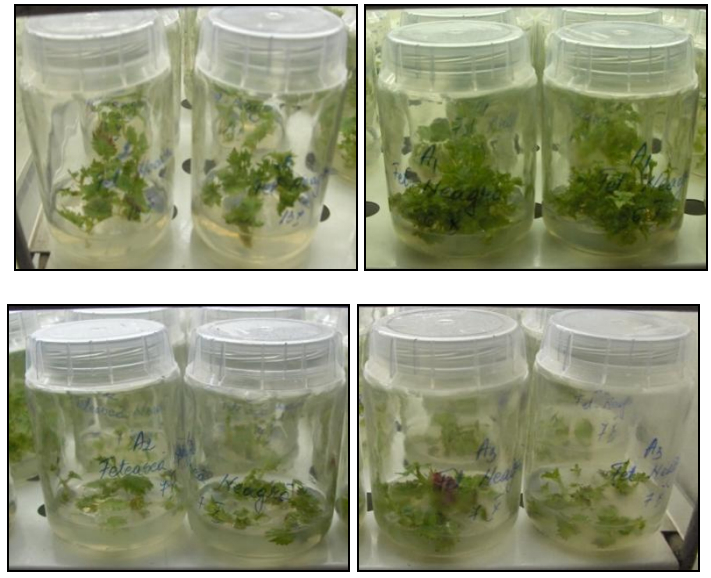

Fig. 1÷4. Evolution of the explants in the four experimental variants - Feteasca neagra clone 6 St. (*detailed*)

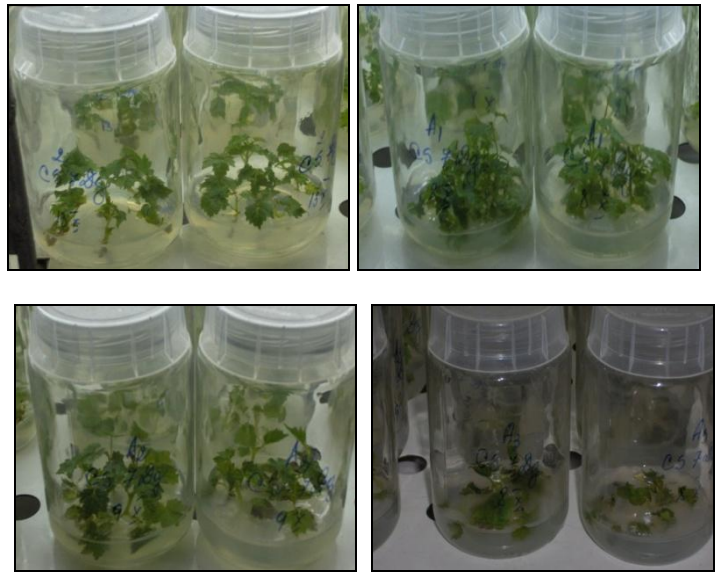

Fig. 5÷8. Evolution of the explants in the four experimental variants - Cabernet Sauvignon clone 4 Is. (*detailed*)

Figures 1÷ 4 and 5÷ 8 shows the detailed results after 20 days the use of the elicitor agent ($AlCl_3$) in the culture medium. The variety of Feteasca neagra clone 6 St. has shown a better multiplication rate in variant A_1 (0.01% $AlCl_3$) compared

with the same variant of Cabernet Sauvignon clone 4 Is.

At higher concentrations of aluminium (60 ppm and 100 ppm Al^{3+}) in the culture medium the rate of multiplication decreased, the elongation being favoured for the young shoots. For the A_2 but especially A_3 variants, a slight reddening of the leaves was also observed, due to the anthocyans biosynthesis.

The chemical analyses conducted on the collected material from the experimental variants showed an increased content of total polyphenols and resveratrol in the plants grown on the medium containing the elicitor agent.

Increasing concentration of $AlCl_3$ in the culture medium for the Feteasca neagra variety led to a significant increase in total polyphenols content in the grapevine plants (figure 9).

Similarly, a content of 0.05% of the elicitor agent in the culture medium almost doubled the content of resveratrol in A_3 variant, compared with the control variant (Mt.) - figure10.

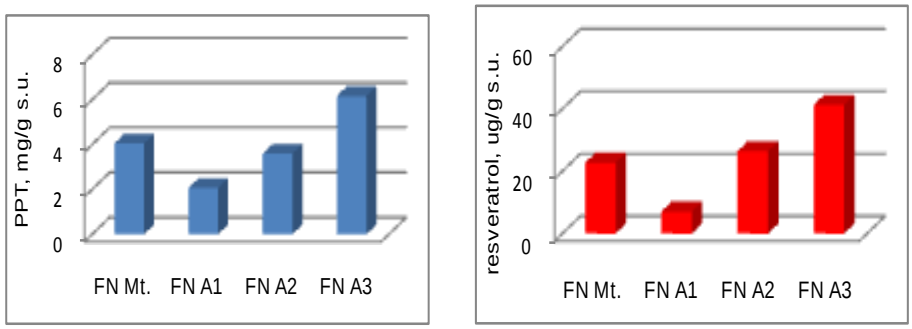

Fig. 9-10. Total polyphenols and resveratrol content in grapevine plants multiplied *in vitro* (Feteasca neagra clone 6 St.)

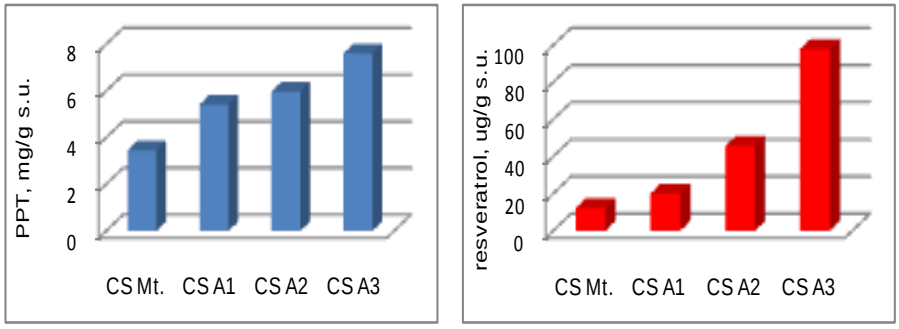

Fig. 11-12. Total polyphenols and resveratrol content in grapevine plants multiplied *in vitro* (Cabernet Sauvignon clone 4 Is.)

The variety of Cabernet Sauvignon had a better response to the treatment with $AlCl_3$, meaning that both total polyphenols and resveratrol contents increased with increasing the dose of elicitor added in the culture medium (figures

11 and 12). Furthermore, the resveratrol biosynthesis was increased in this variety, compared with the variety of Feteasca neagra. Thus, the resveratrol content reached up to 97.94 μg/g d.m. in the A_3 variant compared to 41.3 μg/g d.m. recorded in the similar variant of the variety Feteasca neagra. Is remarkable that, in the plants belonging to the control variant, the resveratrol content was significantly higher in the Feteasca neagra variety compared to the Cabernet Sauvignon one.

CONCLUSIONS

1. To highlight the influence of aluminium chloride in the biosynthesis of resveratrol *in vitro* culture conditions of the grapevine, a laboratory procedure was initiated and the $AlCl_3$ 1% solution was added in the culture medium in various doses;

2. The tested varieties responded to the addition of the elicitor agent in the culture medium by showing an increase of the total polyphenols content, but especially of the resveratrol one according to the used dose;

3. The resveratrol biosynthesis occurred with greater intensity in Cabernet Sauvignon clone 4 Is. compared with Feteasca neagra clone 6 St., the amount of resveratrol synthesized in the plants reaching the value of 97.94 μg/g d.m., at a concentration of 0.05% $AlCl_3$ (100 ppm Al^{3+}).

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RESEARCH ON THE BEHAVIOR OF SOME WINE GRAPE VARIETIES IN THE CONTEXT OF CLIMATE CHANGE AT DEALU BUJOR VINEYARD

CERCETARI PRIVIND COMPORTAREA UNOR SOIURI DE STRUGURI DE VIN IN CONTEXTUL SCHIMBARILOR CLIMATICE, IN PODGORIA DEALU BUJORULUI

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Abstract. *In the recent years a climate change with consequences on Vine behaviour has been noticed. Clime data analysis has revealed an increased average annual temperature with regional differences. Also some changes in the regime of extreme thermic values have been noticed as follows: an increased annual frequency of tropical days (maximum day value > 30 ˚ C) and a decreased annual frequency of winter days (maximum day value <0 ˚ C), a significant increase of summer average minimum temperature and of winter and summer average maximum temperature. As a result of deeper warming and water deficit during summer season the phenomenon of dryness is continuously intensifying. On the background of climate change trend a comparative study on the behaviour of some wine grapes has been carried out at Dealu Bujorului Vineyard, Romania. The experiments have been carried out within the Project entitled „Research concerning the global climate change upon the viticultural ecosystem* , Project no. 51075/Sept 2007, PNII*" run within Partnership Programme* .

Key words: variety , vine , production , temperature, rainfalls**.**

Rezumat. *In ultimii ani s-a observat o modificare a climei cu repercusiuni asupra comportarii vitei de vie. Analiza datelor climatologice a evidentiat o crestere a temperaturii medii anuale, existand diferentieri regionale. S-au observat si schimbari in regimul unor valori termice extreme: cresterea frecventei anuale a zilelor tropicale (maxima zilei >30˚C) si descresterea frecventei anuale a zilelor de iarna (maxima zilnica < 0˚C), cresterea semnificativa a mediei temperaturii minime de vara si a temperaturii maxime de iarna si vara. Urmare a incalzirii mai pronuntate si a unui deficit hidric in crestere din timpul verii s-a intensificat fenomenul de aridizare . Pe fondul tendintei de modificare a climei s-a realizat un studiu comparativ asupra comportarii unor soiuri struguri de vin din podgoria Dealu Bujorului. Studiul întreprins face parte integrantă din proiectul „Cercetări privind impactul schimbărilor climatice globale asupra ecosistemului viticol,* Proiect 51075/sept 2007, PNII*" derulat în cadrul programului Parteneriate*.

Cuvinte cheie: soi, vita de vie, productie, temperatura, precipitatii**.**

INTRODUCTION

The viticultural plantations from the South Moldavia area are affected by climate change appeared during the last period of time. The climate trend leads

most of times to a change of environment conditions with a dep impact upon quantity and quality of grape production (Viorica Enache, 2007**).** The reduction of grape harvest from a quantitative and qualitative point of view and the damages upon vine stumps in the viticultural plantations due to the climate events (realy autumn frost, late spring frost, excessive negative temperatures) results to substantial losses in the viticultural inventory (Gh.Calistru, Doina Damian, 1998**).**

MATERIAL AND METHOD

The experiments have been organized in the viticultural plantation of Bujoru Research and Development Station for Viticulture and Vinification during the period 2005-2009. Three grape varietes for wine have been used as biological material as folows: Black Băbească, Black Feteasca and Merlot. In order to analyse the climate factors, the data registered by Meteo Forecast Station of Bujoru Research and Development Station for Viticulture and Vinification have been used. The following parameters have been analysed: the trend of climate factors, grape yield and its quality.

RESULTS AND DISCUSSIONS

In order to analyse the behaviour of some vine varieties for wine grapes in the context of global climate change at Bujoru Hills Vineyard where the Research and Development Station for Viticulture and Vinification is situated, the data registered for a period of five year (2005-2009) have been processed and interpreted. The climate factors noticed during the analyzed period correspond to a few years with different conditions (table 1).

Table 1

The main Climate Parameters at Bujoru Research and Development Station for Viticulture and Vinification in the period 2003-2009

Climate Parameter	2005	2006	2007	2008	2009
Global Thermic Balance , (Σt°g)	3,576.7	3,605.5	3,671.5	3,694.9	3,664.2
Active Thermic Balance , (Σt°a)	3,516.6	3,563.6	3,618.3	3,645.3	3,510.9
Net Thermic Balance , (Σt°u)	1,716.2	1,598.3	1,858.3	1,875.3	1,660.9
Σ Annual Rainfalls , mm	474.2	430.5	554.4	364.7	357.4
Σ Rainfalls during the Vegetation Period , mm	292.0	330.2	254.5	224.8	174.6
Σ Number of Insolation Hours in the Vegetation Period , Hours	1175.3	1287.6	1477.4	1332.7	1560.6
Average Annual Temperature,°C	11.8	11.7	13.5	12.9	11.2
Average Temperature in the month of - July ,°C	24.3	24.2	28.1	24.0	23.8
– August,°C	23.3	23.5	25.5	25.9	22.1
– September,°C	19.1	18.1	17.4	17.1	17.2
Air Absolute Minumum Temperature,°C	-13.6	-21.0	-13.0	-14.5	-15.2
	8, 10, 11.II	23.I	25.II	5.I	9.I
The Average of Maximum Tepmerature in the month of August,°C	28.0	29,7	30,6	32,0	30,8
Average Temperature in the I-st and II-nd decades of the month of June	20.0	20.2	25.2	21.9	20.5
Wind Speed (km/hour	1.9	2.1	2.3	2.0	2.5
Relative Air Humidity (%)	72	69	57	54	74,1

Nebulosity	5.9	5.5	5.6	6.2	3.3
No. Of days with Maximum Temperatures > 30 °C	29	44	66	52	44
Length of Bioactive Period , days	190	195	178	177	186
Real Heliothermic Index	2.02	2.06	2.75	2.50	2.56
Hydrothermic Coefficient	0.83	0.9	0.7	0.6	0.49
Vine Bioclimate Index	7.73	7.59	11.5	11.8	17.0
Index of Oenoclimate Amplitude	4,649.3	4,771	5,091.2	5,003.2	5,149.1

Bujoru Hills Vineyard is situated in a dry area, characterized by a multi annual average temperature of 12,2ºC and 451.1 mm annual average rainfalls. In the period 2005-2009, it was noticed an increased average air temperature, except the year 2009. It is noticed an average annual temperature of 13.5ºC/2007 and 12.9ºC/2008, with a thermic gain of 1.4-2.0ºC compared to the average multiannual temperature. In the year 2007, the monthly evolution of air average temperature has put into evidence high montly multiannual average temperature, during the period of vegetation and in the year 2009 lower values than the multiannual temperature, except the months of January and February (fig.1).

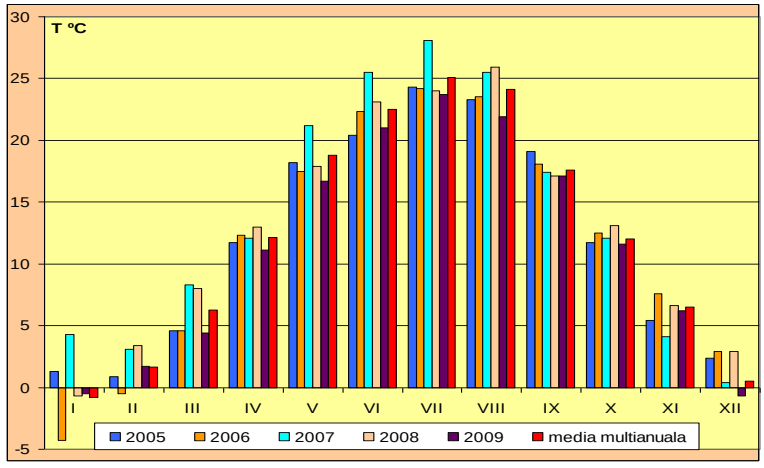

Fig.1. Montly Evolution of Air Temperature during the period 2005-2009

The Global Thermic Balance during the period of vegetation, registered 3.576,7-3.694,9 ^{0}C showing that at Bujoru Hills Vineyard there are assured conditions for grape maturation till the stage V and VI, and with caution for the stage VII. The Active and Net Thermic Balance has increased during the analyzed period, except the year 2009. Under the temperate climate peculiar to Bujoru Hills Vineyard, the frequence of absolute minimum temperatures is important for vine growing, the Winter absolute minimum temperature during the period 2005-2009 have varied between -13,0ºC/Febraruy 25, 2007 to -21,0 ºC /January 23, 2006.

The Average Rainfalls during the studied period have been 431.8 mm, dof which 255.5 mm during the vegetation period. During the last years, we assist to a reduction of rainfalls during the period of vegetation, with an ununiform distribution across the time. Frequently, torrential rainfalls alternate with long

periods of low rainfalls. The deficitary rainfalls are manily noticed during the vegetation period and are due to high air temperature with a deep influence upon vine growing. The years 2006, 2008 and 2009 were very dry, with low annual rainfalls much lower than the multiannual avergare (fig.2). The month of July of the year 2007 was terrible dry. The deficit of rainfalls during the vegetation period has been compensated by the precipitations supply during the Winter period, which is leading theoretically to annual precipitations at the level of the multiannual average, covering vine requirements concerning this climate item, despite that it is about very dry periods. Many times for vine growing, annual averages are not so important, but the extreme values of some climate items (absolute minimum temperature, maximum temperatures in the month of August, average temperature in the I-st and II-nd decades of the month of June, the number of days with a maximum temperature higher than 30 ºC).

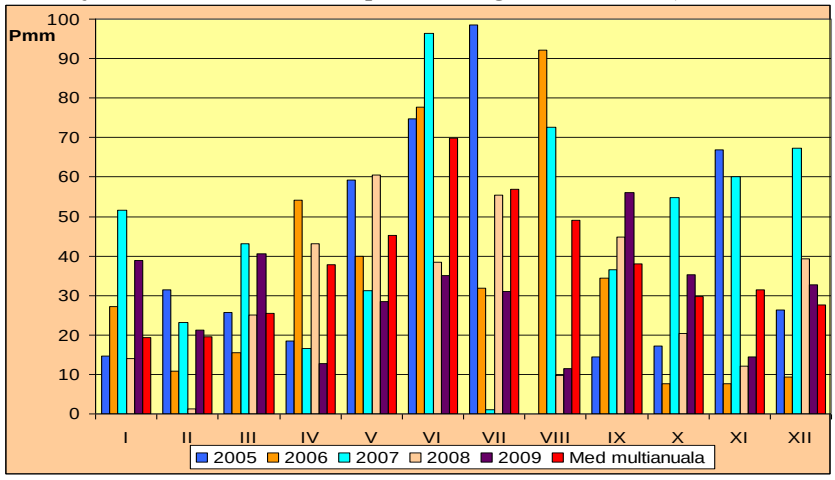

Fig.2. The monthly Evolution of Rainfalls during the years 2005-2009

The values registered by the synthetical indicators (Heliothermic Index, Bioclimatic Index, Oenological Amplitude and Hydrothermic Coefficient) show a favourable and balanced area for vine growing and a good favorability for the growing of varieties for red and white wines.

Compared to the records of the climate indices, mentioned above, the varietes included in the experiments have shoiwn a different reaction, depending on its genetical backgound, applied growing measures, grape yield achieved in the previous years etc.

The average grape production has varied for Black Babeasca from 3.677 kg /ha/2007 to 7.547 kg/ha/2008, for Merlot from 3.040 kg/ha/2007 to 8.800 kg/ha/2008 and for Royal Fetească from 5.376 kg/ha/2009 to 13.188 kg/ha/2008. Depending on the average grape production per surface unit, the variety hyerarchization in the decreasing order is the following one: Royal Fetească, Merlot and Black Băbească (fig.3). Concerning the obtained production, the year 2007 has been deeply influenced by the evolution of climate factors.

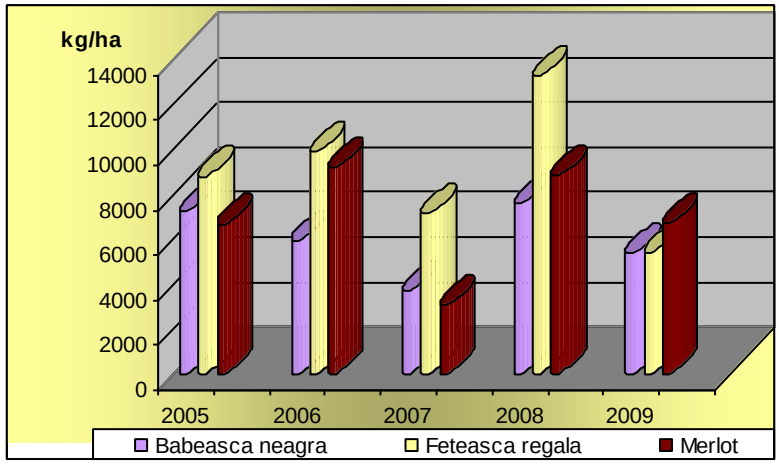

Fig.3. Grape Production during the period 2005-2009

We must mention that the climate trend in the year 2006 has deeply affected grape production in the year 2007. The grape sugar content is closely related to temperature evolution. The differences between the maximum and minimum temeperatures are 68 g/l/ Black Babească and 40 g/l/ Royal Fetească and Merlot. The highest sugar concentration was achieved in the year 2009 for Black Babească /243 g/l, in 2007 for Royal Fetească /243 g/l and in 2006 for Merlot/217 g/l (fig.4).

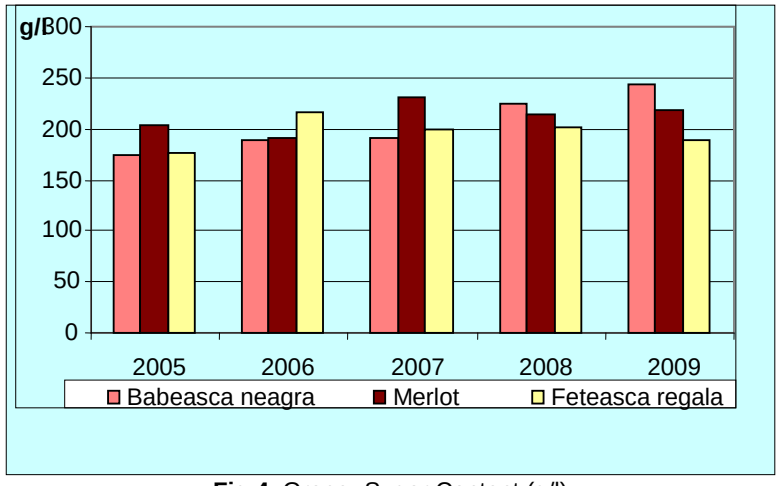

Fig.4. Grape Sugar Content (g/l)

Must Acidity has recorded a decrease in 2007 and 2008. The minimum values registered in the year 2008 have been: 4.0 g/l H_2SO_4/Black Babească, 3.6 H_2SO_4/Royal Fetească and 3.3 H_2SO_4/Merlot (fig.5).

The evolution of sugar content has a reverse relationship with must acidity. Assessing the evolution of grape varieties during the period 2005-2009, Royal Fetească has achieved balanced productions, with quantitative and qualitative

performances specific to this vine type. On the second position is coming Merlot and then on the third one Black Băbească.

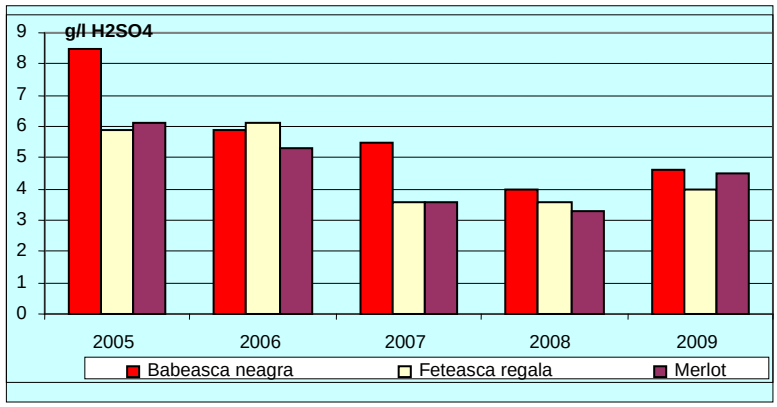

Fig.5. Must Acidity (g/l H_2SO_4)

CONCLUSIONS

In the period 2005-2009, the evolution of climate factors has had a deep impact upon production potential and grape quality for each vine variety.

1. During the last years, we have noticed a reduction of precipitations during the vegetation period and their ununiform distribution, frequently torrential rainfalls have alternated with long deficitary periods. The deficit of rainfalls has been mainly noticed during the vegetation period and is closely related to very high temperatures of the air with a deep impact upon vine growing.

2. The years 2006, 2008 and 2009 were very dry, the annual rainfalls were below tha multiannual average. The compensation of rain deficit during the vegetation period by Winter precipitations leads, theoretically, to annual precipitations at the level of the multiannual average, covering vine needs, despite than theses periods are very dry.

3. Assessing the evolution of vine varieties in the period 2005-2009, we may say that Royal Fetească has registered balanced grape productions, the quantitative and qualitative indices being specific to this vine type, followed by Merlot and Black Băbească.

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THE PHENOLOGY, FERTILITY AND PRODUCTIVITY OF WHITE GRAPEVINE VARIETIES IN THE VITICULTURAL CENTRE OF JIDVEI OF THE TÂRNAVE VINEYARD

FENOLOGIA, FERTILITATEA SI PRODUCTIVITATEA SOIURILOR DE VIŢĂ DE VIE PENTRU VINURI ALBE DIN CENTRUL VITICOL JIDVEI-PODGORIA TÂRNAVE

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Abstract*. In this paper, data are presented concerning the behaviour of the white grapevine varieties Fetească regală and Riesling italian growing in the viticultural centre of the Târnave vineyard. The observations were made in the years 2006 and 2007 and they concerned the phenology, the percentage of fertile vine shoots, the fertility coefficients and the production indices of those grapevine varieties.*
Key words: Jidvei, fertility, productivity, grapevine varieties.

Rezumat. *În lucrare sunt prezentate datele referitoare la comportarea soiurilor de viţă de vie Fetească regală şi Riesling italian cultivate în centrul viticol Jidvei - podgoria Târnave. Obeservaţiile s-au efectuat în perioada anilor 2006-2007 şi au vizat desfăşurarea fenofazelor de vegetaţie, procentul de lăstari fertili, coeficienţii de fertilitate şi indicii de productivitate ai soiurilor.*
Cuvinte cheie: Jidvei, fertilitate, productivitate, soi de viţă de vie

INTRODUCTION

Târnave vineyard is one of the oldest and best known Romanian vineyards. The name of *„Wine Land"* that it was given even before the year 1566, when Ioan Sabuccus drew up a map of Transylvania, prove that people had dealt in wine growing in this area for ages. It is the largest vineyard in Transylvania and it covers almost the whole Transylvanian Plateau, which is crossed by two rivers bearing similar names, i.e. the Smaller and the Greater Târnava, whose tributaries cut the land into various mounds and hills, whose slopes have various orientations and declivities and exposure to the sun. Although the ecoclimatic conditions here do not quite meet the optimal parameters required by vine growing, they are however well interconnected and complementary, resulting in special features of the area, which explains the age-old presence of vineyards in the area and the unanimous appreciation the Târnave wines enjoy.

Last but not least, these vineyards are renowned for their grapevine varieties, mainly for their high quality white wines (Fetească regală, Fetească albă, Riesling italian, Sauvignon, Pinot gris, Traminer roz, Gewurztraminer etc.), all of which take advantage of the ecoclimatic conditions best fitting their requirements, which explains the fine flavour that stands as a quality brand for the *"Târnave wines"*. The wine centre of Jidvei is the largest and the most representative one in the Târnave vineyard. It is located between the villages of Cetatea de Baltă and Şona and it includes the vineyards

growing on the hill slopes of the Smaller Târnava corridor (Şona, Jidvei, Cetatea de Baltă) and on the southern hills (Balcaciu). Wines are usually being obtained here on a *controlled term of origin basis*, i.e. dry and semi-dry, by harvesting the grapes when fully ripe.

MATERIAL AND METHOD

Grapevine varieties have been studied which are representative for the viticultural centre of Jidvei – the Târnave vineyard, i.e.: Fetească regală and Riesling italian. Observations and determinations were made in the Wine Farm Nr. 23 belonging to S.C. Jidvei SRL – Alba Branch, in the years 2006 and 2007, in order to establish the agrobiological potential of the grapevine varieties. To this effect, we have surveyed: the phenological spectrum of the varieties, depending on the weather conditions throughout the production year; the fertility and yield of grapevine varieties – by determining the fertile grapevine shoot percentage, the values of the fertility coefficients and of the production indices and the amount of grape production.

We designed the experimental set-up (scheme) as straight / linear blocks with four variants and 3 repetitions. Each experimental variant consisted of 20 rootstocks (trunks) with normal growth vigour. The difference between the experimental variants (V_1 - V_3) is shown by a graduation of the fruit load which differs from the witness variant (M). The experimental variants are as follows:

- Witness variant (**M**): Guyot fruiting arm pruning with periodical replacement 48 nodes (buds) / trunk, 4 fruiting arms/cordons (2-node replacement spurs + 4 canes with 10 nodes each), i.e. 18,18 nodes/m^2, 181800 nodes/ha;
- variant (**V_1**): Guyot fruiting arm pruning with periodical replacement 40 nodes / trunk, 4 fruiting arms/cordons (2-node replacement spurs + 4 canes with 8 nodes each), i.e. 15,15 nodes/m^2, 151500 nodes / ha;
- variant (**V_2**): Guyot fruiting arm pruning with periodical replacement 56 nodes/trunk, 4 fruiting arms/cordons (2-node replacement spurs + 4 canes with 12 nodes each), i.e. 21,21 nodes/m^2, 212100 nodes/ha;
- variant (**V_3**): Guyot fruiting arm pruning with periodical replacement 64 nodes/trunk, 4 fruiting arms/cordons (2-node replacement spurs + 4 canes with 14 nodes each), i.e. 24,24 nodes/m^2, 212100 nodes/ha;

The soil was brown illuvial clay, slightly acid or even neutral (pH = 6-7.20), half-rich in humus (1.96-2.31%), with low phosphorus content (35-48 ppm) and rich in potassium (206-212 ppm).

RESULTS AND DISCUSSIONS

Phenology of the varieties. The variety Fetească regală, originating from the village of Daneş, near Sighişoara, is one of the varieties that have best adapted to the Transylvanian Plateau ecoclimatic conditions. In literature, it is referred to as a variety with middle vegetation (155 – 170 days) and with moderate temperature needs, requiring an aggregate temperature of 2500-3200^{0}C for its time of vegetation.

The variety Riesling italian, originating from Central Europe, is a variety with long-time vegetation (160-175 days), requiring 2600-3650^{0}C aggregate temperature for full vegetation.

The two varieties behaved quite differently in the years 2006 – 2007, in the conditions typical with the Târnave vineyard (table 1). Analyzing the experiment data,

one can notice that the beginning of vegetation phases and their length are influenced by the size of the nodes load per trunk (rootstock) at the cutting time.

The variety Fetească regală*:* with the witness variant (M), bud unfolding occurred in the interval 15-17 IV. With the variant V1, for which the smallest fruit load had been provided (18,18 nodes/m^2), bud unfolding began 1-2 days earlier (12-15 IV) than with M, while with the variant V3 (24,24 nodes/m^2) it began 3-4 days later (20 IV).

Table 1

Succession of vegetation phenophases with the varieties studied (years 2006-2007)

Variety	Year	Variant	Vegetation phenophase						Nr. of days from the bud unfolding till full maturation
			Bud unfolding	Vine shoot sprouting	Blooming	Grape ripening	Full maturation	Leave falling	
Fetească regală	2006	**M**	17 IV	29 IV	9 VI	13 VIII	23 IX	20 X	159
		V1	15 IV	27 IV	4 VI	10 VIII	20 IX	22 X	158
		V2	18 IV	29 IV	8 VI	14 VIII	23 IX	20 X	161
		V3	20 IV	1 V	12 VI	15 VIII	25 IX	24 X	168
	2007	**M**	15 IV	22 IV	31 V	10 VIII	18 IX	23 X	156
		V1	12 IV	19 IV	30 V	8 VIII	15 IX	23 X	150
		V2	17 IV	23 IV	3 VI	12 VIII	20 IX	25 X	157
		V3	20 IV	27 IV	5 VI	14 VIII	23 IX	26 X	159
Riesling italian	2006	**M**	24 IV	1 V	12 VI	11 VIII	24 IX	30 X	153
		V1	25 IV	30 IV	14 VI	15 VIII	26 IX	28 X	154
		V2	25 IV	1 V	13 VI	12 VIII	25 IX	28 X	153
		V3	26 IV	2 V	15 VI	15 VIII	26 IX	30 X	154
	2007	**M**	20 IV	28 IV	8 VI	5 VIII	20 IX	26 X	153
		V1	18 IV	26 IV	9 VI	7 VIII	18 IX	27 X	153
		V2	21 IV	30 IV	12 VI	10 VIII	22 IX	27 X	154
		V3	21 IV	1 V	13 VI	10 VIII	22 IX	27 X	154

The variety Riesling italian: the bud unfolding occurs later, that is in the last decade of April. The witness variants and V1 were the earliest to start their vegetation (18-24 IV). We noticed that an increase of the fruit load caused the two varieties to start their vegetation 3-5 days later. This is convenient for grape production, because late spring hoarfrosts, that use to occur in the viticultural centre of Jidvei until early in May, destroying the vine shoots shortly after bud unfolding, can thus be avoided. The first variety to bloom, late in May and early in June, is Fetească regală, which is followed by the variety Riesling italian, starting from the second decade of June.

Blooming started earlier with the variant V1 (1-2 days earlier than the witness variant), because a small number of vine shoots and inflorescences had sprouted on the trunk. With the variants V2 and V3 (56 and 64 nodes/trunk, respectively), blooming started 3-4 days later than with the witness variant. The fruit load also influences the beginning of grape maturation (ripening). With the variety Riesling italian, the witness variant grapes started to ripe first (5 VIII), while the grapes of variants V2 and V3, with larger node loads left for cutting, were the last to ripe.

The node load established during the cutting (pruning) influences the grape maturation phenophase due to the amounts yielded by each trunk. With the variants

V1 and M, the grapes reached full maturity in the time interval 18-23. IX, while with the variants V2 and V3 the period was 22-26 IX, and the variety Riesling Italian reached ripeness later than the variety Feteasca regală. Under normal climate (weather) conditions, leaves fall in the period October 20-30. Leaves may fall accidentally early in October, if unexpected early hoarfrosts occur.

The fertility and productivity elements are characteristics determined by the biological nature of the grape varieties and by their productivity levels. The elements of fertility and productivity have been studied and they are expressed as: fertile vine shoots percentage, absolute and relative fertility coefficient, absolute and relative productivity index and average weight of a grape cluster. Analyzing the table 2, we notice that there is a negative correlation between the fruit loads provided during the cutting (pruning) and the fertility elements. It shows that the percentage of fertile shoots drops if a larger number of nodes is being left during the cutting (pruning). Thus, the variant V_1 of the variety Fetească regală resulted in a slight increase of the percentage of fertile shoots (1.8%), whereas the variant V_2 had almost the same percentage as the witness, while the variant V_3 led to a decrease of the number of fertile shoots by 12.5%.

Table 2

Fertility elements for the studied soils (years 2006-2007)

Variety	Year	Percentage of fertile shoots (%)				Absolute fertility coefficient				Relative fertility coefficient			
		M	V_1	V_2	V_3	M	V_1	V_2	V_3	M	V_1	V_2	V_3
Fetească regală	2006	85,4	86,3	84,3	70,2	1,14	1,20	1,14	1,07	0,98	1,00	0,87	0,77
	2007	73,2	75,1	72,9	68,5	1,34	1,39	1,30	1,19	0,81	0,89	0,78	0,75
	aver.	79,3	80,7	78,6	69,4	1,24	1,30	1,22	1,13	0,89	0,95	0,83	0,76
	Diff, from M %	-	101,8	99,1	87,5	-	104,9	98,3	91,1	-	106,7	93,3	85,4
Riesling italian	2006	63,7	68,2	64,2	58,6	1,39	1,41	1,28	1,21	1,02	1,08	0,99	0,80
	2007	65,7	69,1	65,5	60,6	1,61	1,58	1,54	1,52	1,06	1,10	1,01	0,84
	aver.	64,7	68,7	64,8	59,6	1,50	1,50	1,41	1,37	1,04	1,09	1,00	0,82
	Diff, from M%	-	106,2	100,1	92,1	-	100,0	94,0	91,3	-	104,8	96,1	78,8

With the variety Riesling italian one can see that the variant V_1 resulted in an increase of the fertile shoot percentage by 6.2% as compared to the witness, variant V_2 caused about the same percentage of fertile shoots to sprout, while variant V_3 led to a decrease of the fertile shoot percentage by 7.9%. The fertility coefficients also tended to get smaller values as the fruit load left during the cutting (pruning) increased. With the variety Fetească regală, the values of the absolute fertility coefficient were greater by 4.9% for the variant V_1, and smaller by 1.7% with the variant V_2 and much smaller than the witness - the variant V_3, which was 8.9%. The variety Riesling italian has the same absolute fertility coefficient when given a fruit load of 15.15 nodes/m^2 (V_1) and these values further decrease when by 6.0 % with the variant V_2 and 8.7% with the variant V_3, when compared to the witness. The relative fertility coefficient with the variety Fetească regală displayed average values ranging from 0.95 with the variant V_1 to

0.76 with the variant V_3. In percents, an increase of the fruit load reduced the relative fertility coefficient values by 6.7% with the variant V_1 and 14.6% with the variant V_3, when compared to the witness, whereas a reduction on the fruit load (V_1) caused the values to grow by 6.7% as compared to the witness.

The productivity elements of the varieties we have studied (table 3) tend to be similar to the fertility elements.

Table 3

Productivity elements of the studied varieties (Years 2006-2007)

Variety	Year	Average weight per grape cluster (g)				Absolute productivity index				Relative productivity index			
		M	V_1	V_2	V_3	M	V_1	V_2	V_3	M	V_1	V_2	V_3
Fetească regală	2006	169	175	159	155	192,7	210,0	181,3	165,8	165,0	175,0	138,3	119,3
	2007	149	167	144	138	199,6	232,1	187,2	171,4	120,7	148,6	112,3	103,5
	med	159	171	151,5	146,5	196,2	222,3	184,8	168,6	142,9	162,5	125,7	111,4
	Dif, faţă de M%	-	107,5	95,2	92,1	-	113,3	83,1	75,8	-	113,7	87,9	77,9
Riesling italian	2006	107	115	102	91	148,8	162,1	130,5	110,1	109,2	124,2	100,9	72,8
	2007	105	112	99	94	169,0	176,9	152,5	142,8	111,0	123,2	99,9	78,9
	med	106	113,5	100,5	92,5	158,9	170,2	141,7	126,7	110,1	123,7	100,5	75,8
	Dif, faţă de M%	-	107,0	94,8	87,3	-	107,1	89,2	79,7	-	112,3	91,3	68,9

The average weight of a Fetească regală grape increased by 7.0 % with the variant V_1, as compared to the witness (159 g) while smaller values were registered with the variants V_2 and V_3 – the latter's values only amounted to 146.5 g, which means a drop by 7.9% as compared to the witness variant. With the variety Riesling Italian, the average weight of a grape was smaller than that of the variety Fetească regală, due to the biological nature of the soil and to the fruit load which was left during the cutting (pruning). The range limits were 92.5 g with the maximum fruit load variant V_3 and 113.5 g with the variant V_1, whose fruit load was smaller than the witness variant. The absolute productivity index values were the greatest with the variant V_1 (15,15 nodes/m^2) with the both varieties and they were the smallest with the variant with 24,24 nodes/m^2 (V_3). With the variety Fetească regală, a percent increase by 13.3% was noted with the variant V_1 and by 7.1% with the variety Riesling Italian, as compared to the witness variants. The negative differences to the witness variant were greater with the variety Fetească regală, i.e. 24.2% and 20.3% with the variety Riesling italian. The relative productivity indices were also the greatest with the variant V_1, i.e. 162.5 with the variety Fetească regală, meaning a productivity increase by 13.7 % as compared to the witness (142.9). With the variety Riesling italian the relative productivity indices for V_1 showed a yield increase by 12.3% as compared to the witness. The variant V_2 led to a productivity decrease 22.1% for the variety Fetească regală and by 8.75 for Riesling italian. The variant V_3 led to a productivity decrease by 22,1% for Fetească regală and much more drastically for the Riesling Italian, by 31,1% as compared to the witness.

All this shows that for the variety Fetească regală, which is more vigorous, an increase of the fruit load results in a severe drop in fertility and productivity, while with the variety Riesling italian an increase of the fruit load reduces the fertility, however there is a kind of negative adjustment (adaptation) as concerns the productivity; a greater unbalance only occurs with the excessive fruit loads, e.g. 24,24 nodes/m^2.

CONCLUSIONS

1. The vegetation phenophases occur in the time period 15.IV – 26.X for the variety Fetească regală and 18.IV – 30.X for the variety Riesling italian. The vegetation duration is 164 – 172 days for Feteasca regală and 162 – 177 days for Riesling italian and it occurs within the bioactive interval of the air, i.e. 178 days, which is typical with the vine grapevine areas of the Transylvanian Plateau. The node load established at the cutting (pruning) time influences the vegetation phenophases and the grape maturation. With the variant V1 (15.15 nodes/m^2) the full grape maturation was the earliest to take place, i.e. 18- 23.IX for Feteasca regală and 20-24.X for Riesling italian. With the both varieties, the variant V3 (24.24 nodes/m^2) delayed the grape maturation by 2-3 days, as compared to the witness variant (M).

2. The soil fertility expressed in percents of fertile vine-shoots, number of inflorescences per trunk (rootstock) and fertility coefficients is best turned to account with moderate fruit loads of 15.15 - 18.18 nodes/m2 (V1 - M). Excessive loads of 21.21 – 24.24 nodes/m^2 (V2 - V3) lead to a decrease of the fertile shoots percentage and of the fertility coefficients, with both the varieties.

3. The productivity indices of the varieties show maximum values for the variant: 162.5 with the variety Fetească regală and 123.7 with the variety Riesling italian. As compared to the witness variant, the variant V3 (24.24 ochi/m^2) determines a productivity decrease, by 21.2 % with the Feteasca regală and 31.3% with the Riesling italian variants, respectively.

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THE AGROBIOLOGICAL AND TECHNOLOGICAL EVALUATION OF SOME TABLE GRAPE VARIETY WITH DIFFERENT MATURATION PERIODS IN VINEYARD OSTROV

EVALUAREA AGROBIOLOGICA ŞI TEHNOLOGICĂ A UNOR SOIURI DE STRUGURI PENTRU MASĂ, CU DIFERITE EPOCI DE MATURARE, ÎN CENTRUL VITICOL OSTROV

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Abstract *Table grape varieties with their characteristics of quality, impressive variability, genetic diversity, offers new ways of study the ampelographic scientific research. This paper work is a comparative study aimed at the behavior of table grapes varieties with different maturation periods, cultivars are from global range, and also Romanian selection – Victoria, Muscat D'Adda, Afuz Ali, Xenia, raised in ecopedoclimatic conditions registred under the vineyard Ostrov, situated in viticultural region Danube Terraces. The experience has referred the application of different loads of buds/stock and have made detailed observations and determinations, the reaction agrobiological and technology, but in particular, the production was evaluated in terms of physical and chemical characteristics of grape harvest for marketing. The eco-climatic conditions of vine vineyard Ostrov has shown that is a zone with a very favorable growing grape varieties for table and define the achievement of a maximum of grape maturation earliness and adds organoleptic quality, conditions which are not found in other wine-growing region of our country*.

Key words: table grape varietes, quality, quantity

Rezumat *Caracteristicile calitative, variabilitatea impresionantă, diversitatea genetică şi popularitatea de care se bucură soiurile de struguri de masă este foarte cunoscută, oferind noi căi de abordare în cercetarea ştiinţifică ampelografică. Lucrarea de faţă reprezintă un studiu comparativ ce vizează comportarea unor soiuri de struguri pentru masă, cu diferite epoci de maturare, din sortimentul mondial, dar şi selecţii românesti - Victoria, Muscat D' Adda, Afuz ali, Xenia, în condiţiile ecopedoclimatice înregistrate în centrul viticol Ostrov, din Regiunea Viticolă Terasele Dunării. Experienţa a prevăzut aplicarea unor încărcături diferite de ochi/butuc şi s-au efectuat observaţii şi determinări detaliate, privind comportarea agrobiologică şi tehnologică, dar în special s-a evaluat producţia sub aspectul caracteristicilor fizico-chimice ale strugurilor în vederea comercializării recoltei. Condiţiile eco-climatice ale centrului viticol Ostrov au demonstrat că sunt foarte favorabile pentru cultura soiurilor de struguri pentru masă şi definesc realizarea unui maxim privind precocitatea maturării strugurilor şi aduc un plus de calitate organoleptică, condiţii care nu se regăsesc în altă regiune viticolă a ţării noastre.*

Cuvinte cheie: soiuri de struguri pentru masă, calitate, cantitate.

INTRODUCTION

Most times, the quality of table grapes is associated with grain size and color in reality is a complex term, only apparent, clearly seen from several perspectives: visual, taste, nutrition, health etc., measured by the consumer, according to his claims, and if it comes to favorability of a growing area, then it should provide an annual repetitivity regarding product quality. The popularity enjoyed by the species studied approach to determine new possibilities in ampelographic scientific research because they, by diverse quality wine production recorded every viticultural year, always surprising. Starting from this consideration, the present study was intended that the application of differential loads buds/vine results in an improvement both in terms of grape quality under carpometric characteristics and also under physique - chemical terms.

MATERIAL AND METHOD

To achieve the objective outlined above, the research was conducted in 2008/2009 wine growing year, in an experimental field in Ostrov Vineyard. Varieties subject to these investigations are varieties - Muscat d 'Adda, Afuz ali– from global range and Romanian selections - Victoria, Xenia - varieties highly valued by consumers in terms of visual and taste characteristics. During the experience has been applied a differential load of bud that led to obtaining the following experimental variants (Table 1) with the main aim of determining the optimal number of buts/vine that leads to some great commercial quality grapes.

Table 1

Experimental variant

Varieties/ rostocks	Experimental variants	Distances in planting	Cutting type
Victoria/SO_4	10 buds/m^2 13 buds /m^2 16 buds/m^2	2,5/1,4	Guyot periodically replaced with arms
Muscat d" Adda/ Kober 5 BB	10 buds/m^2 13 buds/m^2 16 buds/m^2	2,2/1,2	Guyot periodically replaced with arms
Afuz ali/41B	10 buds/m^2 13 buds/m^2 16 buds/m^2	2,2/1,4	Guyot periodically replaced with arms
Xenia/ SO_4	10 buds/m^2 13 buds/m^2 16 buds/m^2	3,6/1,05	Double Cortina geneveza

Varieties were followed throughout the phenological spectrum and at harvest, were made the following carpometrical determinations and physico-chemical characteristics: no. grape/vine, the average weight of a grape, the average weight of a grain, production/vine (kg/vine), sugars (g/l), acidity (g/l tartric acid). The obtained results were analyzed using one-dimensional indicators- arithmetic mean, maximum, minimum - indicators that can be applied for most quantitative characters, which have the property to be variable in time and space. Those, by their nature, characterized

these traits in terms of their level of development (size, number) and frequency of occurrence, trends in the values with typical character for the entire table of values under study.

RESULTS AND DISCUSSIONS

To analyze the behavior of these varieties under the conditions of Vineyard Centre Ostrov, it is necessary to emphasize that the center enjoys a warm temperate climate, a large amount of solar radiation and high heliothermic resources in conditions of poor rainfall regime, providing conditions very favorable for growth and fructification, on one hand, and secondly, to obtain annual production with high commercial value, regardless of age maturing varieties grown here. Findings eco-climatic favorability of the area for growing grapes varieties is detailed in table 2 (Savu, 2004) as part of the Growing Region of the Danube Terraces, which no longer reflect these conditions in other regions of our country.

Table 2

The wine growing climates of the Growing Region of the Danube Terraces

IS1 IH4 IF4*	***IS1 IH4 IF3***	***IS2 IH4 IF4***	***IS2 IH4 IF3***
climate with moderate drought, warm temperate, with very cold nights, including Greek and Giurgiu centers	climate with moderate drought, warm temperate, with cold nights), wine center Zimnicea	pronounced drought climate, warm temperate, with very cold nights), includes 4 wine centers Island, Baneasa, Oltina, Fetesti	pronounced drought climate, warm temperate, with cold nights), includes wine center Aliman
Growing centers have resources in terms of a heliothermic warm temperate climate (IH4), enjoying a large amount of solar radiation and high heliothermic resources in conditions of poor rainfall regime.			
Today show IF3 and night cooling centers IF4s in all wine growing centers positively influence the region's wine quality attributes of grapes on aroma variety, accumulation of anthocyanic and tannin substances,pattern etc.			
**) rought index - IS heliothermic index - index HI and cooling of the night – RU and has been proposed by Tonietto J., Carbonneau, 2000.			

Application at cutting of a different load of buds/vine at the four varieties studied, results a difference of their behavior in terms of quality and quantity of production, and for being easier the evaluation of the results obtained, data analysis was done for each variety individually analyzing all the carpometric parameters:

In table 3, it is noted that the variety Victoria, get a load of 10 buts/m^2 (35 buts/vine), the largest number of grapes on the vine (39), the highest average weight of a grain, (6,0 g), the largest amount of sugar (155 g/l), with a maximum yield of 11,3kg/vine. At a load of 13 buts/m^2 (46 buts/vine), recorded a peak at the three repetitions, in terms of average weight of a grape (352 g) and glucose-acidimetry index (42,8) and a load of 16 buts/m^2 (56 buts/vine) has not been any maximum value for any of the repetitions, observing only the minimum values for most carpometrical parameters analyzed.

Table 3

Carpometrical analysis – Victoria variety

Load of buds	No. of grapes	Average weiht of grape (g)	Prod. Kg/vine	Average weiht of grain (g)	Sugars g/l	Acidity g/l	Glucose-acidimetry index
10 buds/m^2 35 buds/vine	26	300,0	7,8	5,4	155,0	4,3	36,0
	23	325,0	7,5	6,0	145,0	4,3	33,7
	39	290,0	11,3	4,5	137,0	4,0	34,0
13 buds/m^2 46 buds/vine	23	352,0	8,1	5,0	152,0	3,9	38,8
	25	320,3	8,0	4,8	150,0	3,8	39,5
	34	263,0	8,9	3,6	154,0	3,6	42,8
16 buds/m^2 56 buds/vine	38	250,0	9,5	2,9	137,0	4,0	34,1
	19	302,0	5,7	4,0	145,0	4,0	36,3
	34	204,5	7,0	2,8	135,0	4,2	31,9
averages	29,0	289,6	8,2	4,3	145,6	4,0	36,3
maximum	39,0	352,0	11,3	6,0	155,0	4,3	42,8
minimum	19,0	204,5	5,7	2,8	135,0	3,6	31,9

Table 4

Carpometrical analysis – Muscat d'Adda variety

Load of buds	No. of grapes	Average weiht of grape (g)	Prod. Kg/vine	Average weiht of grain (g)	Sugars g/l	Acidity g/l	Glucose-acidimetry index
10 buds/m^2 35 buds/vine	27	201,0	5,4	4,5	159,0	3,7	43,0
	23	289,0	6,6	4,0	162,2	3,8	42,2
	16	190,0	3,0	4,7	157,0	3,5	45,5
13 buds/m^2 46 buds/vine	35	209,0	7,3	4,8	174,0	4,3	40,9
	14	301,5	4,2	3,8	165,0	3,8	43,4
	24	257,0	6,2	4,0	180,0	4,1	43,9
16 buds/m^2 56 buds/vine	7	269,0	1,9	3,6	163,0	3,7	44,1
	16	300,0	4,8	3,8	164,0	4,0	41,5
	25	252,0	6,3	2,8	162,0	3,8	42,6
averages	20,8	252,1	5,1	4,0	165,1	3,8	43,0
maximum	35,0	301,5	7,3	4,8	180,0	4,3	45,5
minimum	7,0	190,0	1,9	2,8	157,0	3,5	40,9

In case of Muscat d'Adda (table 4) the analysis of the three repetitions of three loads of buds applied, indicates the maximum expression of carpometrical measurements at a load of 13 buts/m^2 (34 buts/vine) as follows: 35 grapes on the vine, with an average weight of a grape with a maximum of 301,5g, with a production of 7,3 kg/vine and a quantity of high sugars (180 g/l).

Table 5

Carpometrical analysis – Afuz ali variety

Load of buds	No. of grapes	Average weiht of grape (g)	Prod. Kg/vine	Average weiht of grain (g)	Sugars g/l	Acidity g/l	Glucose-acidimetry index
10 buds/m^2	10	321	3,2	3,8	136	3,21	42,4
	11	387	4,3	4,0	145,1	3,57	40,6
31 buds/vine	14	372	5,2	4,3	151	3,97	38,0
13 buds/m^2	24	289	6,9	3,0	137	3,65	37,5
	17	306	5,2	3,1	176	3,2	55,0
40 buds/vine	28	400	11,2	4,7	168	3,01	55,8
16 buds/m^2	24	311	7,5	4,1	160	4,37	36,6
	36	287	10,33	3,2	158	3,9	40,5
49 buds/vine	15	307	4,61	3,9	148	4,2	35,2
averages	19,9	331,1	6,5	3,8	153,2	3,7	42,4
maximum	36,0	400,0	11,2	4,7	176,0	4,4	55,8
minimum	10,0	287,0	3,2	3,0	136,0	3,0	35,2

Table 6

Carpometrical analysis – Xenia variety

Load of buds	No. of grapes	Average weiht of grape (g)	Prod. Kg/vine	Average weiht of grain (g)	Sugars g/l	Acidity g/l	Glucose-acidimetry index
10 buds/m^2	50	225	11,3	3,4	150,5	4,33	34,8
	36	236	8,5	3,6	170	3,5	48,6
38 buds/vine	53	245	13,0	4,1	166	4,23	39,2
13 buds/m^2	42	255	10,7	5,0	163	3,2	50,9
	17	265	4,5	3,6	152,6	3,6	42,4
49 buds/vine	56	258	14,4	5,0	150	3,89	38,6
16 buds/m^2	38	238	9,0	4,2	167	4,4	38,0
	36	289	10,4	5,2	144	3,1	46,5
60 buds/vine	20	248	4,96	5,0	168	4,35	38,6
averages	38,7	251,0	9,6	4,3	159,0	3,8	41,9
maximum	56	289	14,4	5,2	170	4,4	50,9
minimum	17	225	4,5	3,37	144	3,1	34,8

For the other 2 loads, stands a maximum glucose acidimetry index 10 buts/m^2 (34 buts/vine) and a minimum value at a load of 16 buts/m^2 (42 buts/vine) in terms of average weight a grain. Going on the same principle of data analysis, at the variety Affuz ali (table 5), we can see that the vast majority of the maximum values are obtained at a load of 13 buts/m^2 (40 buts/vine), namely: the grapes have a average

weight of 400g, with an average weight of a grain of 4,7 g, a production of 11,2 kg/vine, which recorded a large quantity of sugars, even maximum for this variety (180 g/l). The lowest values of these parameters are at a load of 10 buts/m^2 (31 buts/vine), and if we analyze the behavior of variety when he was a load of 16 buts/m^2 (49 buts/vine), the values are framed in the limits of medium values of the three repetitions.

Xenia variety recorded maximum values in the number of grapes on the vine, (56) to a load of 13 buts/m^2 (49 buts/vine) and a maximum production (14,4 kg/vine) at the same load. Applying 10 buts/m^2 (38 buts/vine) maximum values are obtained from parameters - accumulated sugars in beans (170g/l) and glucose -acidimetry index (48.6). At a load of 16 buts/m^2 (60 buts/vine), recorded a maximum value, the average weight of a grape (289g) and average weight of a grain of 5,2 g, practically those parameters which mainly attracts consumers, even before any analysis and gustative appreciation.

CONCLUSIONS

1. For Victoria variety, best results are obtained at a load of 10 buts/m^2 (35 buts/vine) of the seven carpometric parameters (100%), maximum values occurred in five parameters, representing 71,4%.

2. For Muscat d'Adda variety, load 13 buts/m^2 (34 buts/vine), it seems optimal, thus forming large grapes, with large beans, with a great production and a balanced glucose-acidimetry index; in the seven carpometrical parameters (100%), maximum values occurred at six parameters representing 85,71%;

3. For Afuz ali-variety, load of 13 buts/m^2 (40 buts/vine), is the optimal load, the obtained data is significant, of the seven carpometrical parameters (100%), maximum values occurred in five parameters representing 71,4%;

4. For Xenia-variety, the analysis results can draw the conclusion that it is almost uniformly at three loads buts/m^2, specifying that a load of 16 buts/m^2 (60 buts/vine), have maximum three parameters, representing 42.85%, some of whom are most appreciated: the size of grape and grain size.

5. Applying a different load of but on the stock is a very important technological link to culture variety table grape varieties, and the results are always influenced by their vigor, of the mother plant used, the degree of favorability of the area in terms of repetition of the values of environmental factor.

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STUDIES REGARDING THE THERMAL TREATMENT EFFECT ON THE QUALITY OF APPLES REFRIGERATED IN SÂRCA STOREHOUSE OF SCDP IAŞI

STUDII PRIVIND EFECTUL TRATAMENTULUI TERMIC ASUPRA CALITĂŢII FRUCTELOR DE MĂR PĂSTRATE FRIGORIFIC LA DEPOZITUL SÂRCA AL SCDP IAŞI

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Abstract. *To maintain the quality of fruit as long a period of time, may apply a series of post-harvest treatment, pre-cold preservation. One of them is to use hot water and heat treatment, tested in succession in recent years by researchers in Spain, France, Israel and the U.S. It was shown that exposure to high temperature mitigates some fruit ripening processes. Ethylene production is reduced due to inhibition of enzymes. Four varieties of apples, treated with hot water and kept in a freezer, it had a higher evolution than witness. The results may provide an extension and improvement of such treatment, not only the fruits but also vegetables.*

Key words: thermal treatment, quality of fruits, cold storage

Rezumat. *Pentru a menţine calitatea fructelor o perioadă cât mai îndelungată de timp, se pot aplica o serie de tratamente postrecoltă, premergătoare păstrării frigorifice. Unul dintre acestea îl reprezintă şi tratarea termică utilizând apă caldă, testat cu succse în ultimii ani de către cercetători din Spania, Franţa, Israel şi SUA. S-a demonstrat că expunerea fructelor la temperaturi ridicate atenuează unele procese de maturare. Producţia de etilenă este redusă datorită inhibării unor enzime. Patru soiuri de mere, tratate cu apă caldă şi păstrate în condiţii frigorifice, au avut o evoluţie superioară martorului. Rezultatele obţinute, pot prevedea o extindere şi îmbunătăţire a acestui tip de tratament, nu numai la fructe ci şi la legume.*

Cuvinte cheie: tratament termic, calitatea fructelor, păstrare frigorifică

INTRODUCTION

The use of post-harvest physical treatments to maintain fruit quality, as an alternative method of replacing the chemical products used for the same purpose, is an issue of great interest in the countries with an advanced horticulture. (Anghel Roxana Mihaela, 2009)

The exposure of fruits to high temperatures reduces some maturation processes. The ethylene production is reduced due to the inhibition of some enzymes. (Lurie S., 2006)

The thermal treatment using hot water is used to also prevent degradation caused by the pathogen agents and has been successfully applied to apples, avocado, citric fruits, plums etc. (Ben-Yehoshua S. and Porat R., 2005).

MATERIAL AND METHOD

The apple fruits belonging to Generos, Starkrimson, Idared and Ionagold variety were subjected to a post-harvest thermal treatment.

The thermal treatment consisted in the immersion of fruits into water heated at a temperature of 30^0C for 5 minutes, then their immersion into water at a temperature of 50^0C for 3 minutes.

Since fruits were exposed to a temperature of 15-18 ^{0}C, we first used the transition temperature (30^0C) so as not to cause a physiological shock of fruits.

After exterior moisture has evaporated, all variants were stored in the frigorific cell having a temperature of 2^0C, a relatively high humidity of 90-95% and air circulation with a speed of at least 0.25 m/s, for a circulation coefficient of 30 re-circulations/hour.

We monthly drew samples from each variant and variety which were then analysed in the lab of Technology of horticultural products department within USAMV Iaşi.

These samples were subjected to a series of physical determinations and chemical analyses to estimate their physiological state and biochemical content.

Thus, we determined:

- the content of soluble dry substance by the refractometric method
- titrating acidity by the titrimetric method
- breathing intensity by means of Pettenkofer device
- starch content by the iodine test
- vitamin C content by titrimetric method with 2,6 dichlorophenolindophenol
- catalasis activity by Lobeck gasometrical method
- structural-textural firmness by means of penetrometric method.

RESULTS AND DISCUSSIONS

In the first four months of refrigeration, the evolution of fruits was the following, presented in tables 1-8.

We first notice (tab. 1, 2) a reduction of the value of soluble dry substance for the thermally treated variant. At the same time, the content of ascorbic acid is more reduced, given the fact that vitamin C is destroyed under the influence of high temperatures.

Table 1

November 2009 Blank experiment

Variety	SUS	Titrating acidity	Breathing intensity	Score for iodine test	Content in ascorbic acid	Catalasis activity	Structural-textural firmness for (5 sec.)	
	^{0}Bx	g. malic acid %	cm^3CO_2/ Kg/h		mg/100 g prod.	cm^3O_2/g /h	V	A
Generos	12,4	0,62	4,72	8	3,87	2,6	7,8	1,56
Starkrimson	14,6	0,38	4,4	7	4,4	3,4	5,4	1,08
Idared	12,6	0,68	7,91	8	5,32	2,1	6,6	1,32
Ionagold	10,4	0,55	9,16	8	2,11	1,9	7,2	1,44

The values of the iodine score indicate that only Starkrimson variety registers a stagnation of starch hydrolysis for the blank experiment.

Table 2

November 2009 Treated experiment

Variety	SUS	Titrating acidity	Breathing intensity	Score for iodine test	Content in ascorbic acid	Catalasis activity	Structural-textural firmness for (5 sec.)	
	^{0}Bx	g. malic acid %	cm^3CO_2/ Kg/h		mg/100 g prod.	cm^3O_2/g /h	V	A
Generos	10,4	0,5	1,92	7	3,72	1,7	7	1,4
Starkrimson	14,2	0,27	2,60	7	2,51	1,5	4,8	0,96
Idared	10,6	0,52	3,8	7	6,32	1,2	7,2	1,44
Ionagold	9,8	0,41	3,1	7	2,74	1,3	6,4	1,28

The comparative values of the structural-textural firmness show that the thermally treated variant presents a high firmness in the first month of refrigeration. In exchange, the blank experiment of all four variety under study register higher values of firmness showing a relative degradation of tissues.

We notice that the hot water treatment also led to the decrease of titrating acidity expressed in malic acid.

The breathing intensity as well as the catalasis activity, the two parameters indicating the fruits' metabolic health, has smaller values in case of the treated variant. This indicates that the fruits' breathing is reduced due to the inhibition of some enzymes among which catalasis. This leads to the reduction of metabolism and implicitly to a slowing down of physiological degradation of fruits.

In the second month (tab. 3, 4) of refrigeration, the qualitative parameters of apples evolved constantly. Thus, for both variants under study – blank experiment and the treated variant – we notice a slight increase of the value of soluble dry substance to the detriment of titrating acidity.

Table 3

December 2009 Blank experiment

Variety	SUS	Titrating acidity	Breathing intensity	Score for iodine test	Content in ascorbic acid	Catalasis activity	Structural-textural firmness for (5 sec.)	
	^{0}Bx	g. malic acid %	cm^3CO_2/Kg/h		mg/100g prod.	cm^3O_2/g/h	V	A
Generos	0,57	7,03	8	2,61	3,8	7,8	1,56	1,56
Starkrimson	0,32	7,49	8	2,4	6,6	5,6	1,12	1,12
Idared	0,47	6,36	8	3,35	4,5	7	1,4	1,4
Ionagold	0,36	6,96	8	3,25	3,6	7,8	1,56	1,56

The iodine score of this month indicates that starch was not hydrolyzed for the thermally treated variant. Vitamin C from fruits diminishes more and more. In exchange, the catalasis activity and the breathing intensity increase as compared to the previous month. We notice a differentiation between the two variants, the treated one still presenting smaller values of these parameters as compared to the blank experiment for every variety under study.

Only for Idared variety do we notice an equality of values in terms of structural-textural firmness, the treated variant registering a good firmness for the other.

Table 4

December 2009 Treated experiment

Variety	SUS	Titrating acidity	Breathing intensity	Score for iodine test	Content in ascorbic acid	Catalasis activity	Structural-textural firmness for (5 sec.)	
	^{0}Bx	g. malic acid %	cm^3CO_2/ Kg/h		mg/100 g prod.	cm^3O_2/g /h	V	A
Generos	10,6	0,51	5,14	7	2,16	3,4	7,2	1,44
Starkrimson	15	0,23	4,9	7	2,12	3,2	4,8	0,96
Idared	10,8	0,48	4,82	7	2,98	2,9	7	1,4
Ionagold	10,6	0,39	3,96	7	2,28	3,2	7	1,4

We notice a more accelerated evolution of the cultivars from the blank experiment by the more rapid decrease of the malic acid content (tab. 5, 6). The catalasis activity has also higher values for all variety as compared to the treated variant.

Table 5

January 2010 Blank experiment

Variety	SUS	Titrating acidity	Breathing intensity	Score for iodine test	Content in ascorbic acid	Catalasis activity	Structural-textural firmness for (5 sec.)	
	^{0}Bx	g. malic acid %	cm^3CO_2/ Kg/h		mg/100 g prod.	cm^3O_2/g /h	V	A
Generos	13,4	0,46	12,05	8	2,28	4,6	8	1,6
Starkrimson	15	0,27	12,25	8	3,17	6,8	6,8	1,36
Idared	13,6	0,42	9,85	8	1,40	4,8	7,6	1,52
Ionagold	11,2	0,30	10,70	8	3,29	3,9	8,2	1,64

As for the breathing intensity, we may notice that the variety Generos and Ionagold register a double value for the blank experiment as compared to the treated variant.

Table 6

January 2010 Treated experiment

Variety	SUS	Titrating acidity	Breathing intensity	Score for iodine test	Content in ascorbic acid	Catalasis activity	Structural-textural firmness for (5 sec.)	
	^{0}Bx	g. malic acid %	cm^3CO_2/ Kg/h		mg/100 g prod.	cm^3O_2/g /h	V	A
Generos	11,4	0,48	6,74	8	2,02	2,2	7,6	1,52
Starkrimson	13,2	0,21	9,19	7	2,85	2,8	5,2	1,04
Idared	12,8	0,42	8,76	7	1,22	1,6	7,4	1,48
Ionagold	10,8	0,36	5,31	8	3,10	2,8	7,4	1,48

In the fourth month of refrigeration (tab.7, 8), we notice an even more accelerated degradation of the blank experiments as compared to the treated ones.

Thus, the iodine score indicates that the thermally treated fruits have a higher quantity of starch than the blank experiments.

The catalasis activity and the breathing intensity are more reduced for the treated variants than for the blank experiments.

Table 7

February 2010 Blank experiment

Variety	SUS	Titrating acidity	Breathing intensity	Score for iodine test	Content in ascorbic acid	Catalasis activity	Structural-textural firmness for (5 sec.)	
	^{0}Bx	g. malic acid %	cm^3CO_2/ Kg/h		mg/100 g prod.	cm^3O_2/g /h	V	A
Generos	13,8	0,40	7,41	9	2,52	6,6	8,4	1,68
Starkrimson	15,2	0,23	9,88	8	2,05	7,4	8,4	1,68
Idared	14,4	0,38	7,81	9	3,15	5,8	8,6	1,72
Ionagold	12,2	0,27	11,10	9	2,98	4,2	8,4	1,68

Table 8

February 2010 Treated experiment

Variety	SUS	Titrating acidity	Breathing intensity	Score for iodine test	Content in ascorbic acid	Catalasis activity	Structural-textural firmness for (5 sec.)	
	^{0}Bx	g. malic acid %	cm^3CO_2/ Kg/h		mg/100 g prod.	cm^3O_2/g /h	V	A
Generos	10,4	0,46	6,98	8	1,98	1,4	8	1,6
Starkrimson	14,2	0,20	6,73	8	1,75	1,8	7,4	1,48
Idared	10,6	0,40	6,26	8	2,86	1,3	8,2	1,64
Ionagold	12,2	0,34	7,44	8	2,40	1,2	7,8	1,56

CONCLUSIONS

1. The application of the hot water treatment to the refrigerated apples had an obvious impact on their evolution ever since the first months of storage.

2. Thus, even if this thermal treatment had as an immediate effect the reduction of the biochemical substance content in fruits during storage, due to the physiological degradation of the blank experiments, after a couple of months we may notice a more significant biochemical compound content for the treated variants.

3. The two parameters indicating the physiological state of the fruits from storehouse – catalasis activity and breathing intensity – registered much smaller values for the treated fruits as compared to the blank experiments which means that metabolism is seriously slowed down. An important role in this respect is played by the inhibition of the degradation enzymes through the treatment with hot water at the temperature of 55^0C. The reduce metabolism of the thermally treated fruits is also more obvious by the slower loss of the malic acid.

4. The water loss from fruits as well as the starch hydrolysis is seriously slowed down for the treated variants so that structural-textural firmness of these variants is much smaller as compared to the blank experiment. The same thing happens in the case of the iodine score, too.

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RESEARCHES REGARDING THE QUALITY OF SOME ASSORTMENTS OF LACTO-FERMENTED VEGETABLES TRADED IN THE MUNICIPALITY OF IAŞI

CERCETĂRI PRIVIND CALITATEA UNOR SORTIMENTE DE LEGUME LACTOFERMENTATE, COMERCIALIZATE ÎN MUNICIPIUL IAŞI

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Abstract. *Pickling is a semiconservation method by which they try to obtain the necessary concentration of lactic acid in a saline solution, through bacterial fermentation, starting from the glucides existing in products. In this paper we made a comparative study between lacto-fermented products from the commercial network and lacto-fermented products obtained in a different way (iodated/non-iodated salt) through the household pickling method. All in all, we had 14 samples of lacto-fermented products, 9 samples from supermarkets and 5 samples of sauerkraut with iodated and non-iodated salt. During the carrying out of the study, we also followed the highlighting of iodated salt's effects on the conservation process of vegetables by pickling. Through the chemical analyses and the physical determinations effectuated, we tried to show the differences existing between the products purchased from the commercial network and those obtained by household pickling.*

Key words: quality of vegetables, lacto – fermentation, processing

Rezumat. *Murarea este un procedeu de semiconservare prin care se urmăreşte obţinerea, în soluţie salină, prin fermentaţie bacteriană, a unei concentraţii necesare de acid lactic, pornind de la glucidele existente în produse. În prezenta lucrare s-a realizat un studiu comparativ între produse lactofermentate din reţeaua comercială şi produse lactofermentate obţinute diferenţiat (sare iodată/neiodată) prin procedeul de murare casnică. În total au fost 14 probe de produse lactofermentate, 9 probe din supermarketuri şi 5 probe de varză murată cu sare iodată şi neiodată. Pe parcursul efectuării studiului s-a urmărit deasemenea punerea în evidenţă a efectelor pe care le are sarea iodată asupra procedeului de conservare a legumelor prin murare. Prin analizele chimice şi determinările fizice efectuate am încercat să punem în evidenţă deosebirile care există între produsele cumpărate din reţeaua comercială şi cele obţinute prin procedeul de murare casnică.*

Cuvinte cheie: calitate legume, lactofermentare, prelucrare

INTRODUCTION

Lacto-fermentation is a conservation method known from times immemorial. In Romanian, the terms pickles and brine (the covering liquid) derive from the Latin words *muria*, *muratiorum* (pl) that referred to products fermented in sea water concentrated in salts by boiling. (Beceanu D., 2005, 2003,)

At present, there exists a culinary and food tradition related to these

products in all areas of the world, among which Korea might occupy the most important place. They consider that Romanian could obtain the necessary quantity of vitamin C during the cold season by consuming pickles, especially cabbage (keeping the terminology for 2000 years). (Beceanu D., 2009, 2008)

Though many people consider it to be a more or less spontaneous process, in fact it is a complex technology more evolved the greater the quantities of vegetables for the supply of a larger community.

MATERIAL AND METHOD

As a study material, we used 14 samples of lacto-fermented products: a sample of pickled autumn tomatoes, 3 samples of pickled cucumbers and 10 samples of sauerkraut. The samples under analysis are presented in table 1.

Nine out of ten samples (table 1) were packed in vacuumed bags and 5 were packed in PET containers. In the table, we mention the ingredients (water, salt, spices, preservatives etc). The manufacturing companies are both Romanian and foreign (9 variants) to which we add 5 variants pickled in household conditions, each of them different by the type of salt used (Salrom – iodated cooking salt, Xion and Niki – iodated sea salt, Albito and Elcirom – non-iodated cooking salt).

RESULTS AND DISCUSSIONS

From chemical analysis, physical and organoleptic assessment determinations were obtained the following results:

The content of titrating acidity (table 2) registered values between 0.6g lactic ac./100g of product (pickled cucumbers RN) and about 2.0 g lactic ac./100g of product (sauerkraut D P). The maximum extreme has the highest (positive) deviation from average (about 0.9g lactic ac./100g of product).

Table 2

Titratable acidity and vitamin C content of commercial network products

Nr. crt.	Product	Titratable acidity (g ac. lactic/100 g prod)	Vitamin C (mg/100 g prod)
1	Pickled cucumbers Roadele Naturii	**0,59**	**1,23**
2	Pickled autumn tomatoes Roadele Naturii	0,69	1,69
3	Sauerkraut Roadele Naturii	0,59	2,11
4	Pickled cucumbers Putina Soacrei	0,79	1,23
5	Sauerkraut Putina Soacrei	1,48	5,10
6	Sauerkraut Mama Nina	1,28	1,23
7	Pickled cucumbers Dorsvet Plus	0,88	**10,03**
8	Shredded cabbage Dorsvet Plus	1,28	9,32
9	Head cabbage Dorsvet Plus	**1,97**	5,45

Table 1

The products under analysis

Nr. crt.	Product	Net mass (g)	Producer Distributor	Ingredients	Package
1	Pickled cucumbers Roadele Naturii	504	OVM TOTAL 2003 S.R.L.	cucumbers, water, salt, dill	Vacuum
2	Pickled autumn tomatoes Roadele Naturii	1020	OVM TOTAL 2003 S.R.L.	autumn tomatoes, salt, dill	Vacuum
3	Sauerkraut Roadele Naturii	814	OVM TOTAL 2003 S.R.L.	cabbage, salt, dill	Vacuum
4	Pickled cucumbers Putina Soacrei	738	S.C. MAGIC RADU S.R.L. Bucureşti	Cucumbers, water, salt, horseradish, dill	Vacuum
5	Sauerkraut Putina Soacrei	2082	S.C. MAGIC RADU S.R.L. Bucureşti	cabbage, salt, dill	Vacuum
6	Sauerkraut Mama Nina	2000	FIX CO S.R.L.; Bucureşti	Cabbage, water, salt, dill, spices: potassium sorbate	Vacuum
7	Pickled cucumbers Dorsvet Plus	500	Dorsvet Plus s.r.o. Kechnet 130, Slovensko	Cucumbers (7-12 cm), brine (water, salt, spices, preservative E 202	Vacuum
8	Shredded cabbage Dorsvet Plus	1000 g	Dorsvet Plus s.r.o. Kechnet 130, Slovensko	White cabbage shredded, mixed spices,brine water,salt, reservative E 211, 224	Vacuum
9	Head cabbage Dorsvet Plus	1000	Dorsvet Plus s.r.o. Kechnet 130, Slovensko	White cabbage, salt, water, preservative E 211, E 224	Vacuum
10	Sauerkraut with salt Salrom	5000	Household pickling	Cabbage, salt, water	PET Container
11	Sauerkraut with Xion	5000	Household pickling	Cabbage, salt, water	PET Container
12	Sauerkraut with salt Niki	5000	Household pickling	Cabbage, salt, water	PET Container
13	Sauerkraut with salt Albito	5000	Household pickling	Cabbage, salt, water	PET Container
14	Sauerkraut with salt Elcirom	5000	Household pickling	Cabbage, salt, water	PET Container

The content of ascorbic acid (table 2) ranged between 1.2 and 10.0 mg/100 g of product, the average of variants being about 4.2 mg/100 g of product. We noticed 5 variants with very low values, 2 variants with a content close to average (PS sauerkraut and DP pickled head of cabbage), and two variants with a double content as compared to average (DP pickled cucumbers and DP shredded sauerkraut).

The sauerkraut pickled in household conditions (table 3) registered practically the same values of lactic acidity (values a third smaller than the average of manufactured products) though the 5 variants were different by the types of salt used.

For the variants pickled in household conditions, the average content of ascorbic acid (table 3) is three times higher due to the lack of additional conservation treatments using high temperatures. In this case too, we noticed maximum values of 18.4 mg/100 g of product for the sauerkraut pickled with Niki salt and minimum values of about 9.2 mg/100 g of product for the variant pickled with Elcirom salt. There is no obvious correlation between the content/lack of iodine additives and the ascorbic acid content.

Table 3

Titratable acidity and vitamin C content of household pickling

Nr. crt.	Product	Titratable acidity (g ac. lactic/100 g prod)	Vitamin C (mg/100 g prod)
1	Sauerkraut with salt Salrom	0,69	14,9
2	Sauerkraut with Xion	0,69	16,5
3	Sauerkraut with salt Niki	0,69	**18,4**
4	Sauerkraut with salt Albito	0,69	16,5
5	Sauerkraut with salt Elcirom	0,69	**9,15**

The average percentage content in NaCl (table 4) was 2.33%. We noticed 2 variants with half the average content (DP sauerkraut), 6 variants close to average and one single variant with double values as compared to average (RN sauerkraut).

The pickled products based on cabbage had an average content of soluble dry substance (about 4.7 ^{0}Bx) superior to those based on cucumbers (4.2^{0}Bx), and autumn tomatoes (4^{0}Bx).

The total dry substance registered a value of 5.8 %, and we noticed 6 values inferior or close to average and only 3 values superior to it (DP pickled head of cabbage, PS sauerkraut and RN sauerkraut).

The values corresponding to the SUS content do not proportionally and wholly correspond to SUT values.

Table 4

Salt, soluble dry substance and total dry substance content in commercial network products

Nr. crt.	Product	NaCl %	SUS Bx	SUT %
1	Pickled cucumbers Roadele Naturii	2,52	4	5,11
2	Pickled autumn tomatoes Roadel Naturii	2,61	**3**	5,94
3	Sauerkraut Roadele Naturii	**4,11**	4,6	**8,28**
4	Pickled cucumbers Putina Soacrei	2,59	5,2	5,15
5	Sauerkraut Putina Soacrei	2,04	3	6,96
6	Sauerkraut Mama Nina	2,34	4,8	5,95
7	Pickled cucumbers Dorsvet Plus	2,50	5	4,40
8	Shredded cabbage Dorsvet Plus	1,20	5	**4,25**
9	Head cabbage Dorsvet Plus	**1,14**	**5,8**	6,05

For the sauerkraut picked in household conditions (table 5), the average of the 5 variants is about 2.5 g NaCl %, noticing that there are 3 values closer to average as well as two variants having a content of ± 1g NaCl % (sauerkraut pickled with Salrom salt and the one pickled with Elcirom salt). We may notice a predominance of superior percentage values for the variants pickled with iodated salt.

The total dry substance of the household variants registered an average of 5.6 %, with more important positive deviations for the sample pickled with Xion salt and negative for the sample pickled with Elcirom salt.

Table 5

Salt, soluble dry substance and total dry substance content in products of household pickling

Nr. crt.	Product	NaCl %	SUS ^{0}Bx	SUT %
1	Sauerkraut with salt Salrom	**3,02**	4,2	5,44
2	Sauerkraut with Xion	2,74	**4,6**	**6**
3	Sauerkraut with salt Niki	2,39	4,6	5,70
4	Sauerkraut with salt Albito	2,15	4,6	5,84
5	Sauerkraut with salt Elcirom	2,09	4	**5,25**

As for the sensorial analysis, there were no deficiencies in terms of content. As deficiencies related to the colour of products, we notice a certain non-uniformity of it for the PS sauerkraut, MN sauerkraut, DP pickled cucumbers. As for consistence, there are deficiencies for the PS pickled cucumbers (that are partially soft). Taste registered deficiencies in the case of RN pickled autumn tomatoes and PS pickled cucumbers (an intense salty taste), as well as the DP sauerkraut (very sour taste).

CONCLUSIONS

1. We notice an obvious difference between the products conserved by lacto-fermentation and pasteurization existing in the commercial network and the household products (thermally untreated) for all parameters, especially in terms of content of ascorbic acid.

2. The variants produced in household conditions registered differences following the use of some different types of salt (non-iodated, additivated cooking salt or iodated sea salt).

3. Though the products obtained in household conditions stand out (in our case) by superior features, we must appreciate the steady quality of the existing sterilized products and their stability within the validity term.

4. In the commercial network, products subjected to the sensorial qualitative control did not have major differences, except some colour non-uniformities and excessively intense tastes (salty or sour).

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RESEARCHES REGARDING THE QUALITY OF SOME VINEGAR ASSORTMENTS TRADED IN THE MUNICIPALITY OF IAŞI

CERCETĂRI PRIVIND CALITATEA UNOR SORTIMENTE DE OȚET, COMERCIALIZATE ÎN MUNICIPIUL IAŞI

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Abstract. *Vinegar is a conservation product and also an aromatic substance used in the food industry and the culinary art. We studied a number of 14 samples representing common (regular) vinegars from different sources and aromatic vinegars produced by traditional companies: from wine – 5 assortments (1 with pepper, 2 with herbs, 1 from fermentation and a common one), 2 assortments from cider (France), 1 assortment from apples, 1 assortment from alcohol, 1 assortment from rice (Japan) and 3 assortments of balsamic vinegar (from Modena, Colavita - Italy and Kalamata - Greece). They were analyzed in terms of density, total dry extract, ashes (mineral content), total acidity (expressed in acetic acid) and colour. In parallel, we effectuated complex qualitative determinations according to the existing standard norms.*

Key words: vinegar, quality, assortments

Rezumat. *Oțetul este un produs de conservare şi totodată un aromatizant utilizat în industria alimentară şi în arta culinară. S-au luat în studiu un număr de 14 probe, reprezentând oțeturi comune (obişnuite) de diferite proveniențe şi oțeturi aromatizate produse de firme tradiționale: din vin – 5 sortimente (1 cu piper, 2 cu plante aromate, 1 de fermentație şi 1 comun), 2 sortimente din cidru (Franța), 1 sortiment din mere, 1 sortiment din alcool,1 sortiment din orez (Japonia) şi 3 sortimente de oțet balsamic (de Modena, Colavita - Italia şi Kalamata - Grecia). Ele au fost analizate în privința densității, extractului sec total, cenuşii (conținut mineral), acidității totale (exprimată în acid acetic) şi culorii. În paralel s-au efectuat determinări calitative complexe, conform normelor standard existente.*

Cuvinte cheie: oțet, calitate, sortimente

The technology of food vinegars is highly diversified offering consumers natural but expensive products as well as industrial vinegars produced from cheap raw matters or imitations of the expensive products. (Alessi A., 1996)

MATERIAL AD METHOD

To evaluate the samples, we used the existing European norms and standards. The appreciation of colour was made according to CIE-Lab norms. On this occasion, we noticed that in some members states of the EU there are national provisions that have not been adopted at the level of the European Community. (Beceanu D., 2009)

We analysed (table 1) vinegars from different sources (from red/white wine, balsamic, from alcohol, from apples/cider or from rice, supplied as such or aromatized, non-matured or matured). The Vinegretto product is a vinegar-based sauce containing spices and herbs, sugar etc. Most packages were from glass (11 assortments), only 3 assortments being packed in plastic material containers (PET).

Material used *Table 1*

Nr. crt.	Products	Package	Weight	Ingredients	Producer/Distributor
1	Aceto di vino aromatizzato al pepe nero	Glass Bottle	250 mL	- wine vinegar, natural flavors, antioxidant: sulfur dioxide.	CARREFOUR România
2	Aceto di vino bianco aromatizzato alle erbe fini	Glass Bottle	250 mL	- white wine vinegar, natural flavors of sage, rosemary.	CARREFOUR România
3	Aceto Balsamico di Mondena	Glass Bottle	1000 mL	- concentrated grape must, wine vinegar, coloring: caramel E 150 d, E 224 (contains sulphites).	Acetificio M. de Nigris Afragola - Italia/
4	Colavita Condimento Balsamico Bianco	Glass Bottle	500 mL	- white wine vinegar, concentrated grape, antioxidant E 224.	DARINNE DISTRIBUTION S.R.L.
5	Balsamic vinegar Kalamata	Glass Bottle	250 mL	- is a natural product produced from dried grapes from vineyards only peloponesiene.	C.C PAPADIMITROIU S.A România
6	Vinegar Kräuter	Glass Bottle	500 mL	- wine vinegar, apple vinegar, salt, acidity regulator, sodium acetate, hardener carrageen, herbs, natural extracts of herbs.	MATRA INTERNATIONAL
7	Vinegar Fermentation	Plastic Bottle	1000 mL	- obtained exclusively from natural acetic fermentation	S.C. PRODALCOOL
8	Alcohol vinegar	Plastic Bottle	1000 mL	- vinegar fermentation of ethyl alcohol, coloring: caramel food, E 150 c.	S.C. SIENANA S.R.L.
9	Apple vinegar	Plastic Bottle	500 mL	- apple vinegar obtained by the classical method of natural fermentation.	VINCON VRANCEA
10	Japanese rice vinegar	Glass Bottle	150 mL	- distilled vinegar (made from wheat, cooking sake, rice and corn), water, salt.	ROCON DISTRIBUTION 2000
11	Vinaigre de cidre au cidre de Normandie	Glass Bottle	750 mL	- apple vinegar, E 223.	CARREFOUR România
12	Vinaigre de cidre aux pommes du verger	Glass Bottle	750 mL	- apple vinegar, E 224.	CARREFOUR România
13	Vinigretto	Glass Bottle	500 mL	- wine vinegar, sugar, natural extract of garlic, pepper, coriander, chives, bay leaves, mustard seeds	S.C. CRAMELE HALEWOOD S.A.
14	Wine Vinegar	Glass Bottle	750 mL	- wine vinegar, preservative sulfur dioxide.	CIRIO - Roma Italia

The ingredients and the recipe differ very much from one assortment to another and it is presented in short. At the same time, they mention the producing countries and distributors from Romania. The Romanian products are 4 in number, 5 from Italy, 2 from France, and 1 assortment from the Great Britain, Greece and Germany. The balsamic vinegars from Italy and Greece drew our attention since they are obtained from concentrated grapes must. Most assortments contain SO_2 as preservative.

RESULTS AND DISCUSSIONS

From chemical analysis and physical determinations were obtained the following results:

There is not always an obvious correlation between density and refraction index (table 2). Density (specific mass) of the vinegars under study ranged between 1.109 and 1.007 g/cm^3. We noticed that 5 assortments had a density close to that of water, namely between 1.010 g/cm^3 and 1.007 g/cm^3. 6 samples had a relatively higher density (between 1.022 g/cm^3 and 1.013 g/cm^3). Only 3 samples of balsamic vinegars had a more important density between 1.109 g/cm^3 and 1.075 g/cm^3.

In most cases, the refraction index registered the value of 1.34, except the 2 samples of balsamic vinegar of Italian origin.

Table 2

Density and refraction index

Nr. crt.	Products	Density g/cm^3	Refraction index
1	Aceto di vino aromatizzato al pepe nero	1,013	1,341
2	Aceto di vino bianco aromatizzato alle erbe fini	1,013	1,340
3	Aceto Balsamico di Mondena	1,075	1,362
4	Colavita Condimento Balsamico Bianco	1,100	**1,372**
5	Balsamic vinegar Kalamata	**1,109**	**1,337**
6	Vinegar Kräuter	1,022	1,341
7	Vinegar Fermentation	1,013	1,341
8	Alcohol vinegar	1,010	1,339
9	Apple vinegar	**1,007**	1,338
10	Japanese rice vinegar	1,016	1,339
11	Vinaigre de cidre au cidre de Normandie	1,010	1,339
12	Vinaigre de cidre aux pommes du verger	1,010	1,339
13	Vinigretto	1,020	1,343
14	Wine Vinegar	1,010	1,338

For the total dry extract (table 3), we noticed a situation similar to that for density meaning that the highest values were registered by the balsamic vinegars (between 16.3 and 26.4 g/L). There is an intermediate segment with an extract higher than 1 g/L (between about 3.1 and 1.3 g/L) registered by 7 samples. A number of 4 samples registered an extract smaller than 1 g/L.

Table 3

Total dry extract

Nr. crt.	Products	Total dry extract	
		g/L	%
1	Aceto di vino aromatizzato al pepe nero	1,39	0,137
2	Aceto di vino bianco aromatizzato alle erbe fini	1,31	0,129
3	Aceto Balsamico di Mondena	16,26	1,513
4	Colavita Condimento Balsamico Bianco	26,01	2,365
5	Balsamic vinegar Kalamata	26,39	**2,380**
6	Vinegar Kräuter	2,36	0,231
7	Vinegar Fermentation	0,75	0,074
8	Alcohol vinegar	0,07	**0,007**
9	Apple vinegar	0,91	0,091
10	Japanese rice vinegar	2,37	0,233
11	Vinaigre de cidre au cidre de Normandie	1,64	0,163
12	Vinaigre de cidre aux pommes du verger	1,61	0,159
13	Vinigretto	3,06	0,300
14	Wine Vinegar	0,89	0,088

The mineral content (table 4) of the samples under study registered fewer extreme values. Thus, Kräuter vinegar and rice vinegar's content was above 10g/L. Most samples' content ranged between 2 and 6 g/L (7 assortments). At the same time, 5 assortments registered values below 2 g/L, among which one smaller than 1 g/L (vinegar from alcohol). Not always did we notice a correspondence between the quantity of ashes g/L and its alkalinity expressed in gK_2CO_3/L.

Table 4

Determination of ash and ash alkalinity

Nr. crt.	Products	Ashes g/L	Ash alkalinity	
			meq/L	g/L K_2CO_3
1	Aceto di vino aromatizzato al pepe nero	2,15	28,0	1,93
2	Aceto di vino bianco aromatizzato alle erbe fini	1,79	29,0	2,00
3	Aceto Balsamico di Mondena	4,28	24,5	**1,79**
4	Colavita Condimento Balsamico Bianco	1,35	30,5	2,10
5	Balsamic vinegar Kalamata	6,36	38,0	2,62
6	Vinegar Kräuter	**17,4**	42,5	**2,93**
7	Vinegar Fermentation	2,36	33,0	2,28
8	Alcohol vinegar	**0,32**	26,0	1,69
9	Apple vinegar	1,29	32,5	2,24
10	Japanese rice vinegar	10,9	26,0	1,79
11	Vinaigre de cidre au cidre de Normandie	2,89	40,0	2,76
12	Vinaigre de cidre aux pommes du verger	5,48	32,5	2,24
13	Vinigretto	3,36	32,5	2,24
14	Wine Vinegar	1,54	29,5	2,04

Total acidity (table 5) expressed in g/100mL acetic acid oscillated within very large limits (from about 10 to 4.5). We may group samples in several classes of acetic content:

1. Prodalcool Vaslui fermentation vinegar and Seini alcohol vinegar's content in acetic acid was above 9%

2. The acetic acid content of 6 samples was between 6 and 8% acetic acid (4

Italian vinegars, the German vinegar and Vinegretto – vinegar-based product)

3. A content smaller than 6% acetic acid was registered by 6 samples, 2 of them having a content even below 5 % acetic acid (Kalamata balsamic vinegar and the rice vinegar). We also noticed that all vinegars from apples/cider had a quite similar content of acetic acid (5.2-5.3% acetic acid).

Table 5

Total acidity

Nr. crt	Products	Total acidity g/100mL a. acetic
1	Aceto di vino aromatizzato al pepe nero	7,516
2	Aceto di vino bianco aromatizzato alle erbe fini	7,543
3	Aceto Balsamico di Mondena	6,842
4	Colavita Condimento Balsamico Bianco	5,657
5	Balsamic vinegar Kalamata	4,665
6	Vinegar Kräuter	6,142
7	Vinegar Fermentation	**9,967**
8	Alcohol vinegar	9,482
9	Apple vinegar	5,388
10	Japanese rice vinegar	**4,472**
11	Vinaigre de cidre au cidre de Normandie	5,226
12	Vinaigre de cidre aux pommes du verger	5,307
13	Vinigretto	6,627
14	Wine Vinegar	6,088

Most assortments analyzed (table 6) were clear (9 samples), three samples were opalescent and Modena balsamic vinegar was practically opaque to sunlight. As for the coordinate of complementary colour **a,** 6 samples may be classified under the predominant red colour, among which the cider vinegar, the vinegar from orchard fruits and especially the aromatic vinegar with black pepper had the most significant values; the rest of 8 samples may be classified under the predominant green colour without having a more important value.

Table 6

Determination of chromatic parameters

Nr.crt.	Products	L-	a	b
1	Aceto di vino aromatizzato al pepe nero	57,91	31,3	47,68
2	Aceto di vino bianco aromatizzato alle erbe fini	96,98	-1,62	15,85
3	Aceto Balsamico di Mondena	2,05	1,50	3,53
4	Colavita Condimento Balsamico Bianco	94,78	-0,32	19,69
5	Balsamic vinegar Kalamata	6,87	3,69	1,19
6	Vinegar Kräuter	96,06	-0,77	8,16
7	Vinegar Fermentation	96,95	-1,57	15,45
8	Alcohol vinegar	98,97	-0,65	4,96
9	Apple vinegar	97,11	0,58	9,68
10	Japanese rice vinegar	96,72	-1,19	13,80
11	Vinaigre de cidre au cidre de Normandie	95,21	-0,51	21,70
12	Vinaigre de cidre aux pommes du verger	65,24	19,3	64,12
13	Vinigretto	79,38	6,76	28,90
14	Wine Vinegar	97,43	-0,70	10,12

L- brightness, a - coordinate complementary color red (+) and green (-),
b - coordinate complementary colors yellow (+) and blue (-)

As for the coordinate of complementary colour **b,** all variants were predominantly yellow and few assortments even had an intense yellow colour: the cider vinegar and the aromatic vinegar with black pepper.

Consequently, we may affirm that the vinegars under study were mostly yellow with a greenish hue, very less obvious. There were also samples having an obvious reddish hue (2 assortments).

CONCLUSIONS

1. The vinegar samples under study presented highly differentiated characteristics in terms of origin and processing technology.

2. We may group these products in several commercial categories:

- strong vinegars with reduced extract (Prodalcool Vaslui vinegar and Seini alcohol vinegar)
- vinegars with an acetic content between 6 and 8% g acetic acid (most of them from Italy and Germany), among which the balsamic ones had a high extract quantity and the aromatic ones had a more reduced extract.
- vinegars with a lower acetic acid content (vinegars from apples and cider as well as the Greek balsamic vinegar – Kalamata and the rice vinegar). The vinegars from apples and cider registered relatively reduced extract content whereas the rice vinegar and especially the Kalamata balsamic vinegar had high/very high content of extract.

3. The mineral content (ashes g%) is not always correlated with the appreciation criteria used. Thus, the aromatic vinegar (Kräuter) registered the maximum value followed by the rice vinegar. We may distinguish two following groups in terms of mineral content: between 6 and 2 g% (7 assortments, Kalamata balsamic vinegar, 2 cider vinegars, Modena balsamic vinegar, Prodalcool Vaslui fermentation vinegar, aromatic wine with black pepper and Vinegretto). Less than 2 g% of mineral content was registered by 5 samples (white wine aromatic vinegar, Wine Vinegar, Colavita balsamic vinegar, Vrancea apple vinegar and Seini alcohol vinegar. The reduced mineral content may lea to the suspicion of counterfeit.

4. The colour of the samples under analysis was mostly yellow with a slight greenish hue. Only two samples were yellow with a significant red hue.

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DETERMINATION OF TOTAL POLYPHENOLIC CONTENT AND ANTHOCYANINS OF DRIED POMACE OBTAINED FROM LOCAL GRAPE VARIETIES

DETERMINAREA CONŢINUTULUI POLIFENOLIC TOTAL ŞI AL ANTOCIANILOR DIN TESCOVINA USCATĂ OBŢINUTĂ DIN SOIURI AUTOHTONE DE VIŢĂ DE VIE

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Abstract. *Horticultural products are irreplaceable sources for obtaining natural compounds, with a nutraceutic and bioactive role (functional foods). Also, the use of waste from their processing has increased significantly in recent years. Pomace from red and black grapes, resulting from the technological process of wine (after maceration) was subjected to drying processes under natural conditions and then to the extraction of phenolic compounds. By analysis of the resulting fractions, obtained through repeated extractions, was determined total polyphenolic index (ITP or D_{280}) and the total content of anthocyanins (CA), of the dried pomace obtained from 15 local varieties of vines. Unlike the established nutrient classes (proteins, vitamins, minerals), phenolic compounds are not considered vital for survival, but instead, they have properties that promote optimum human health.*
Key words: waste, dried pomace, polyphenols, anthocyanins

Rezumat. *Produsele horticole constituie surse de neînlocuit pentru obţinerea unor compuşi naturali, cu rol nutraceutic şi bioactiv (alimente funcţionale). De asemenea, utilizarea produselor secundare provenite din prelucrarea acestora a crescut semnificativ în ultimii ani. Tescovina strugurilor roşii şi negri rezultată în urma procesului tehnologic de vinificaţie (după macerare), a fost supusă uscării, în condiţii naturale şi apoi extracţiei compuşilor fenolici. Prin analiza fracţiunilor rezultate din extracţii repetate a fost determinat indicele polifenolic total (ITP sau D_{280}), precum şi conţinutul total de antociani (CA) al tescovinei uscate provenită de la 15 soiuri autohtone de viţă de vie. Spre deosebire de clasele de nutrienţi consacrate (proteine, vitamine, minerale), compuşii fenolici nu sunt consideraţi vitali pentru supravieţuire, dar în schimb, într-o gamă largă de sensuri, au proprietăţi care promovează optimul de sănătate umană.*
Cuvinte cheie: deşeuri, tescovină uscată, polifenoli, antociani

INTRODUCTION

Phenolic compounds form one of the most important classes of compounds in all plant secondary metabolites. Their role, in both plants and humans, is evident by active character in the biological, physiological and environmental field.

Because of their bioactive properties and beneficial effects on human health, particular attention was given to attract new sources of valuable phenolic

compounds (tannins, phenolic acids, anthocyanins etc), and developing methods of extraction, isolation and characterization of them.

Anthocyanins play an important role in current research in oenology and industry of obtaining natural food colorants. Usually located in the skin of black grapes, anthocyanins are extracted only partially (30-40%) by the winemaking process, so pomace resulting from the production of red wines contains significant amounts of these phenolic compounds (Câmpeanu R. *et al*., 1989). They are glycosides of anthocyanidins (cyanidin, delphinidin, peonidin, petunidin, malvidin), which only in the case of *Vitis vinifera* species, are present as monoglycosides (Zănoagă C. *et al.*, 2010).

Grapes who reached the full maturity have a very complex chemically composition (table 1). This gradually changes with the processing, winemaking process, which they are subject to (Stoian V. *et al.*, 2000).

Table 1

Chemical composition (%) of grapes reached to the maturity
(Fregoni, 1998)

Substance	Cluster	Peel	Pulp	Seed
Water	30-45	60-70	70-80	31-45
Carbohydrate	1	1	10-35	34-36
Free organic acids	0,2-0,9	0,3-0,5	0,5-0,7	0,8-1,2
Related organic acids	1	-	0,3-1	-
Minerals	5-6	1-3	0,1-1	2-4
Polyphenols (tannins, anthocyanins etc)	1-3	1-5	trace	4-6
Nitrogenous substances	1-1,5	1-1,5	0,1	4-6
Odoriferous substances	-	-	trace	trace
Cellulose	45-55	28-32	0,4-0,6	35-45
Pectin	trace	trace	0,005-1	trace

MATERIAL AND METHOD

This study aims to determine total amount of polyphenols and anthocyanins content (AC) of the dried pomace obtained from 15 local black grape varieties, of which 7 old grape varieties (Fetească neagră, Băbească neagră, Bătută neagră, Busuioacă de Bohotin, Negru de Căuşani, Negru vârtos, Vulpe) and 8 new Vinifera creations (Amurg, Arcaş, Balada, Codană, Negru aromat, Negru de Drăgăşani, Novac and Roz de Miniş).

Grape samples was harvested on 09 September 2009, from the Ampelographic collection of UŞAMV Iaşi, "V. Adamachi" farm, wine center Copou.

Wine technology applied was classic with destemming and crushing. Maceration was carried out in static plastic pots for 72 hours, followed by pressing (pneumatic press). Sugars content in the must, determined with refractometer, took an average of 18.7°Bx.

Fresh pomace of grape varieties was weighed, keeping about 1 kg of each variety and ready for drying. Marc drying space was previously prepared, clean, away from direct sunlight, wind and rain, at room temperature. After 3 weeks pomace was considered to be dry enough to prepare for storage (average moisture was 7.5%, determined by air oven drying samples of pomace, at 105°C for 4 hours). Preservation was done in paper bags, stored in dry, cool and dark place (refrigerator).

After 40 days of cold storage was passed to making extraction made in the Laboratory of Oenological Research of the Romanian Academy, Iaşi branch.

The solution used for the extraction was ethanol (alcohol), purity 96%, acidified with hydrochloric acid (HCl), having a concentration of 0.75% HCl. Thus resulted a pH = 1 - 1.5.

Seeds from each sample were further dried using microwave (1 minute at 750W, with mixed seed at 30 seconds).

Dried pomace (seeds and skins) was ground, using an electric grinder Goldy, thus achieving a high degree of comminution of plant material (particles less than 0.5 mm). From each sample was weighed 16g, using a balance with 2 decimal, then the samples were treated with 160 mL solution of extraction, resulting a ratio of 1:10. Extraction time was approximately 72 hours (3 days) at room temperature (25-28 ° C).

In grapes skin, anthocyanins without acyl group predominate, which can be removed very quickly, while acyl anthocyanins can be removed gradually. The second and third stages of extraction were made by treating pomace, recovered from the filter paper, for exhaustion of plant material. Before the third filter was applied a ultrasound treatment on vessels containing pomace treated with extraction solution. The ultrasonic device used was Pros Kit Digital Ultrasonic Cleaner SS-802, ultrasonic time: 480 seconds, for each sample. Using ultrasound, as a means of enhancing the process of transfer of property (mass, heat) and desorption, is reported in the literature since 1970. It was proven that ultrasonic can dislocate organic matter adsorbed on a specific area of sediments and increase significantly the bioavailability of sorbent.

Total polyphenolic index (IPT) or D_{280} index expresses the content of total phenolic compounds (phenolic acids, tannins and coloring substances) of the samples. This index has values between 20 and 100 at red wines.

The method principle for determining the index D280 is that, benzene nuclei, characteristic of phenolic compounds, strongly absorb ultraviolet light, with a maximum around λ =275-280 nm (Zamfir C., 2009).

D_{280} index is a spectral characteristic of all existing phenolic compounds (Ţârdea C., 2007).

Measurements were made using a UV-VIS spectrometer Analytik Jena Specord 200, as follows: absorbance was measured at λ = 280 nm in 1 cm quartz cell, in comparison with distilled water, the result being index D_{280}. For expressing the content of phenolic compounds in grams gallic acid, reported at gram of material, it was drew a calibration curve, using gallic acid solutions of different concentrations. It was necessary to determine the Folin-Ciocalteu index to obtain values of phenolic compounds at λ = 750 nm and applying formulas for calculating. This method is reliable, reproducible and can be used to any wine or alcoholic extract.

In acidic medium, there is a balance between colored and colorless forms of **anthocyans**. This balance is a function of pH (Zamfir C., 2009). It was chosen pH 0.6 and pH 3.5 and measured the absorbance (optical density) at λ = 520 nm for both sample and blank, using 1 cm glass cuvette optical path, compared with distilled water. Coloring intensity variation between pH values is proportional to the anthocyanin content. With this change, phenolic function is not affected and it is recognized that other phenolic compounds (tannins) do not interfere the determination (Zamfir C., 2009).

RESULTS AND DISCUSSIONS

Observations made during drying pomace:

- yield samples of pomace at drying: from1 kg of fresh pomace resulted 200 g dry pomace (seeds, skins and parts of rachides).

- has been found that grape varieties with lighter colour were more susceptible to mold, than most intensely colored.

Following interpretation of the absorption spectra obtained at the wavelength of each compound analyzed and applying formulas were obtained the results for the total phenolic compounds and anthocyanin content, data were centralized in table 2.

Table 2

IPT (total phenolic compounds) and CA (anthocyanin content) values of the studied samples

No.	Variety	D_{280}	IPT (g gallic acid /g mp)	CA (mg/g mp)
1	Arcaş	**0,2234**	**33,458**	17,0908
2	Băbească neagră	0,2293	34,334	**4,5801**
3	Roz de Miniş	0,2271	34,011	8,7744
4	Bătută neagră	0,2272	34,017	6,7723
5	Busuioacă de Bohotin	0,2275	34,071	19,0929
6	Amurg	0,2286	34,231	30,5280
7	Negru vârtos	0,2286	34,232	7,8119
8	Fetească neagră	0,2289	34,284	19,7090
9	Negru aromat	0,2289	34,283	11,7391
10	Balada	0,2252	33,714	24,3677
11	Codană	0,2297	34,397	20,6715
12	Negru de Căuşani	0,2304	34,509	21,5956
13	Novac	0,2312	34,626	52,3585
14	Negru de Drăgăşani	0,2325	**34,821**	21,7881
15	Vulpe	**0,6851**	34,201	**170,8209**

Values were expressed with 4 decimal to reveal very small differences that occur at the total amount of polyphenols in the studied varieties.

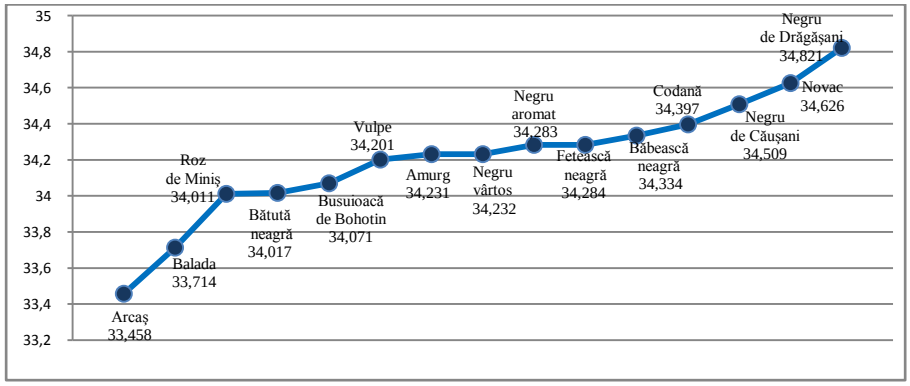

Fig.1. D_{280} index values of the studied varieties

Index D_{280} (fig. 1) has assigned values to specific parameters of red wines, which in literature are in the range 20-100. Can be observed the location of this index, close to the theoretical lower limit, but still with significant values, ranging from: 33.458, Arcaş variety and 34.821 at variety Negru de Dragăşani.

Regarding the content of total phenolic compounds (fig. 2), determined quantitatively, it is noted that it has very similar values, except Vulpe variety with a higher value, 0.6851 g/g, phenolic compounds expressed as gallic acid.

From the data, we can notice the existence of local varieties of grapes with potential for accumulation of phenolic compounds higher than established varieties, such as Fetească neagră or Băbească neagră, like Vulpe, Novac, Balada şi Negru de Drăgăşani, although were not harvested at technological maturity of each, but were harvested at the same time.

Regarding the anthocyanins content (fig. 3) of dried pomace, can notice Vulpe variety with high-value of CA index, 170.8 mg/g. It is noted that are local varieties with high potential for accumulation of anthocyanins, such as varieties: Novac, Amurg, Balada, Negru de Drăgăşani, Vulpe. At the opposite pole are varieties: Băbească neagră, Roz de Miniş, Negru vârtos, Bătută neagră, with low values of this parameter.

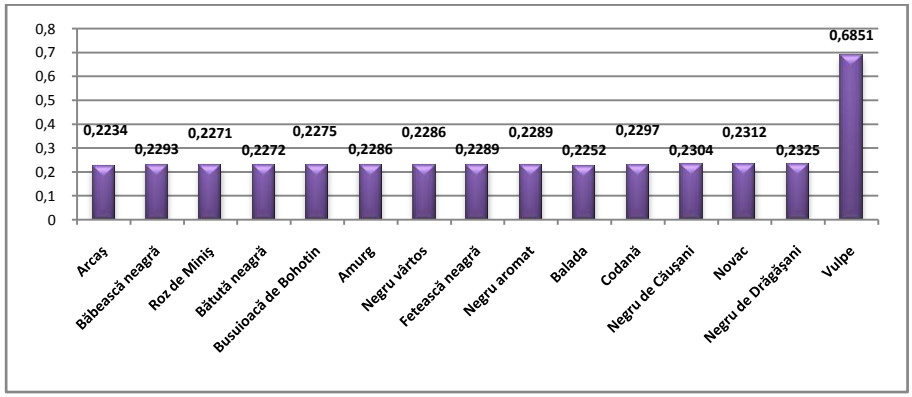

Fig.2. Total phenolic content values (g gallic acid /g dry pomace)

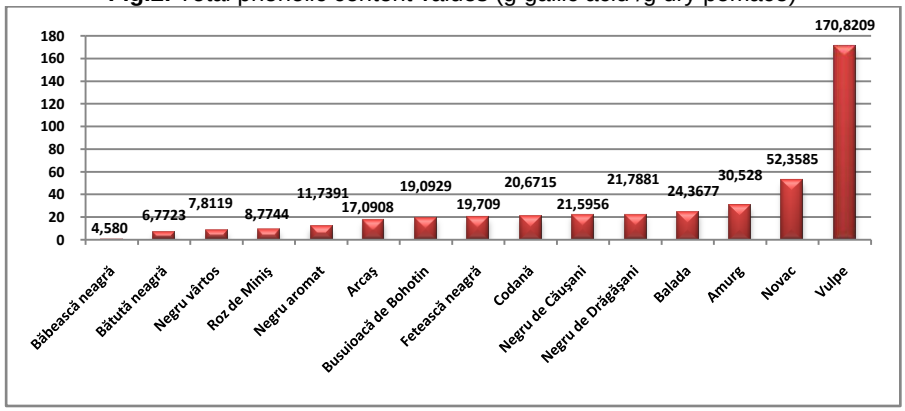

Fig.3. CA values (mg anthocyanins/g dry pomace)

CONCLUSIONS

1. Content of phenolic compounds in grapes is very variable, depending on variety, so higher values have Vulpe variety, 0.6851 g/g and the lowest value have Arcaş variety, 0.2234 g/g phenolic compounds expressed as gallic acid.

2. Dry pomace extracts, from local grape varieties of red and black grapes, are rich in phenolic compounds, with values of D_{280} index between 33 458, the Arcaş variety and 34.821, Negru de Drăgăşani variety, being thus a material with a real recovery potential in the sector of functional food and to obtain compounds with nutraceutic role.

3. Large quantities of anthocyanins, obtained after the extractions, with a maximum value at Vulpe variety, 170.8 mg/g and a minimum of 4.58 mg/g, Băbească neagră variety, show that pomace, even in the dry state, is a valuable source of vegetal pigments, with an significant utilization in food and pharmaceutical industry, replacing synthetic compounds.

4. The high values of indices examined supports the extraction of these compounds from the material considered and for the future arise the question of using smaller quantities of solvent and/or its recovery and recycling.

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ANALYTICAL METHODS FOR DETERMINING THE ANTIOXIDANT ACTIVITY

METODE ANALITICE DE DETERMINARE A ACTIVITĂŢII ANTIOXIDANTE

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Abstract. *Importance of improving quality of human life in the idea of conservation of natural genetic fund a rational and safe food is a subject of concern the world of science. Alongside the problem of food as a source of health, may be located and the problem „succesful aging" concept that defines individuals ability to survive to old age in good physical shape, many factors of aging can be prevented or treated. There are numerous studies and research showing that intake of vegetables and fruits help to combat oxidative stress. Antioxidants thus the effects of free radicals. To determine the antioxidant capacity of horticultural products, researchers have used different methods. One of these methods is the ORAC method (Oxygen Radical Absorbance Capacity). The method consists of measuring antioxidant capacity to absorb free radical. Is the only test wich measure the time and inhibition degree of free radicals.*

Key words: ORAC method, antioxidant capacity

Rezumat. *Importanţa ameliorării calităţii vieţii umane în ideea conservării fondului său genetic natural printr-o alimentaţie raţională şi inofensivă constituie o temă care preocupă lumea ştiinţei. Alături de alimentaţie ca sursă de sănatate, poate fi menţionată şi abilitatea indivizilor de a supraveţui până la vârste înaintate într-o formă fizică bună, numeroşii factori ai îmbătrânirii putând fi preveniţi sau chiar trataţi. Există numeroase studii şi cercetări care demonstrează că aportul de legume şi fructe contribuie la combaterea stresului oxidativ. Antioxidanţii contraatacă efectele radicalilor liberi. Pentru determinarea capacităţii antioxidante a produselor horticole cercetătorii au folosit diferite metode. Una dintre aceste metode este metoda ORAC (capacitatea de absorbţie a radicalilor de oxigen). Metoda constă în măsurarea capacităţii antioxidanţilor de a absorbi radicalii liberi. Este singurul test în care se iau în considerare atît timpul cît şi gradul de inhibare a radicalilor liberi*.

Cuvinte cheie: metoda ORAC, capacitatea antioxidantă

INTRODUCTION

The development of many chronic and degenerative diseases, such as cancer, heart disease and neuronal degeneration such as Alzheimer's and Parkinson's disease has been theorized to be caused, in part, by oxidative stress. Oxidative stress has also been implicated in the process of aging. It is known that reactive oxygen species can damage biological molecules such as proteins, lipids, and DNA. While the human body has developed a number of systems to eliminate

free radicals from the body, it is not 100% efficient. (Takayuki Shibamoto şi colab., 2008)

Antioxidants are compounds that protect biological system against the harmful effects of process or reactions caused by excessive oxidation. Dr. Lester Packer, known as the "father of antioxidants", he wrote in "The antioxidant miracle" that the antioxidants have an incredible potential to prevent hundreds of diseases. (Lester Packer, 1999). Determination of antioxidant capacity of products is put in value through methods as:

- ORAC - oxygen radical absorbance capacity;
- TEAC - trolox equivalent antioxidant capacity;
- FRAP - ferric reducing ability plasma;
- DPPH - 1,1 diphenil- 2- picrilhidrazil;
- AEAC - ascorbic acid equivalent antioxidant capacity.

Antioxidant capacity may be expressed as: ORAC units (as μmol TE/100 g), total phenolic content (expressed as gallic acid equivalent - GAE mg%), anthocyanin content (mg%), Trolox equivalent (TEAC – Trolox equivalent antioxidant capacity, μmol TE/g), Fe (II), (FRAP - ferric reducing ability plasma) DPPH - 1,1 diphenil- 2- picrilhidrazil, ascorbic acid equivalent (AEAC - ascorbic acid equivalent antioxidant capacity, mg%). (www.sciencedirect.com)

High performance chromatography (HPLC) is a usual method used for the separation of antioxidants such as catechines.

The total content of polyphenols: blue formed between phenolic compounds and Folin – Ciocalteu reagent being indepndents of phenolic compounds structure, thereby building complex between the metal center and phenolic compounds. The absorption is recorded at a particular wavelength. Total phenol content is expressed as a gallic acid.

Method of Trolox equivalent antioxidant capacity (TEAC), is based on the ability of antioxidants to neutralizate the anion ABTS + radical. ABTS is oxidized by radicals and other peroxil oxidants to its ABTS cation radical, intense color (λmax = 734 nm). Antioxidant capacity is expressed as potential test compounds to bleach ABTS+ radical by direct reaction with it. Antioxidant capacity of tested compounds was expressed as Trolox equivalents.

MATERIAL AND METHOD

In preparing of this bibliographical synthesis it has been consulted a number of treaties, books, articles published or available on the Internet. The references are mentioned only partially, given that some information is repeated and that some sources treated in a very general way the studied problem.

Oxygen Radical Absorbance Capacity method determines the ability of inhibition of peroxil radical, inducing oxidation, highlighting the issue of classical radical, H atom transfer orac values were reported as Trolox equivalents, were expressed as μmol TE/DW. Fluorescence intensity, ex.485nm, em. 525 nm was monitored for 35 min.

RESULTS AND DISCUSSIONS

Healty human body synthesizes under conditions of oxidative stress, large amounts of endogenous antioxidant active substances (products of their own body). The main endogenous antioxidants are: uric acid, albumin, bilirubin, various enzymes (catalase, gluthatione peroxidase). The biosynthesis may decrease greatly in terms of psychological stress in some disease when immunity is low or if a long - term oxidative stress, as happens, for example smokers.

Exogenous antioxidants (those placed in body from outside sources) supplemented endogenous deficit, having a very positive action on the body. Several classes of compounds carries antioxidants, as can be seen in the teble below. (www.elsevier.com)

Table 1

Exogenous antioxidants substances

Groupe of substances	REPRESENTATIVES
Minerals	Selenium
	Copper
	Zinc
	Iron
Vitamins	Vitamin A (retinol)
	Vitamin C (L – ascorbic acid)
	Vitamin E (tocopherols)
	Vitamin P (rutina/bioflavone)
	PABA (para – aminobenzoic acid)
	Folic acid
Protide and its precursors	Betaine
	Histidine
Lipids and fatty acids	Conjugated linoleic acids (CLA)
Glycosides	Flavonoids
	Glucobrasiscin
Enzymes	Peroxidase
Terpenes	Intibina

The ORAC (Oxygen Radical Absorbance Capacity) assay is a relatively simple but sensitive method suitable for quantifying the antioxidant capacity of a number of products including whole fruits and vegetables, beverages such as fruit juices and wines, and supplement products. The ORAC assay is used primarily for water-soluble antioxidants. It can also be used to measure the antioxidant capacity of biological samples such as human plasma, blood serum or organ tissue. (Determining antioxidant capacity. Food Technology, 2008)

The chemical assay at the core of the ORAC method was developed by Guohau Cao at the Nutritional Science Department at the University of Connecticut. In 1994, Dr. Cao brought the method to the USDA Human Nutrition Research Center on Aging to work with Dr. Ronald Prior.

Most measurements of antioxidant activity use either the inhibition time at a fixed degree of inhibition or the extent of inhibition at a fixed time for a basis of

quantifying the results. The ORAC method is unique in that it measures both: the degree to which a sample inhibits the action of an oxidizing agent; and how long it takes to do so. These measurements are integrated into a single measurement called the ORAC Value.

Trolox, a non-commercial water-soluble derivative of tocopherol, is used as the control standard of antioxidant activity and the units of an ORAC value are expressed as micromoles Trolox equivalents per gram of a substance (mmole TE/g). Trolox it is used in other many methods for antioxidant activity determination.

The assay measures the oxidative degradation of the fluorescent molecule (either beta-phycoerythrin or fluorescein) after being mixed with free radical generators such as azo-initiator compounds. Azo-initiators are considered to produce the peroxyl radical by heating, which damages the fluorescent molecule, resulting in loss of fluorescence. Antioxidant is able to protect the fluorescent quantified using a fluoremeter. Fluorescein is currently used most as a fluorescent probe. Equipment that can automatically measure and calculate the capacity is commercially available (Biotek, Roche Diagnostic).

The fluorescent intensity decreases as the antioxidant degeneration proceeds, abd this intensity is typically recorded for 35 minutes after the addition of the azo-initiator (free radical generator). The degeneration (or decomposition) of fluorescein is measured as the presence of the antioxidant slows the fluorescence decay. Decay curves (fluorescence intensity vs. time) are recorded and the area between the two decay curves (with or without antioxidant) is calculated. Subsequently, the degree of antioxidant-mediated protection is quantified using the antioxidant trolox (a vitamin E analogue) as a standard. Different concentrations of trolox are used to make a standard curve, and the test sample are compared to this. Results for test samples (foods) have been published as “trolox equivalents”or TE.

Although the method is straightforward, it was time consuming to run many samples at once. In 1995, Dr. Cao and Dr. Prior automated this method in order to analyze large numbers of samples. The automation of the method resulted from adapting the chemical assay to work in a COBAS FARA II analyzer and linking the analyzer to a computer to store the data. Unfortunately, the COBAS FARA II analyzer is no longer produced and therefore, there are very few laboratories that run this method regularly. (ORAC: Oxygen radical absorbance capacity, 2002)

Today, the ORAC assay has become commonplace in research and in the marketing of antioxidant products, keeping these laboratories considerably busy. A small number of supplement companies have managed to procure this obsolete piece of equipment for measuring ORAC value of their products for quality control and research and development purposes.

In 2001, Dr. Prior and Brunswick Laboratories made improvements to the ORAC assay. The original ORAC assay used b-phycoerythrin (B-PE) as the fluorescent probe. However, B-PE is isolated from a natural source and the purity varied from lot to lot, which often caused poor reproducibility. In addition, B-PE

was found to interact with phenolic compounds, usually the very compounds believed to have the antioxidant activity in many samples, and therefore, the values reported were often understated. The improvements made to the assay eliminate the problems associated with using B-PE. By using fluorescein, a synthetic compound, the variability and the phenolic-interference problems were solved. However the newer method reports ORAC values 2-3 times higher than the original method.

ORAC method is considered most suitable due to its biological relevance in vivo antioxidant effectiveness.

Prof. Rui Hai Liu of Cornell University says that there is a food group with high antioxidant capacity, but growing conditions, variety, genetic origin, may affect the antioxidant capacity measured in vitro. (ORAC: Oxygen radical absorbance capacity, 2002)

Ronald L. Prior Research Chemist/ Nutritionist, USDA/ARS Arkansas Children's Nutrition Center, Little Rock, Ark., said that antioxidant phytochemicals in fruits and vegetables are effective in protecting against free-radical damage in vitro but that additional research is needed on factors affecting their absorption and metabolism.

Prior said that different radicals can give different test results, depending on their structure. ORAC uses the peroxyl radical, the most common free radical in the human body. A lot of methods give the same relative ranking of antioxidants, he said, but there's some variation depending on how the radicals react with components in food. (ORAC Antioxidant assay kit, 2008).

The measurement of the antioxidant capacity of products is a matter of growing interest because it nay provide a variety of information, such as resistance to oxidation, quantitative contribution of antioxidant substances, or the antioxidant activity that may be present inside the organism after ingestion.

Ana Zubuta *et al*. compared oxygen radical antioxidant capacity (ORAC) and trolox equivalent antioxidant capacity (TEAC) assays to estimate the total antioxidant capacity (TAC) of orange juice, milk, and an orange juice-milk beverage. When the TEAC method was used with this beverage, an increase in the concentration of orange juice corresponded to an increase in TAC, but increasing the percentage of milk did not increase the TAC value. When the ORAC method was applied, it was seen that increased concentrations of juice or milk corresponded to greater antioxidant capacity. An evaluation was also made of the influence of certain compounds (ascorbic acid, gallic acid, b-carotene, lutein, zeaxanthin and albumin) with antioxidant capacity that were present in the samples studied. (ORAC and Teac assays comparison to measure the antioxidant capacity of food products, Food Chemistry, 2009)

The antioxidant capacity of foods depends on many factors, including the colloidal properties of the substrates, the conditions and stages of oxidation, and the localization of antioxidants in different phases. Moreover, the measured antioxidant capacity of a sample depends on which technology and which free radical generator or oxidant is used in the measurement.

Consequently, comparison of different analytical methods for determining TAC is a key factor in helping investigators to choose a method and to understand the result obtained.

Although the TEAC method is simpler and cheaper than the ORAC method, it gives an underestimate of the antioxidant capacity of foods or beverages of a more complex nature.

Table 2

Advantages and disadvantages of the TEAC and ORAC methods

Methods	Advantages	Disadvantages
ORAC	-Uses biologically relevant free radicals -Integrates both degree and time of antioxidant reaction -Standardised: allows for data comparison across laboratories	-Normally requires use of expensive equipment -pH-sensitive -Requires long times to quantify results
TEAC	-Inexpensive and easy to use -Stable to pH, hence can be used to study pH effect on activity -Fast reaction	-Extra step to generate free radical from ABTS salt necessary -Generated free radical not stable for long periods of time

CONCLUSIONS

1. ORAC assay is the only test which measure the time and the inhibition degree of free radicals.

2. It is used to determine the hydrophilic and lipoliphific antioxidants.

3. The method is effective for in vitro and in vivo determinations.

4. Most researchers use this method when it comes to clinicals trials.

5. It is used to control the antioxidant content of various foods, cosmetics, and product with therapeutic potential.

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THEORETICAL ASPECTS OF PRESSING IN ORDER TO OBTAIN APPLE JUICES

ASPECTE TEORETICE ALE PRESĂRII ÎN OBŢINEREA SUCURILOR DE MERE

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Abstract. *One of the most important stages of the technological process for the obtaining of apple juices is pressing. Certain empirical observations could lead to the establishing of some rules and the output of the pressing operation is influenced by factors such as: succulence of the raw matter, thickness of the material subject to pressing, consistence and structure of the pressing layer, time variation of pressure, auxiliary pressing substances added and the enzymatic maceration of pulp. The pulp obtained by crushing/grinding is made, in case of apples, of a liquid and viscous phase – juice and a solid – semi-jellified phase. The adding of pectolitic enzymes leads to the increase of juice quantity and triggers a superior content in compounds determining its flavour, taste and smell. The modern pressing techniques rely on the sequential control principle according to which preliminary data in terms of the raw matter used and characteristic qualitative parameters (breed, phytosanitary state, crunchiness, acidity, succulence etc) shall be memorized and subsequently processed by means of a computer being thus defined as "ideal" parameters of the pressing process.*

Key words: pressing, juice production, quality

Rezumat. *Una din cele mai importante etape ale procesului tehnologic de obtinere a sucurilor de mere o constituie presarea. Anumite observaţii empirice au putut conduce la stabilirea anumitor reguli, randamentul operaţiei de presare fiind influenţat de factori ca: suculenţa materiei prime, grosimea stratului de material supus presării, consistenţa şi structura stratului de presare, variaţia în timp a presiunii ce se exercită, substanţe auxiliare de presare adăugate, macerarea enzimatică a pulpei. Pulpa obţinută prin zdrobire/mărunţire este formată, în cazul merelor, dintr-o fază lichidă şi vâscoasă – suc şi o fază solidă - semigelificată. Adăugarea de enzime pectolitice duce la mărirea randamentului în suc şi determină un conţinut superior în compuşi ce determină aroma, gustul şi mirosul acestuia. Tehnicile moderne de presare se bazează pe principiul controlului secvenţial, potrivit căruia date preliminare cu privire la materia primă utilizată şi parametrii calitativi caracteristici (soi, stare fitosanitară, crocanţă, aciditate, suculenţă etc) vor fi memorate şi procesate ulterior cu ajutorul unui computer, fiind astfel definiţi parametri "ideali" ai procesului de presare.*

Cuvinte cheie*:* presare, obţinere sucuri, calitate

INTRODUCTION

The pressing itself may be achieved classically by continuous and discontinuous acting presses that may be, from the structural viewpoint, basket

presses, screw presses, roll presses or pneumatic presses (Arthey D., Ashurst Ph. R., 2001).

The discontinuous acting presses (with galley or basket) are used for the artisanal production of the fruit juice. To obtain juices in an industrial system, they prefer the continuous belt presses (Beceanu D., 1994).

MATERIAL AND METHOD

Besides the study of specialized literature in the field, books, treaties and scientific articles published at international symposia or specialized magazines and doctoral theses, we also read different internet pages of some foreign non-governmental agencies having as object of activity the research in the field of public alimentation (Cockram S., Seneca, 1993; Beceanu D., Chira A. 2003; Ducastaing A., Adrian J. 1990; Espiard E. 2002).

We studied the ways to increase output when pressing apple pulp to obtain apple juice. A team of specialists of Bucher's R & D, USA have elaborated a technique for the optimization of pressing designing a computer-assisted system (Espiard E. 2002).

RESULTS AND DISCUSSIONS

Even since 1943 (Terzaghi), they have made numerous studies trying to determine the bond between the speed of juice discharge, the pressing time and the juice quantity, on one hand, and the characteristics of pulp and presses, on the other hand. Numerous parameters, steady or variable in time, were taken into account: pulp thickness, its porosity, mechanical resistance, juice viscosity and density, inflicted pressure. In 1964, Kormendy proposed a differential equation to describe the pouring down of juice fractions depending on the thickness of the material layer subject to pressing in conditions of given temperature and pressure.

Certain observations and empirical data regarding pressure could lead to the setting of some rules:

- the thinner the pulp layer, the easier the juice discharge;
- output is improved if pressure is inflicted progressively;
- the alternation of the rest phases with the pressing ones favors the progressive destruction of the cellular walls and the elimination of juice.

In the same pressing conditions, using Bucher HPX 5005 press (9 t/h capacity) for a pulp with component particles having size between 2-4 mm, we obtained an output of 85.3% by 1.3% more than in the case of coarse particle pulp. Pectic enzymes (pectinases, pectolitic enzymes) from the hydrolase class catalyze the scission of pectic substances. Depending on the specific substratum and they way of action, we have: protopectinases, pectin demetoxylases, pectin depolymerases etc. Protopectinase catalyzes the scission of bonds from protopectin macromolecule leading to its degrading into calculosis, hemicellulose and pectin. Pectin demetoxylases PME or PE (saponifiable enzymes) produce demetoxylation of pectic substances with methanol release. In case of apples, they are active at pH-6.6 being activated by some salts.

Pectin depolymerases divide the bonds of polygalacturonic chain in the presence of water and may be classified in:

- Endo/Exo polymethyl galacturonases = PMG de-polymerize pectinic acids in the presence of water

- Endo/Exo poly-galacturonases = PG act on pectic acids.

The activity of these enzymes intensifies once with the decrease of structural-textural firmness when the fruits mature and in case of apples this treatment lasts for 20 minutes at temperatures of 15-30 ^{0}C.

Amylases catalyze enzymatic hydrolysis of starch. The most important are:

- Alpha-amylase is an endoenzyme that hydrolyzes at random the glycosidic bonds from the starch macromolecule leading to dextrins of different sizes.

- Beta –amylase is an exoenzyme hydrolyzing the glycosidic bonds at the non-reducing ends of polyglucidic chains of starch releasing maltose and "limit dextrins". It acts at a weak acid pH and an optimal temperature of 55-63^{0}C.

During maturation, the activity of amylases increases once with the decrease of the starch content.

Cellulases (beta-glucanases) catalyze cellulose hydrolysis from the cellular membrane contributing to its getting thinner. The glycosidic bonds from cellulosic chains are gradually divided. Cellulases have an optimal weakly acid pH 4.5-6.5 being thermally stable in the range 30 – 60 ^{0} C. The pulp obtained by crushing/grinding is made of a liquid and viscous phase – juice and a solid- semi-jellified phase. The adding of pectolitic enzymes leads to the increase of juice quantity and a superior content of compounds determining its flavor, taste and smell. The optimal way of their administration is the following:

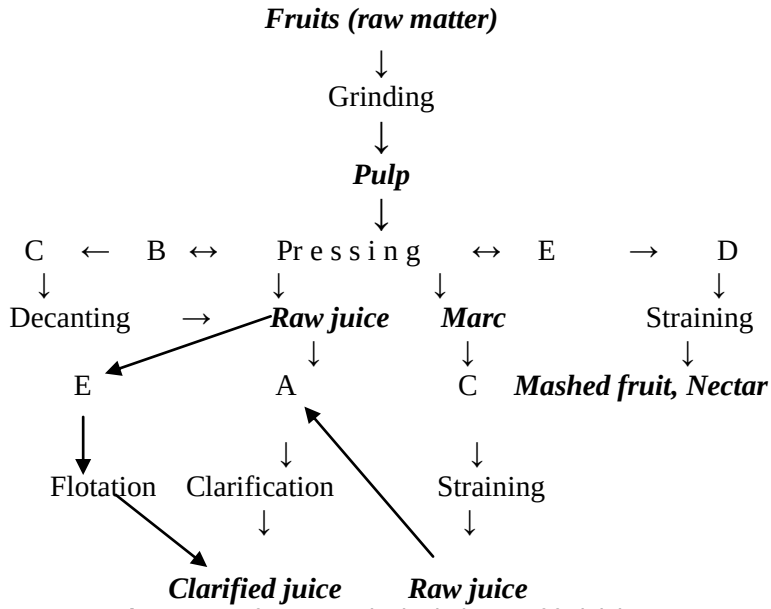


Fig. 1. Use of enzymes in the industry of fruit juice (European method)

where:

A: pectolitic enzymes – clarification
B: pectolitic enzymes – auxiliary maters for pressing
C: pectolitic and amylolytic enzymes – liquefaction
D: poly-galacturonases (PG) - maceration
E: pectolitic enzymes and calcium salts – pectin jellification

In recent years, they use a wide range of enzymes in the obtaining of fruit juices for their synergic effect, namely:

a) Increase of the pressing output: the pulp is usually treated with pectolitic enzymes at the temperature of 15-30^0 C for 30-60 minutes. The quantity of enzymes used varies depending on the pH, the activity of enzymes, the type of fruits as raw matter, the contact time and temperature. The enzymatic treatment may lead to the increase of pressing output by up to 10% in case of apples harvested at optimal maturity and kept in frigorific storehouses.

b) Juice clarification and improvement of filtration: the raw juice is generally turbid, with a high viscosity due to the presence of the pectic substances. The pectolitic enzyme treatment leads to the clarification of these juices. The used quantity shall be calculated depending on the content in pectins of the raw juice, its pH, and temperature. The enzymatic treatment usually takes place at 54^{0}C for 1 hour or at 16^{0}C for 6-8 hours.

Pectinase
↓
Raw juice ← Clarification ← o→ Filtration → Clarified juice

c) The flavour enrichment of the final product: certain volatile substances are lost during the clarification and concentration processes of juices. One of the methods for the increase of the juice quality in terms of flavours is the fortification of the final product by enzymatic treatment with glycosidases, glucosides being flavour precursors for apples (Enzymes in Juice processing - Y. D. Hang). Flavours also appear naturally: beta-glucosidase (endogenous) from fruits catalyzes the hydrolysis beta D glucosides up to geraniol, nerol and citronellol.

Beta - glucosidase
↓
Glucosidic monoterpene → Monoterpene + Glucose
(Inactive flavour) (Active flavour)

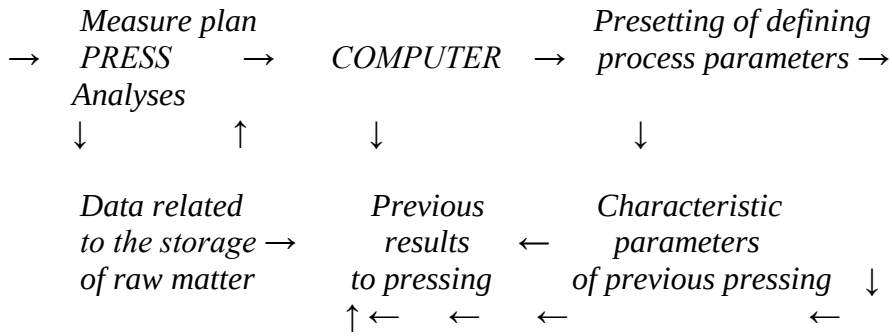
In recent years, in the food industry, NOVO Laboratories, Inc; Gist-brocades Food Ingredients, Inc; Genecor International, Inc; Rohm Tech, Inc; Solvay Enzimes, Inc, AB Enzymes GERMANIA a.o. have become conspicuous as main manufacturers and suppliers of pectolitic enzymes.

The modern pressing techniques rely on the sequential control principle according to which preliminary data in terms of the raw matter used and characteristic qualitative parameters (breed, phytosanitary state, crunchiness, acidity, succulence etc) shall be memorized and subsequently processed by means of a computer being thus defined as "ideal" parameters of the pressing process.

The objectives attained by the use of this optimization technique are:

1. optimization is achieved by self regulation;
2. the press operation takes place depending on the characteristics of the raw matter, the press must "feel" the pressability degree of the material subject to pressing;
3. for each parameter in evolution they try to define a physical model based on the laws of physics that might allow the obtaining of an optimal output.

SEQUENTIAL CONTROL PRINCIPLE



This technique was successfully put into practice by the team of specialists of the company Bucher's R & D, USA, that has designed such a computer-assisted system, Bucher HPX 5005, being considered at present the most effective system for this purpose.

The press used to obtain juices must give a product where the insoluble solid substances may be easily eliminated by decanting. This exigency is satisfied by the vertical or horizontal presses that do not turn round or turn round very little during pressing.

The discontinuous acting presses (with galley or basket) are used for the artisanal production of the fruit juice. To obtain juices in an industrial system, they prefer the continuous belt presses.

Belt press

When designing this type of press they started from the operation principle of the galley discontinuous press or the pressing filters. The pulp, stored on the belt (cloth) is pressed in a thin layer to favor the discharge of juice. The first belt presses, such as Shenk, operated in fact semi-continuously, the loading, emptying and pressing phases being successive. At present, numerous types of presses - Bellmer, Flotweg, and Klein – with double belt allow the continuous processing

of the raw matter. The pulp bed is carried forward between two belts whose movement is owed to the movement of some parallel adjustable drums (rolls). By reducing the distance between them, they inflict a higher and higher pressure over the pulp, the juice extracted being collected in a collecting tank and the waste go though an evacuation strainer. A beater and aspersion jet device ensures the cleaning of the pressing belts. After pressing, the raw juice is vulnerable to oxidization and the spontaneous starting of fermentation depending on the raw mater and the technological line; thus they must prevent the enzymatic brownness and ensure the microbiological stability.

CONCLUSIONS

The pressing time necessary for the obtaining of a steady output is proportional to the square of initial thickness of the pulp layer.

The output of the pressing operation is influenced by factors such as: succulence of raw matter, thickness of the material subject to pressing, consistence and structure of pressing layer, time variation of the inflicted pressure, auxiliary pressing substances added for the enzymatic maceration of pulp.

At present, one of the modern pressing techniques relies on the sequential control principle, the computer-assisted system designed and put into practice by specialists of Bucher's R & D, USA, the use of Bucher HPX 5005 press being the most effective system for this purpose.

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QUALITY EVALUATION OF SOME SWEET CHERRY CULTIVARS PROCESSED INTO STEWED FRUIT

EVALUAREA CALITĂȚII UNOR SOIURI DE CIREŞ PRELUCRATE SUB FORMĂ DE COMPOT

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Abstract. *In 2009, 7 sweet cherry cultivars existing in experimental plot of Fruit Growing Research Station Iasi, as stewed fruit processing, in the technological industry, at Contec Foods Ltd. Tecuci (Galati County, Romania), was performed. With these samples was performed in a 'consumer test' of Cantina USAMV Iasi, attended by 155 persons of both sexes, aged between 11 and 62 years, of different occupations. Sheet used for the test referred to the main parameters characterizing the quality of cherry stewed fruit and assessment index for a parameter was expressed on a scale rising from 1 minimum to a maximum 5. 'Mary' was most appreciated by consumers, recording scores between 4.2 and 4.5 at most syrup and fruit characteristics. Compote made from 'Bucium' has qualities valued by both consumers and processors, with large fruit size (22.2 mm), bright red skin colour and a balance sugars / acidity ratio (22.34).*

Key words: sweet cherry processing, cultivar, consumer test, stewed fruit, acidity.

Rezumat: *În 2009, din 7 soiuri de cires existente in poligonul experimental al SCDP Iasi, s-a realizat prelucrarea fructelor sub formă de compot, în flux tehnologic industrial, în cadrul SC Contec Foods SRL Tecuci. Cu aceste probe s-a efectuat un test al consumatorului la Cantina USAMV Iaşi, la care au participat 155 persoane de ambele sexe, cu vârste cuprinse între 11 şi 62 ani, de ocupatii diferite. Fişa utilizată pentru test s-a referit la principalii parametri ce caracterizează calitatea compotului de cireşe, iar indicele de apreciere pentru un parametru a fost exprimat pe o scară crescândă de la minim 1 la un maxim de 5. Soiul Maria a fost cel mai apreciat de consumatori, înregistrând note cuprinse intre 4,2 si 4,5 la majoritatea caracteristicilor siropului si fructului. Compotul obținut din soiul Bucium are calități apreciate atât de consumatori cât şi de procesatori, având fructe mari (22,2 mm), de culoare roşu strălucitor şi cu un raport zaharuri/aciditate echilibrat (22,34) .*

Cuvinte cheie: prelucrare cireşe, soi, evaluare senzorială, compot, aciditate.

INTRODUCTION

Compotes are produced as part of canned fruit assortment used as a dessert, which containing over 50% fruit and a liquid coating of at least 16 °Brix,

sterilized at 100 ºC for 65 minutes (20-25-20) for 570 jars ml (Beceanu, 2009 ; Beceanu & Chira, 2003 ; Jamba & Carabulea, 2002).

Being a short trial processing, stewed fruit preserves more nutrients and taste properties of fruit (Jamba & Carabulea, 2002).

Compotes quality particular depends on the cultivar features, which must provide a fruit cracking resistance into sterilization process, the minimum size of 18 mm in equatorial diameter (Jamba & Carabulea, 2002), fermity, uniform fruit size and attractive color (Webster & Looney, 1996).

Tressler & Woodroof, 1976 shows that products with higher fruit size, syrup coating requires a higher concentration, compared compotes with small fruit size (about 18 mm in diameter), where the number of fruits per jar is greater. In terms of processors, a condition the choice of the cultivar are presence the stone without adherence to flesh (Webster & Looney, 1996 ; Beceanu & Chira, 2003 ; Sîrbu & Beceanu, 2007).

The most popular cultivars used for making cherry compote in Romania are: 'Van', 'Bing', 'Sam', 'Bigarreau Dönissen', 'Hedelfinger', 'Boambe de Cotnari', 'Roze', 'Simbol', 'Rubin', 'Jubileu 30', 'Daria' and 'Severin' which were added soon another cultivars like 'Maria', 'Golia', 'Stefan', 'Bucium' and 'Marina' (Budan & Gradinariu, 2000, Sirbu et al., 2007). In the U.S.A., recently introduced cultivars are used for compote like 'Cavalier T', 'Chelan', 'Hartland, (Andersen et al., 2003), and in the world are known other cultivars for fermity and clear juice coloring like 'Vega', 'Germersdorf', 'Linda', 'Solymar Gömbolü' (Hui, 2006).

Fruit assessment directly to the consumer test is often used when seeking widespread a new cultivar or when you want to compare quality of several varieties or processed fruit products (Lugli et al., 2006, Turner et al., 2008).

In this paper, the results of sensory evaluation of the 7 samples of compotes made in processing flow from 7 different sweet cherry cultivars are presented.

MATERIAL AND METHODS

On November 12, 2009, in collaboration UASVM Iasi and FGRS Iasi organized a consumer test of 7 types of sweet cherry compote. The test samples, 10 jars of compote of 7 different sweet cherry cultivars from the experimental polygon of FGRS Iasi: 'Maria', 'Oana', 'Radu', 'Golia', 'Van' 'Bucium' and 'Boambe de Cotnari' were presented. 151 people aged between 11 and 62 years with different profesional occupations participated. Samples from stewed fruit processing by the 7 sweet cherry cultivars were done in processing flow, at CS Contec Foods Ltd. Tecuci. HACCP quality products system are practice there. Samples were kept in cold storage at 10 °C until testing (125 days).

Consumer test was performed at UASVM Iasi restaurant, each taster received about of 30 ml syrup and 5-6 fruits. Sheet used for the test referred to the main parameters concerning the quality of sweet cherry compote (Peter et al., 2005), represented by the appearance (color), integrity, taste and aroma of fruit. For syrup quality parameters followed as: color, clarity, taste and aroma.

Assessment index for a parameter was expressed on a scale increasing from minimum 1 to maximum 5, as follows: 1 = unpleasant, 2 = less pleasant, 3 =

neutral, 4 = pleasant, 5 = very pleasant.Consumers present data has been statistically processed with multiple comparisons method (Duncan test, P 5%) using Microsoft Excel (Snedecor, 1968; Ceapoiu, 1968).

Compote samples were analyzed in laboratory, too. Average number of fruits was established for each type compote, soluble solids content (SSC), titratable acidity (TA), reducing sugars content (RSC) and RSC / TA ratio. SSC was determined using of fruit pulp with a hand refractometer Zeiss, at room temperature (range from 18 to 23ºC). Titratable acidity (TA) was determined by titrimetric method by neutralization with sodium hydroxide solution 0.1 N, to the point of equivalence, using timolftaleine as an indicator. Reducing sugars content were determined by Schoorl method whose principle is the property of reducing sugars to reduce at hot influence the alkaline cupper-tartarical solution to cupperous oxide. Excess divalent copper oxidizes potassium iodide to elemental iodine, free iodine is then titrated with sodium thiosulfate. Depending on the amount of thiosulfate consumed we determined the quantity of reducing copper, and then from tables, the reducing sugars (as glucose, fructose, etc.) (Ghimicescu, 1977).

RESULTS AND DISCUSSIONS

By consumer test were recorded average notes for both fruit and juice characteristics presented in tables 1 and 2. Thus, at fruits, for color, integrity and taste 'Maria' has the highest notes of appreciation, ranging between 4.11 and 4.5 (table 1). For fruit flavor, 'Bucium' was most appreciated, with an average score of 4.07 (table 1).

Table 1

Average notes for fruit characteristics recorded by consumer test with 7 compote samples (November 2009)

Sample	Color*	Integrity*	Taste*	Aroma*
Maria	4.5^{a}	4.2^{a}	4.1075^{a}	3.9525^{ab}
Oana	3.82^{de}	4.09^{abc}	3.8625^{bc}	3.9675^{ab}
Radu	3.79^{e}	4^{abc}	3.925^{abc}	3.935^{ab}
Golia	4.02^{bcd}	3.87^{c}	3.7375^{c}	3.735^{b}
Van	3.99^{bcde}	4.01^{abc}	3.945^{abc}	3.8925^{ab}
Bucium	4.14^{bc}	4.11^{abc}	4.0625^{ab}	4.0725^{a}
Boambe de Cotnari	4.15^{b}	4.19^{abc}	3.725^{c}	3.825^{ab}
LSD 5%=	**0.18 - 0.24**	**0.24 - 0.33**	**0.22 - 0.24**	**0.23 - 0.26**

*****- Different letters after the number corresponds with statistically significant differences for P 5% - Duncan test

At syrup compote, highest scores were recorded to 'Maria', with scores between 4.26 and 4.5 (table 2), for color and taste. However, for clarity and flavor

syrup, ‘Bucium’ was most appreciated by consumers, with scores between 4.16 and 4.23.

Analyzed in the laboratory, compote samples have registered values contained in table 3.

Table 2

Average notes for syrup characteristics recorded by consumer test with 7 compote samples (November 2009)

Sample	Color*	Clarity *	Taste*	Aroma*
Maria	4.5125^{a}	4.2225^{a}	4.2625^{a}	4.1775^{a}
Oana	3.9925^{b}	4.075^{a}	3.955^{bc}	4.0875^{a}
Radu	4.0325^{b}	4.05^{a}	3.9825^{bc}	4.025^{a}
Golia	4.2375^{b}	3.915^{a}	3.87^{c}	3.925^{a}
Van	4.0625^{b}	3.9925^{a}	4.0725^{abc}	3.9975^{a}
Bucium	4.2575^{b}	4.2325^{a}	4.15^{ab}	4.1575^{a}
Boambe de Cotnari	4.0025^{b}	4.2075^{a}	3.855^{c}	3.9175^{a}
SD 5% =	**0.25 - 0.28**	**0.28 - 0.32**	**0.25 - 0.28**	**0.24 - 0.27**

***** - Different letters after the number corresponds with statistically significant differences for P 5% - Duncan test

At cultivars have been studied, the lagerst fruit size registered on ‘Van’ with 23.2 mm in equatorial diameter, and the smallest fruit size registered on ‘Oana’ and ‘Golia’ with 19.9 mm (table 3). Depending on the size, the average number of fruits per jar was different at each cultivars, ranging between 62 fruits at ‘Boambe deCotnari’ and 76 fruits at ‘Radu’ (table 3).

‘Van’, ‘Maria’ and ‘Radu’ have a short peduncle, and this presented difficulties in stem removal mechanized operation. However, ‘Bucium’, ‘Golia’, ‘Oana’ and ‘Boambe deCotnari’ have a medium length of stems and in this regard are more suitable for industrial processing.

Soluble solids content (SSC) **of syrup** made from the highest at ‘Van’ and ‘Golia’ (17.27 ° Bx) and lowest values in ‘Maria’, ‘Oana’ and ‘Boambe Cotnari’ (16.27 ° Bx) (table 3).

Soluble solids content (SSC) **in fruit** from compote was 18.07 ºBx at ‘Van’ and 16.27 °Bx at both ‘Oana’ and ‘Maria’. All other cultivars accounting an intermediate values.

Highest recorded value in reducing sugar content (RSC) was 10.32 g% on ‘Radu’ and lowest (8.42 g%) was recorded in ‘Maria’ (table 3). Titratable acidity (TA) showed the highest value (0.486 g%) at ‘Radu’ and lowest (0.353 g%) at ‘Van’. RSC / TA ratio showed the highest value (28.84) at ‘Van’ and the lowest was recorded in ‘Boambe Cotnari’ (20.07) (table 3).

Table 3

Physical and chemical features of fruits used for compote presented to the test

Cultivar	Average no. fruits/ jar (570 ml)	Size of fresh fruits used for compotes (mm)	Peduncle length *	SSC (°Bx)		RSC (g%)	TA (g malic acid %)	RSC/TA ratio
				Syrup	Fruit			
Van	66	23.2	short	17.27	18.07	10.18	0.353	28.84
Bucium	65	22.2	medium	16.67	17.07	10.13	0.434	23.34
Golia	71	19.9	medium	17.27	17.47	10.25	0.441	23.24
Maria	64	21.7	short	16.27	16.27	8.42	0.375	22.45
Oana	72	19.9	medium	16.27	16.27	8.78	0.405	21.68
Radu	76	20	short	17.07	17.27	10.32	0.486	21.23
Boambe de Cotnari	62	23	medium	16.27	16.47	8.85	0.441	20.07

*- Peduncle length assessed as: very short ≤ 3.0 cm; short = 3.1-4.0 cm; medium = 4.1-4.5 cm; long = 4.6-5.0 cm; very long ≥ 5.1 cm (***, 2006)

CONCLUSIONS

Compote made from 'Mary' was most appreciated by consumers (getting average grades of 3.9-4.5 to the fruit's parameters and 4.2-4.5 to the syrup's parameters) and the analytical point of view is a cultivar with bright red skin colour, the equatorial diameter 21.7 mm with a total of 64 fruits per jar and RSC / TA ratio of 22.45. However, 'Mary' has a short stalk that being a technological disadvantage, which can cause difficulties for stalk removal mechanized operation.

'Oana' obtained the lowest score on fruit's parameters (3.8-4.09) to consumer test having a smaller size (19.9 mm equatorial diameter) and therefore showed a greater number of fruits / jar (72) and the ratio sugar / acidity was 21.68, being small compared to other cultivars.

'Radu' was appreciated by consumers with high scores on both parameters syrup and fruit characteristics, given in terms of technology has the disadvantage of the presence of a short stalk and smaller fruit size (20 mm in equatorial diameter).

'Golia' and 'Van' showed intermediate assessment scores compared to other cultivars, but 'Van' has the most valuable fruit size (23.2 mm) and ratio RSC / TA (28.8). From the technological point of view, 'Van' have a short stalk that being a disadvantage.

'Boambe de Cotnari' is available in terms of processing, with large fruit, half yellow half red skin colour, with a balance sugars / acid ratio, but consumers have shown a preference for compotes with purple red syrup color, with strong visual impact.

'Bucium' has quality assessed both consumers and processors, with large fruits, bright red, with medium length stems and a balance sugars / acidity ratio (22.34).

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RESIDUAL EFFECTS OF POLYMERIC MATERIALS USED TO TREAT SOILS FROM GLASSHOUSES AND SOLARIUMS

EFECTELE REMANENTE ALE MATERIALELOR POLIMERICE UTILIZATE LA TRATAREA SOLURILOR DIN SERE ŞI SOLARII

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Abstract. *The experimental studies performed with several types of polymeric materials (polyethylene glycol with molecular mass 2000 and 4000 and maleic co-polymers), applied on soils from glasshouses and solariums, with different properties, chemical-mineralogical composition, cultivation technologies, brought a new data series regarding the initiation mechanism of residual effects and the influences of these on the properties of soils treated with polymeric materials. The residual effects appear in final stages of polymeric materials action and are generated by hybrid oligomers and organic-mineral complexes resulted from combination of intermediary decomposition products of polymeric materials with different mineral and organic components of soils. In case of soils from protected areas, due to the specific exploitation conditions the residual effects can have both, benefice influences on soils properties, and negative influences (toxicity on biologic systems, perturbation of plants development, destabilization of chemical equilibriums), which may altered the soil productivity and the quality of agricultural products.*

Key words: soils from glasshouses, polymers, residual effects.

Rezumat. *Studiile experimentale realizate cu câteva tipuri de materiale polimerice (polietilenglicool cu masa moleculară 2000 şi copolimeri maleic) aplicate pe soluri din sere şi solarii variate ca proprietăţi, compoziţie chimico-mineralogică şi tehnologie de cultivare au adus o serie de date noi privind mecanismele de iniţiere a efectelor remanente şi influenţele pe care acestea le au asupra proprietăţilor solurilor tratate cu materiale polimerice. Efectele remanente apar în stadiile finale de acţiune a materialelor polimerice şi sunt generate de oligomerii hibrizi şi complecşii organo-minerali rezultaţi din combinarea produşilor intermediari de descompunere ai materialelor polimerice cu diferite componente minerale şi organice ale solurilor. În cazul solurilor din spaţii protejate, datorită condiţiilor specifice de exploatare, efectele remanente pot avea, atât influenţe benefice asupra proprietăţilor solurilor, cât şi influenţe negative (toxicitate asupra sistemelor bilogice, perturbarea dezvoltării plantelor, destabilizarea echilibrelor chimice) care pot altera productivitatea solului şi calitatea produselor agricole.*

Cuvinte cheie: soluri din sere, polimeri, efecte remanente.

INTRODUCTION

The effects produced by polymeric materials on soils properties from protected areas (glasshouses and solariums) are very complex and variant, and depend by the application way of polymeric materials, chemical-mineralogical characteristics and exploitation way of soils (Bulgariu et al., 2009, Chiţanu et al., 2005, Filipov et al. 2009, Hamilton et al., 1996). The polymeric materials interacts selectively and in competitive regime with all components (mineral and organic) of soils, and show stage their effects on soils characteristics: (**i**) initial stages – macromolecules of polymeric materials interact as there are (without major chemical-structural modifications) with soils components (direct effects); (**ii**) intermediary stages – effects generated by polymeric materials are mainly determined by the intermediary decomposition products of these (indirect effects); (**iii**) final stages – effects generated by polymeric materials are predominantly determined by hybrid oligomers and organic-mineral complexes resulted from combination of intermediary decomposition products of polymeric materials with different mineral and organic components of soils (residual effects) **(**Bulgariu et al., 2009; Filipov et al., 2008, Filipov et al., 2009).

The apparition mechanisms of residual effects and their influence on properties of soils treated with polymeric materials are still, insufficiently known. Several studied underlined that the residual effects produced by polymeric materials have strong influences, and benefic generally, on chemical-mineralogical and agrochemical characteristics of soils. The experimental studies performed by as, with several types of polymeric materials applied on soils from glasshouses and solariums variant as properties, chemical-mineralogical composition, and exploitation technologies have confirmed only partially these conclusions **(**Bulgariu et al., 2009; Filipov et al., 2008, Filipov et al., 2009). Ours results bring several new data about the initiation mechanisms of residual effects and the influences of these on properties of soils from glasshouses and solariums treated with polymeric materials.

MATERIAL AND METHOD

Our studies about the residual effects produced by polymeric materials in soils from protected areas have follows two important aspects: (**i**) verify the hypothesis that residual effects are generated by hybrid oligomers and organic-mineral complexes resulted from combination of intermediary decomposition products of polymeric materials with different mineral and organic components of soils, and (**ii**) estimation of influences produced by residual effects on agrochemical quality of soils. The experimental methodology has included the following steps: (**i**) experimental modelling of some soil-polymeric material systems: was follows the estimation of the limits of physical-chemical stability of some polymeric materials in conditions of soils from protected areas and of decomposition mechanisms of these; (**ii**) separation and determination of hybrid oligomers and of organic-mineral complexes from soils treated with polymeric materials: was performed by plane electrophoresis with vertical gradient, liquid chromatography (HPLC), solvent extraction in aqueous two-phase systems; (**iii**) study of composition and structure of hybrid oligomers and of organic-mineral complexes: was done by chemical analysis, microscopic studies, UV-VIS, IR and Raman spectrometry; (**iv**) establish direct correlations between nature and concentration of hybrid oligomers, and of organic-mineral complexes respectively, and

residual effects observed in soils **(**Bulgariu et al., 2009; Filipov et al., 2008, Filipov et al., 2009). For experiments have been used soils samples from Copou – Iaşi glasshouse (IS. 1 profile: proxicalcaric hipohortic entiantrosol with the following composition: Ap1k, Ap2k, Aho1k, Aho2k(x), BCk, ABk, Ck) and three types of polymeric materials: polyethylene glycol with 2000 molecular mass (PEG-2000), maleate-vynylacetate co-polymer (AM-VA; hydrophobic) and maleat-methacrolate co-polymer (AM-MMA; hydrophilic). The details about the pedological, mineralogical and geochemical characteristics of soils and some physical-chemical characteristics of used polymeric materials respectively, have been presented in several previous studies.

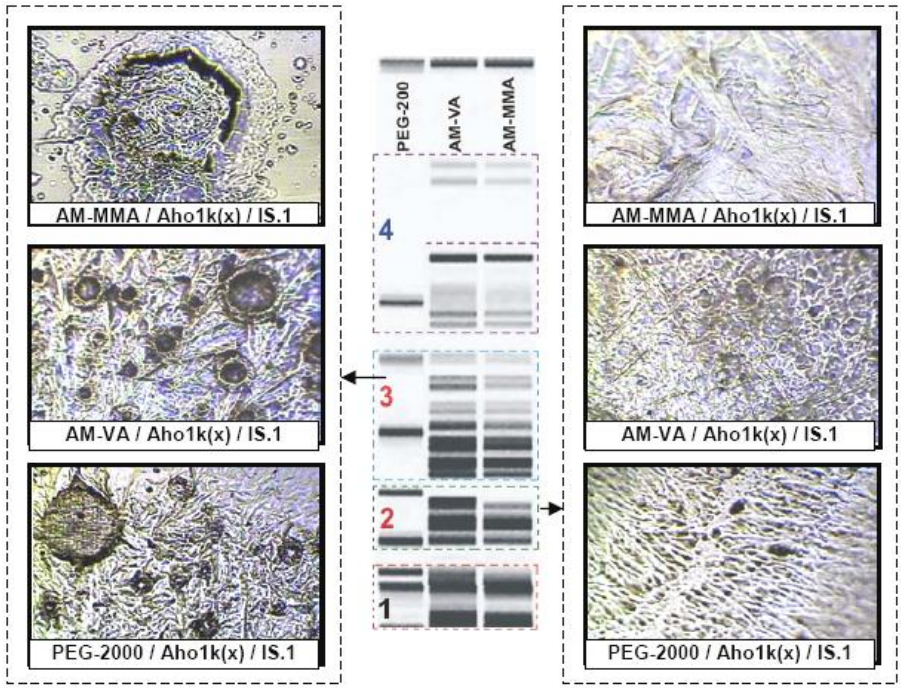
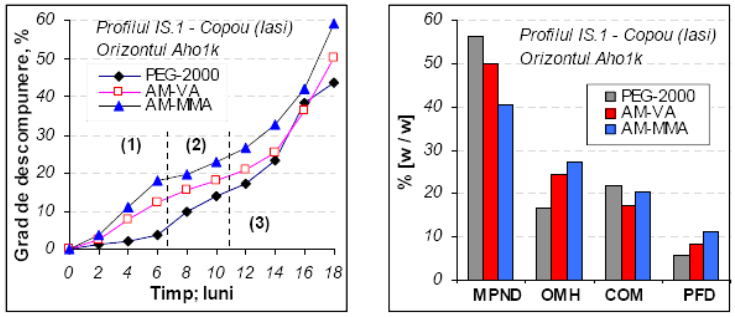


Fig. 1. (**a**) Electrophoregrame obtained at the separation of organic compounds from extracts of soils samples (Copou-Iaşi glasshouse, IS. 1 profile – Aho 1 k(x) horizon, treated with polymeric materials (PEG-2000; AM-VA and AM-MMA) during of 18 months: (1) un-decomposed polymeric materials, (2) hybrid oligomers, (3) organic-mineral complexes formed by "coupling" of some fragments from polymeric materials molecules with some organic compounds (huminic and non-huminic) and inorganic, (4) final decomposition products of polymeric materials (di- or mono-functional organic compounds with low molecular mass). Microscopic images of hybrid oligomers – 450x increased (figure **1-b**) and organic-mineral complexes – 400x increased (figure **1-c**) separated by plane electrophoresis (figure 1-a) from Aho 1k(x) horizon (IS.1 profile – Copou-Iaşi glasshouse).

RESULTS AND DISCUSSIONS

The physical-chemical analysis performed by extracts obtained from soils samples (Copou-Iaşi glasshouse, IS.1 profile) treated with polymeric materials (PEG-2000; AM-VA and AM-MMA) during of 18 months (figure 1), have indicate the existence of four main fractions of chemical compounds: **(i)** un-decomposed

macromolecules of polymeric materials, with insignificant modifications of composition and structure; (**ii**) macromolecular compounds with mass close to that of polymeric materials (hybrid oligomers) and molecules formed from two components – one molecular fragment from polymeric materials and one fragment from organic matter of soil; (**iii**) organic-mineral complexes (with chemical-structural characteristics of supramolecular complexes) formed by "coupling" of some molecular fragments of polymeric materials and hybrid oligomers with some organic compounds (humic and non-humic) and inorganic (iron oxides and oxy-hydroxides, alumino-silicates gels, clay minerals) from soil – these complexes are significantly different from pedogenetic organic-mineral complexes (which appear in untreated soils), by chemical-mineralogical composition and structure (Bulgariu et al., 2008, Filipov et al., 2009); (**iv**) compounds formed by advanced decomposition of polymeric materials (di- or mono functional organic compounds with low molecular mass, and simple inorganic compounds H_2O, CO_2, NH_3, nitrogen oxides, low saturated hydrocarbons, etc.).



(a) (b)

Fig. 2. (**a**) Time variation of decomposition degree in case of polymeric materials used for treating the soils samples from Aho1k(x) horizon (IS. 1 profile – Copou-Iaşi glasshouse). On figure are delimited the steps of polymeric materials decomposition – can be correlated with the effects of polymeric materials to occur in soils [3, 4, 9]: (1) polymer macromolecules without major chemical and structural modifications (direct effects); (2) intermediary decomposition products (indirect effects); (3) hybrid oligomers and organic-mineral complexes (indirect and residual effects). (**b**) Percentage weight of the main components in extracts obtained from Aho1k(x) horizon (Copou-Iaşi glasshouse) after 18 month from polymeric materials administration: MPND– un-decomposed polymeric material; OMH– hybrid oligomers; COM– organic-mineral complexes; PFD– final decomposition products of polymeric materials.

The stability of polymeric materials in conditions of soils from glasshouses and solariums (figure 2-a), and the weight of each fraction of chemical compounds (figures 1 and 2-b) respectively, depends by the physical-chemical characteristics and administration way of polymeric materials, type (chemical-mineralogical composition, physical-chemical conditions) and exploitation technology of soil, contact time between polymeric material and soil, biotic activity from soils, etc. These aspects conditioned directly the intensity, spatial extension and manifestation time of the effects of polymeric materials. In case of studies performed by as, on 18 months from polymeric materials administration, the stability of these in conditions of soils from Copou-Iaşi glasshouse follow the order: AM-MMA < AM-VA < PEG-2000 (figure 2-a). In case of maleic co-polymers, the weight of hybrid oligomers is higher

than of organic-mineral complexes, and the weight of final decomposition products is higher than in case of PEG-2000 (figure 2-b). This means that the residual effects in case of maleic co-polymers occur more rapidly but with a shorter, being predominantly determined by hybrid oligomers. In case of PEG-2000, the residual effects are slowly initiated, are longer and are predominantly determined by organic-mineral complexes.

From experimental data can be observed that the manifestation of residual effects in soils treated with polymeric materials is directly correlated with the "in situ" formation of hybrid oligomers and organic-mineral complexes. Our results largely confirmed the conclusions made in various papers focused on the beneficial influence of residual effects **(**Bulgariu et al., 2009; Filipov et al., 2008, Filipov et al., 2009). The experimental results have evidenced two aspects about the influences of polymeric materials on soils characteristics:

(**i**) Residual effects determined, in soils from glasshouses, special in those which are degradated, a heterogeneous distribution (pedo-geochemical anisotropic phenomena) of micro- and macro-elements essential form plants growing, which are manifested by they local concentration (specially, in areas adjacent to plant roots). This phenomena has very strong benefice influences on soil quality and plant growing by: (**a**) temporary inhibition of excessive mineralization of organic matter (action of balancing speed of mineralization processes and of assimilation by plants); (**b**) biodisponibilization of phosphorus, nitrogen, potassium, iron, and an important number of microelements (Zn, Mn, Cu, Cr, Mo, B, Ni, Co, V etc.); (**c**) redistribution in soil mass of soluble salts (dilution phenomena) – prevent / retrograde the deposition of saline crusts. From this point of view, the residual effects determined the nutritive fond conservation of soils from protected areas and "in situ" optimization of this towards the plants growing.

(**ii**) The residual effects can negatively influenced the characteristics of soils from protected areas by: (**a**) local concentration (specially, in areas adjacent to plant roots) of some chemical compounds (salts, metal and non-metallic ions, non-humic organic compounds) at higher level that permissible limit concentrations in soil; (**b**) relative high toxicity on biological systems and destabilization phenomena of chemical-mineralogical equilibriums from soils, manifested by several intermediary and final decomposition products of polymeric materials; (**c**) temporary blockage of organic matter mineralization, of biodisponibility form micro-and macro-elements essential for plants growing – with negative consequences on plants development.

CONCLUSIONS

The residual effects appear in final stages of polymeric materials action, and are determined specially by hybrid oligomers and organic-mineral complexes, resulted from combination of intermediary decomposition compounds of polymeric materials with different mineral and organic components of soils. The residual effects in case of maleic co-polymers occur more rapidly but with a shorter, being predominantly determined by hybrid oligomers. In case of PEG-2000, the residual effects are slowly initiated, are longer and are predominantly determined by organic-mineral complexes. The benefic influences of residual effects on characteristics of soils from protected areas

are: (**a**) temporary inhibition of excessive mineralization of organic matter; (**b**) biodisponibilization of phosphorus, nitrogen, potassium, iron, and an important number of microelements; (**c**) redistribution in soil mass of soluble salts.

The negative influences of residual effects on characteristics of soils from protected areas, are: (**a**) local concentration of some chemical compounds, at higher level that permissible limit concentrations in soil; (**b**) high toxicity on biological systems and destabilization phenomena of chemical-mineralogical equilibriums from soils, of some intermediary and final decomposition products of polymeric materials; (**c**) temporary blockage of organic matter mineralization, of biodisponibility from micro- and macro-elements essential for plants growing.

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COMPARATIVE STUDY OF SOME CONDITIONING AND IMPROVEMENT PROCEDURES OF SOILS FROM GLASSHOUSES AND SOLARIUMS BY TREATING WITH POLYMERIC MATERIALS

STUDIUL COMPARATIV A UNOR PROCEDEE DE CONDIŢIONARE ŞI AMELIORARE A SOLURILOR DIN SERE ŞI SOLARII PRIN TRATARE CU MATERIALE POLIMERICE

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Abstract*. The studies performed by as, by experimental modelling in laboratory conditions, have follow to establish of optimum technological and economical conditions, for two types of application of polymeric materials to improve and conditioning of soils in protected areas cultivated with vegetables. Have been follow both the overall effects on the physic-chemical characteristics and agrochemical quality of soils, and the differential effects on the main degradation processes of soils from protected areas, and the residual effects of polymeric materials on medium term. In this study are presented several general recommendations about the applicability of tested methods in function of treated soil type and nature of utilized polymeric materials.*

Key words: soils from glasshouses and solariums, polymeric materials treatment

Rezumat*. Studiile realizate de noi, prin modelare experimentală în condiţii de laborator, au urmărit stabilirea condiţiilor de optim tehnologic şi economic pentru două variante de aplicare a unor materiale polimerice la condiţionarea şi ameliorarea solurilor din spaţii protejate cultivate cu legume. Au fost urmărite, atât efectele de ansamblu asupra însuşirilor fizico-chimice şi a calităţii agrochimice a solurilor, cât şi efectele diferenţiate asupra principalelor procese de degradare a solurilor din spaţii protejate, respectiv efectele remanente ale materialelor polmerice pe termen mediu. În acest studiu sunt prezentate o serie de recomandări generale privind aplicabilitatea practică a metodelor testate în funcţie de tipul solurilor tratate şi natura materialelor polmerice utilizate.*

Cuvinte cheie: soluri din sere şi solarii, tratare cu materiale polimerice

In studies from literature are underlined the results obtained to treat different types of soils with a relatively wide variety of polymeric materials (are mentioned over 300 of tested polymeric materials on different soil-plant systems). In many cases are evidenced the positive effects produced on the morphological or physic-chemical characteristics of soils, especially by the polymeric materials from poly-electrolytes class (Azzam, 1980, De Boodt, 1992, Chiţanu et al., 2005, Hamilton et al.,, 1996, Sojka et al., 2004).

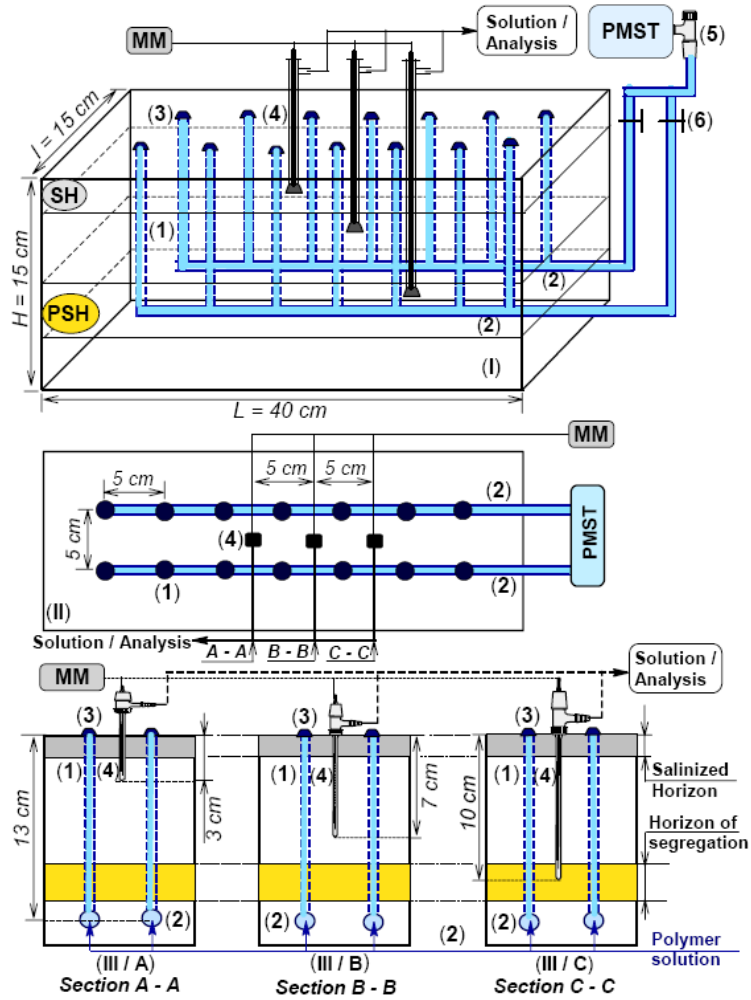

Fig. 1. Schematic diagram of installation – M1-V1 method: application of polymeric materials as aqueous solutions through tubes embedded in the soil distribution. (**I**) overall design and location way in the installation cuvee (Plexiglas, 40x15x15 cm) of distribution and alimentation tubes with polymer solution and of monitoring devices; in figure are guide the salinized horizon (SH) and the horizon of pedo-geochemical segregation (PSH). (**II**) the horizontally plane projection of the installation from figure (I) with details about the location of parts. (**III / A–C**) vertical planes projected by A–A, B–B and C–C transversal sections on installation cuvee (marked in figure II) with details about the location of parts. 1– distribution tubes in soil of polymer solution (poly-propylene, Φ = 3 mm, h = 14 mm, perforation cu Φ = 1 mm la 1 mm each of other); 2– alimentation tube with polymer solution (poly-propylene, Φ = 4 mm); 3– shutter; 4–monitoring devices (electrochemical sensors, temperature sensors and device for collecting solutions for analysis); 5– flashboard; 6– tap; MM–multi-meter (pH, redox potential, electric conductivity, ion-meter); PMST– polymeric material solution tank.

The analysis of data from literature has evidenced several problems regarding the applicability of these studies in practice: (**i**) different proposed procedures for the treating of soils with polymeric materials have reduced

application areas, these is based on data obtained on a particularly number of cases; (**ii**) the recommendations about the methodologies of polymeric materials application have, many times, only guide character; (**iii**) some between experimental variants cannot be reproduced, the non-reproducibility of these methodology are often altered and the overall achievement of undesirable effects; (**iv**) some types of polymeric materials, recommended in different studies, have not the necessary specifications about the environmental effects in the conditions of they utilization for soils treatment; (**v**) is not a coherent observations systems on medium to long term, or unitary data respectively, about the applicability and limits of technological improvement and conditioning with polymeric materials of soils from protected areas (glass houses and solariums).

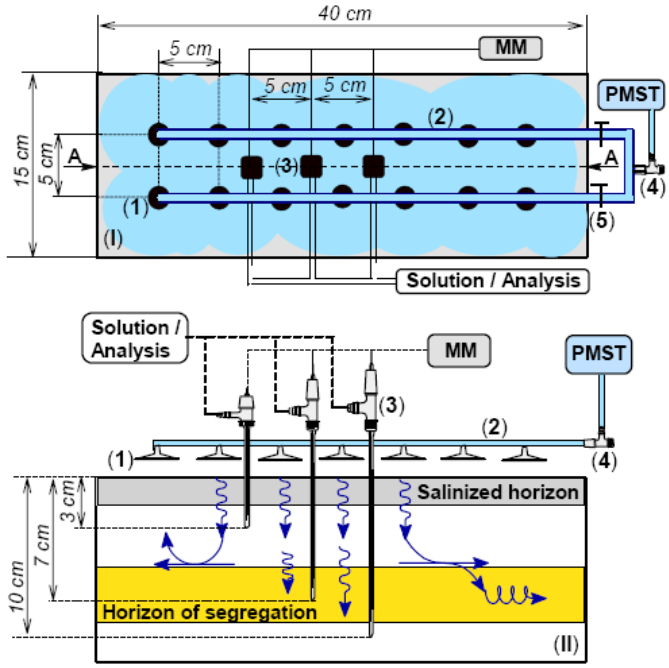

Fig. 2. Schematic diagram of installation – variant II: application of polymeric materials as aqueous solutions through dispersion nozzles (M2-V1 method). (**I**) horizontally plane projection of the installation– is presented the location way in the installation cuvee (Plexiglas, 40x15x15 cm) of dispersion nozzles, of alimentation tubes with polymer solution and of monitoring devices; in figure is marked the relative limit of wetting front. (**II**) longitudinal section on A–A transversal plane on installation cuvee – is presented the location way in installation of parts, the relative limits of salinization and pedo-geochemical segregation horizons, direction of movement of polymer solutions in soil (figured by arrows).

The studies performed by as, by experimental modelling in laboratory conditions, have follow to establish the optimum technological and economical conditions for two application variants of some polymeric materials to improve and conditioning of soils in protected areas cultivated with vegetables. Have been

follow both the overall effects on the physic-chemical characteristics and agrochemical quality of soils, and the differential effects on the main degradation of soils from protected areas, and the residual effects of polymeric materials on medium term, respectively (Bulgariu et al., 2009, Filipov et al., 2008). In this study are presented several general recommendations about the practical applicability of tested methods is function of treated soils type and nature of utilized polymeric materials.

MATERIAL AND METHOD

Have been tested, by experimental modelling in laboratory conditions, two variants of polymeric materials application for to establish the optimum technological and economical conditions for conditioning and improve of soils from protected areas. The schematic representation of testes installations are presented in figures 1 and 2. The experimental strategy and several technical and methodological details have been presented in several previous studies (Bulgariu et al., 2009, Filipov et al., 2008).

Table 1

The applicability and the limits of M1-V1 method.

Administration
Application of polymeric materials in the form of aqueous solutions through distribution tubes embedded in the soil. Tested doses[(1)]: (10–50) mL / Kg soil. Concentration of polymeric material solution[(1)]: 0,1 – 0,5 %
Advantages
Efficient for the prevention (non-degraded soils) and retro-gradation (degraded soils) of pedo-geochemical segregation processes in median horizons and of salinization processes of superior horizons. Relative uniform distribution of polymeric materials in soil horizons; the medium local concentration of polymer in soil mass not interfere with the root system and plant development. Very good favourable effects (fast and intense) for all profile, of physic-chemical characteristics and of agrochemical quality of soils*. Differential effects on degradation processes of soils (dependent by the soil characteristics and type of polymeric material)[2)]. Acceptable consume of polymeric materials.
Disadvantages
Relatively high cost of polymeric materials and equipment buying, implementation and maintenance of the installation process. Relatively rapid wear of the installation. Can be favourite the manifestation of some residual effects with unwanted influence on soil productivity and quality of vegetables produced in particular [(3)].
Effects – salinization processes[(4)]
■ Inhibition (non-degraded soils): AM-MMA > PEG-4000 > AM-VA > PEG-2000 ■ Retro-gradation (degraded soils): AM-VA > PEG-2000 > PEG-4000 > AM-MMA
Effects – pedo-geochemical segregation processes
■ Inhibition (non-degraded soils): PEG-4000 ≅ AM-VA > AM-MMA > PEG-2000 ■ Retro-gradation (degraded soils): AM-VA ≅ PEG-4000 > PEG-2000 > AM-MMA

[(1)]Optimal average values for the obtaining of some favourable effects. [(2)]Physic-chemical characteristics of polymer solutions (concentration, composition, pH, redox potential) and / or application conditions (administrated quantity, flow, etc.). [(3)]The effect produced by intermediary decomposition products of polymeric materials in soils – chemical compounds with toxic potential and / or with destabilizing effect on biological and mineral systems from soils. [(4)]Effects of polymeric materials are manifested differently in function of nature and concentration of cations and anions (salinization type). *Permeability, soil reaction, ionic exchange and buffering capacity, biodisponibility of nutritive elements, etc. PEG-2000 and PEG-4000: polyethylene

glycol with 2000 and 4000 respectively, molecular mass. AM-VA: vinyl-maleate co-polymer (hydrophobic). AM-MMA: metacrilate-maleate co-polymer (hydrophilic).

Have been studied the effects of four types of polymers (polyethylene glycol with molecular mass 2000 and 4000, vinyl-maleate co-polymer and methacrilate-maleate co-polymer) produced on the quality of three types of soils: (i) soils with an advanced degradation degree, cultivated according with traditional technologies - Copou Glass house Iaşi, (ii) non-degraded soils, cultivated according with ecological technologies – Bacău Glass house; (iii) non-degraded soils, cultivated according with traditional technologies – Bârlad Glass house.

The tests have been performed during of 18–26 months interval (2007–2010) in two steps: (**i**) first step – were followed, both the global effects on the physic-chemical characteristics and agrochemical quality, and the differential effects on the main degradation processes of soils in protected areas; the step was considered completed when global interaction processes between polymeric materials and soil components attain the stationary state (in polymeric material – soil no changes occur in time of physic-chemical parameters, experimental monitories); (**ii**) second step – it was followed the dynamic of residual effects; the step start when the polymeric material – soil systems attains the stationary state, according with existent data (Bulgariu et al., 2009, Filipov et al., 2008, Hamilton, 1996, Sojka, 2008), this moment coincides with the initiation of soil residual effects of polymeric materials.

RESULTS AND DISCUSSIONS

A synthesis of experimental data obtained by as, regarding the two methods of conditioning and improvement with polymeric materials of soils from protected areas is presented in tables 2 and 3.

Table 2

The applicability and the limits of M2-V1 method

Administration
Application of polymeric materials in form of aqueous dispersion surface through nozzles. Tested doses(1): (40–80) mL / Kg soil. Concentration of polymeric material solution(1): 0,1 – 0,5 %
Advantages
Efficient for the prevention (non-degraded soils) and retro-gradation (degraded soils) of salinization processes of superior horizons. Reduced effects on pedo-geochemical segregation processes in median horizons. Very good favourable effects (fast and intense) on physic-chemical characteristics and of agrochemical quality of soils from superior horizons and more reduced effects on inferior horizons#. Differential effects on degradation processes of soils (dependent by the soil characteristics and type of polymeric material)2). Limit (inhibition or retardation) the intensity and extinction of residual effects(3).
Disadvantages
Reduced efficiency for prevention / retro-gradation of pedo-geochemical segregation processes. No notable beneficial effects on soils in the inferior horizons#. Relatively high cost of polymeric materials and equipment buying, implementation and maintenance of the installation process (in comparison with M1-V1 method). Uneven distribution of polymeric materials in soil horizons; is possible local accumulation of polymeric materials in soil mass, in concentrations can disrupt activity of the root and plant development.
Effects – salinization processes (6)
■ Inhibition (non-degraded soils): AM-MMA > AM-VA ≅ PEG-4000 > PEG-2000 ■ Retro-gradation (degraded soils): AM-MMA > AM-VA > PEG-4000 > PEG-2000

Effects – pedo-geochemical segregation processes	
■ Inhibition (non-degraded soils):	AM-MMA ≅ PEG-4000 > PEG-2000 > AM-VA
■ Retro-gradation (degraded soils):	PEG-2000 ≅ AM-VA > PEG-4000 > AM-MMA

[#]Superior horizons – situated above; inferior horizons – situated below to the pedo-geochemical segregation horizon (median, frangipane, possible). Other data – see table 1.

CONCLUSIONS

From global effects produced on soils quality and of application costs point of view, the M1–V1 method seems more appropriate to treat soils in protected areas. But, this method has a reduced selectivity towards the salinization and pedo-geochemical processes, sometimes antagonistic effects on nutritive elements bioavailability and may promote the manifestation of some residual effects with undue influence on soil productivity and quality of cultivated vegetables. The M2-V1 method, even is less efficient from global effects produced on soil quality and application cost point of view, has better selectivity and efficiency in the prevention and retro-gradation of salinization processes (generally, degradation of superior horizons).

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CONSIDERATIONS ABOUT ACHIEVING GRAPHIC CADASTRAL DOCUMENTATION FOR THE ADMINISTRATIV TERRITORY OF CUCUTENI VILLAGE, IASI COUNTY

CONSIDERAȚII PRIVIND REALIZAREA DOCUMENTAȚIEI CADASTRALE GRAFICE PENTRU TERITORIUL ADMINISTRATIV AL COMUNEI CUCUTENI, JUDEȚUL IAŞI

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Abstract. *The paper presents a model for achieving basic cadastral plans, separately for residential and unincorporated area, and also as a whole for the overall administrative territory of Cucuteni village from Iaşi County. The graphic and alphanumeric data which led to the cadastral plans have been acquired from the existing Topo-Cadastral documentation identified in the archives of specialized institutions for the specified area. By scanning and digitizing the documents referred above, there were obtained the cadastral plans in digital format.*

Key words: cadastre, basic and general cadastral plan

Rezumat. *În lucrare se prezintă un model de realizare a planurilor cadastrale de bază, separat pentru intravilan şi extravilan, şi de ansamblu pentru teritoriul administrativ al comunei Cucuteni, județul Iaşi.Informațiile grafice şi alfanumerice care au stat la elaborarea planurilor s-au procurat din documentațiile topo-cadastrale existente pentru zona de lucru, identificate în arhivele instituțiilor de specialitate. Prin scanarea, digitizarea şi georeferențierea documentațiilor menționate s-au obținut planurile cadastrale în format numeric.*

Cuvinte cheie: cadastru general, plan cadastral de bază şi de ansamblu.

INTRODUCTION

The general cadastre represents an unitary and mandatory system for technical, economical and juridical evidence of land and buildings within the entire territory of our country (Tămâioagă Gh., Tămâioagă D, 2005). This activity is organized at the level of each rural, urban and municipal administrative territory. In order to execute the cadastral work, several specific working stages have to be carried out in the field and at the office. The final products of cadastral works are represented by the cadastral registers and plans, tabular and graphical documents that rest at the basis of the realization of land registration system by means of the Land Registry Lodging Book. Cadastral registers are tabular technical documents that summarize the entire alphanumeric information of cadastral content, obtained in the stages of both cadastral work types: on the field and at the office. Cadastral plans are scaled graphical plots of the details, limited to the specific needs of the

cadastre. The cadastral plans are of two types: basic and general. The basic ones are drawn up into plan sections (geodesic trapeziums) and have the scale selected in dependence on the area of the administrative territory (residential and unincorporated area), land topography, density of details (N. Boş, 2003). The general cadastral plans are obtained by generalizing the content of the basic plans and are drawn up in order to plot the entire area of the administrative territory on a single or up to four plan sheets. Due to various reasons, the general cadastral work in our country is still in incipiency state. The technical norms are not sufficiently well structured and do not meet all the requirements in order to achieve a unitary system of the country cadastre. The lack of a completed general cadastral work suggests also the need for formal templates and examples that might lead to the elaboration of some strategies and norms with more permanent characteristics. This paper presents a model for achieving general and basic cadastral plans for an administrative territory based on the graphical data information provided by the existing cartographic products in the archives of specialized institutions.

MATERIAL AND METHOD

The studies and researches have been performed for a rural administrative territory in the county of Iasi, namely Cucuteni Village.

The administrative territory is located in the west-central part of the county, having an area of approximately 2800 ha, a population of 1368 inhabitants spread up in four built-up villages, namely Cucuteni, Băiceni, Bărbăteşti and Săcăreşti. Drawn up in the frame of cadastral land works during 1980s, the cadastral plan, at scale of 1:10000, and the cadastral plans of the built-up villages, at scale 1:2000, were used as data sources in order to achieve the general and basic cadastral plans of Cucuteni Village. All of these information were digitized and georeferenced by means of Auto Desk Software. The cadastral plans in digital format were classified into information layers containing all the graphic data and attribute type with cadastral content. The general cadastral plan was elaborated on a single plan sheet at the scale 1:10000, and the basic cadastral plans were drawn up at the scale 1: 2000 in case of unicorporated area (Cucuteni village being located in a hilly area) and the scale 1:1000 in case of residential area (***, 1999). The number, arrangement and nomenclature of cadastral map sheets of the basic plans were established by means of the classical classification schemes for the administrative territory respectively, on plan sheets at scales of 1:5000 and 1:2000 for the unincorporated area, (fig. 1), and 1:2000 and 1:1000, in the case of residential area – at which as a case study was considered the Bărbăteşti Village only (fig. 2) (Moca V, 2009). It has been then established that the entire Cucuteni village territory can be fit into 12 geodetic trapeziums at the scale of 1:5000 and 35 trapeziums at the scale of 1:2000, while the Bărbăteşti village territory could be fit into 3 geodetic trapeziums at the scale of 1:2000 and 5 trapeziums at the scale of 1:1000.

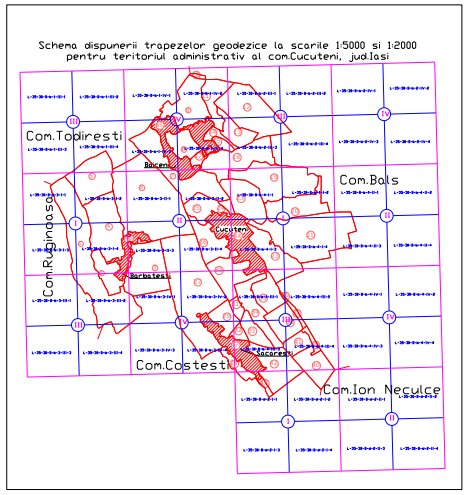

Fig. 1. Scheme of geodesic-trapeziums arrangement at the scales of 1:5000 and 1:2000 for the administrative territory of Cucuteni Village, Iaşi County

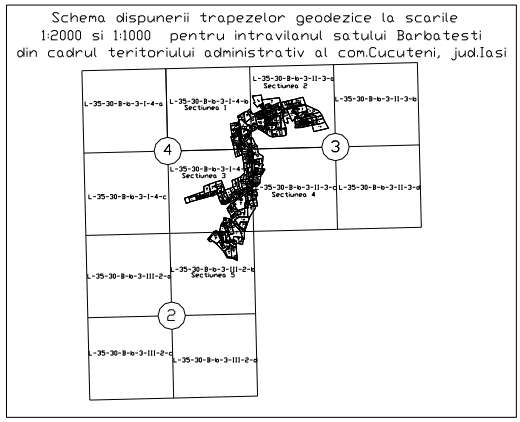

Fig. 2. Scheme of geodesic-trapeziums arrangement at the scales of 1:2000 and 1:1000 for the unincorporated area of Bărbăteşti Village

RESULTS AND DISCUSSIONS

For the general cadastral plan shown in fig. 3, as elements of mandatory content were retained the followings: the limit of the administrative territory together with its bordering points and neighbors, the limits of residential areas

with their names, cadastral sector and numbers, roads, drainage networks, the utilization category for the big area land parcels, grid, toponymy, scale, name, etc.

The plan section no 12, as one of the basic cadastral plans for the unincorporated area of Cucuteni Village, is shown as an example in fig. 4. The graphical and alphanumeric basic information is represented by the topographical plans developed according to the technical standards established by the National Agency of Cadastre and Land Registration. Thus, from the topographical plans, which represent in the opinion of authors, the core basic element for achieving the cadastral general works in the unincorporated area of an administrative territories, were extracted the limits of the cadastral sectors and of the properties and their afferent plot components, classes of use, linear details etc.

For the preparation of the basic cadastral plans corresponding to rural residential areas (fig. 5), there were taken into account the old cadastral plan and the Land Registry Lodging Book documentations and were emphasized the limits of the territorial cadastral units, permanent buildings etc. The cadastral numbering was performed according to the current technical standards and the categories of use for land plots were pinpointed by means of the symbols established by the present codes.

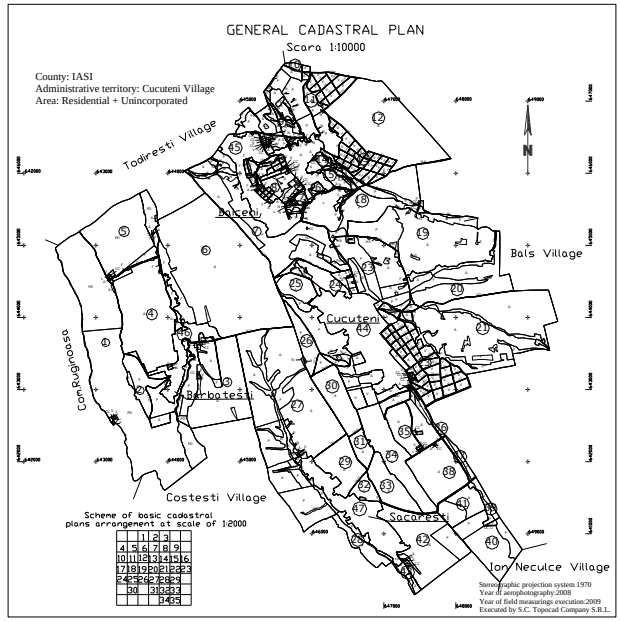

Fig. 3. General cadastral plan of Cucuteni Village

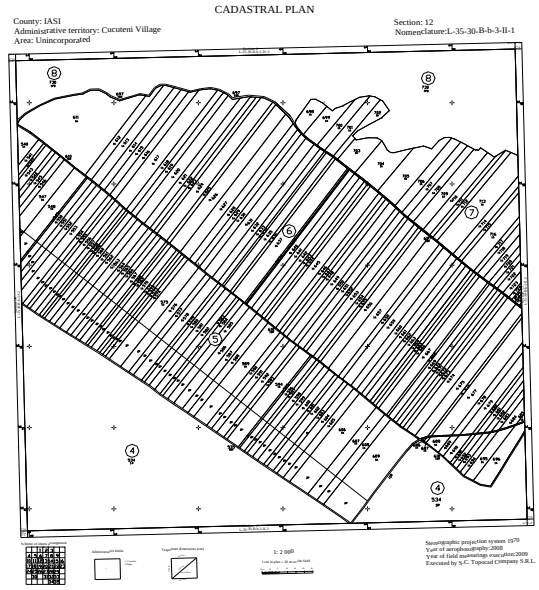

Fig. 4. Basic cadastral plan of unincorporated area - plan section no. 12

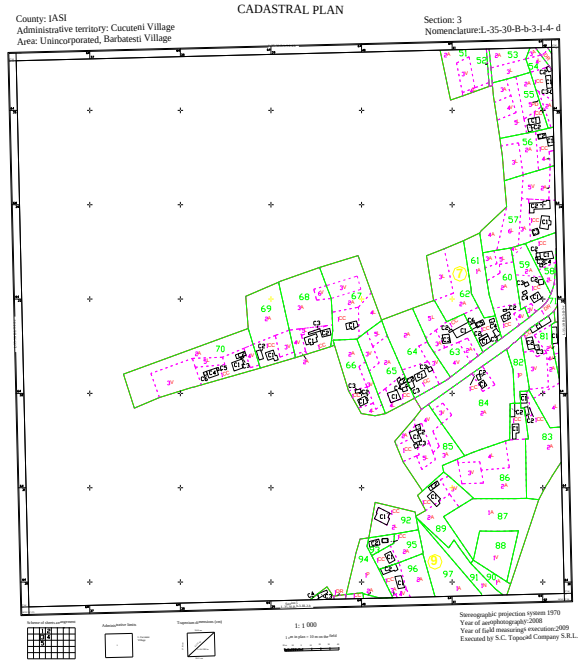

Fig. 5. Basic cadastral plan of Bărbăteşti village - plan section no. 3

CONCLUSIONS

1. In order to elaborate the cadastral plans of the territorial administrative units, there is the urgent need to update the standards and methodologies for these cartographic products, in relation to the specifications of the informational layers for the numerical plans, type and height of writing characters and cadastral symbols, content of the non-cadastral elements of the plans, etc.

2. The scales of the basic cadastral plans in the unincorporated area have to be selected as function of the topography plans. For numerous cadastral sectors (e.g. farmland), the selection of an inappropriate scale leads to worthless basic cadastral plans in those areas due to the fact that those properties have a very particular shape (given by the application of Land Law No. 18/1991), and thus they are very narrow and hard to represent.

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THE INFLUENCE OF THE FARM EQUIPMENT FOR MANAGEMENT OF HIGH DENSITY APPLE ORCHARDS ON SOME SOIL PHYSICAL PROPERTIES

INFLUENȚA SISTEMEI DE MAŞINI PENTRU ÎNTREȚINEREA PLANTAȚIILOR INTENSIVE DE MĂR ASUPRA UNOR PROPRIETĂȚI FIZICE ALE SOLULUI

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Abstract. *The investigations were carried out in an orchard established in 1984 situated on a hillside with a 6 -12% slope. The experimental factors were: A Factor - the soil type, with 3 graduations; B Factor - the soil management system between tree rows, with 2 graduations, and C Factor, technological traffic between the tree rows with 4 graduations. On the eutricombosol with colluvic character (ECC) and slight eroded eutricombosol (SEE) versus typical eutricombosol (TE) on the 4 analyzed soil depths, bulk density (BD) was significantly higher by 3.8-8.8%, resistance of penetration (RP) by 165-241% and hydraulic saturated conductivity (K_{sat}) lower, by 30-144%. Maintaining the soil between the rows cultivated versus its maintaining with mowed sod strips, on the 4 investigated soil depths, determined a significant increase of BD by 6.5 to 10.2% of RR by 34-67% and a significant decreasing of K_{sat}, values by 22-37%.*

Key words: soil compaction, technological traffic, soil physical properties.

Rezumat. *Cercetările s-au efectuat în anul 2004, într-o plantație înființată în 1984, situată pe un versant cu o pantă de 10-12%. S-au experimentat factorii: Factorul A – Solul, cu 3 graduări; Factorul B – întreținerea solului între rânduri, cu 2 graduări, Factorul C –traficul tehnologic dintre rândurile de pomi, cu 4 graduări. Pe solul brun coluvial şi brun slab erodat, față de solul brun tipic pe cele patru adâncimi de sol cercetate, densitatea aparentă (DA) a fost semnificativ mai mare cu 3,8-8,8% rezistența la penetrare (RP) cu 165-241%), iar conductivitatea hidraulică saturată (K_{sat}) cu 30-144% mai redusă. Întreținerea solului pe intervalul dintre rândurile de pomi ca ogor negru față de întreținerea acestuia cu benzi înierbate, pe cele 4 adâncimi cercetate, a determinat o creştere semnificativă a DA cu 6,5% până la 10,2%, a valorilor RP cu 34-67% şi o scădere semnificativă a valorilor K_{sat} cu 22-37%.*

Cuvinte cheie: compactarea solului, trafic tehnologic, proprietăți fizice ale solului.

INTRODUCTION

The practice of an intense technological traffic in high density apple orchards, required for their operation, in time lead to a deterioration of physical soil properties (Gras, 1965; Hogue and Nielsen, 1987, Iancu, 2000, 2001, Miller et al, 1962, Raghaven et al, 1976). This has negative repercussions both on soil fertility and the behavior of trees. The purpose of present work was to bring some contributions to increasing knowledge about influence of technological traffic on some physical soil properties, depending on the nature of soil and its maintenance system for a relatively long period of time (20 years). Thus, in 2005 at the Institute for Fruit Growing Pitesti - Maracineni some studies were carried out.

MATERIAL AND METHOD

The investigations were carried out in a high density apple orchard, situated on a hillside with a length of line on the greatest slope of 200 m and a slope of 6-12% in lower and middle third of the hillside. The trees were planted at 3.6 m between rows and 1.5 m between trees on the row. It was organized the following experimental scheme:

Factor A - soil type, with the following graduations: a_1 = eutricombosol with colluvic character (ECC), a_2 = slightly eroded eutricombosol (SEE) a_3 = typical eutricombosol (TE). Factor B – soil management system between tree rows b_1 = cultivated performed by a fall plowing to 12-14 cm and repeated disking during the vegetation period, b_2 = 2.4 – 2.6 m, wide, mowed sod strips performed by sowing of *Lolium perenne*. Factor C - technological traffic zone between the trees rows: c_1 = weakly compacted zone situated over the trees rows axis; c_2 = strongly compacted zone situated on the wheel trace located in the lower part of the interval between two tree rows; c_3 = medium compacted zone situated in the middle interval between two tree rows; c_4 = strongly compacted zone situated on the wheel trace located in the upper part of the interval between two tree rows.

RESULTS AND DISCUSSIONS

A. Influence of experimental factors on some physical soil properties (average values of the experimental factors graduations)

On average for the experimental factors B and C, in the four soil depths studied, on ECC and SEE, compared with TE, bulk density values (BD) were significantly higher by 3.8% up to 8.8%, the resistance to penetration (RP) by 165-241% and the saturated hydraulic conductivity *(*K_{sat}) by 30 to 144% lower. On average on three soil types and the four compaction zones, maintenance of cultivated soil versus its maintenance as sod strips, on the 4 soil depths investigated, determined a significant increase of BD by 6.5% to 10.2%, of RP values by 34-67% and a significant reducing pf K_{SAT} values by 22-37%. On average on the experimental factors A and B, compared to the weakly compacted zone (c_1), on the other three zones of compaction (c_2, c_3, c_4) within the four soil depths investigated, average value of BD was significantly higher by 8.8% to 13.7%, average value of RP by 65-127%, and average value of K_{SAT} significantly lower by 36-232%). On the three zones of compaction of the interval between of tree rows (c_2, c_3, c_4), the values BD, RP and K_{sat} not have differed significantly from any of the four depths studied. Linked to this last point, however, values deserves to be noted that in the upper soil profile (5-10 cm depth) there was a tendency of increasing in BD and RP and the decreasing of K_{sat} values in densely compacted zones (c_2 and c_4), compared to the medium compacted zone (c_3). It is worth also to indicate that, compared to the weakly compacted zone (c_1), on the other 3 zones of compaction (c_2, c_3, c_4), on the depth of 5-10 cm, the values of physical properties analyzed were more clearly differentiated from the other three soil depths investigated (table 1).

B. The influence of the farm equipment for management of high density apple orchard planted on the three soil types

In the management system with mowed sod strip, compared to maintaining it cultivated, there was a better soil physical condition in almost all the situations considered related to soil type and depths investigated. This better physical condition

was characterized by significantly lower levels of BD and RP and significantly higher values of K_{SAT}.

Table 1

The influence of the farm equipment for management of high density apple orchards on some soil physical properties

Soil depth (cm)	Physical property	A factor graduations				B factor graduation			C factor graduation				
		a_1	a_2	a_3	LSD 5%	b_1	b_2	LSD 5%	c_1	c_2	c_3	C_4	LSD 5%
5-10	1	1.36	11.36	1.31	0.019	1.41	1.28	0.04	1.22	1.40	136	1.40	0.041
	2	19.7	20.8	26.3	6.2	19.1	25.5	6.4	41.3	12.3	17.9	17.6	60
	3	89.6	114.2	36.5	22.1	1002	60.0	19.0	41.1	76.8	105.8	96.8	216
15-20	1	1.38	1.38	1.38	NS	1.42	1.33	0.043	129	143	1.41	1.37	0.045
	2	17.0	16.5	27.4	9.5	18.2	22.4	NS	24.8	24.0	17.6	14.8	NS
	3	78.3	104.9	34.5	35.8	84.5	56.6	16,9	43.4	84.0	830	71.8	29.9
35-40	1	1.42	141	1.36	0.045	1.45	1.34	0.041	1.30	1.42	1.45	1.43	0.04
	2	10.8	11.0	26.6	3.2	13.6	18.6	5.0	23.1	16,4	16.6	8.3	61
	3	87.4	119.9	30.4	37.5	94.1	64.4	17.8	48.9	72.2	94.0	101.8	225
55-60	1	1.46	1.46	1.36	0.0057	1.47	1.38	0.031	1.30	1.48	1.47	1.44	0.045
	2	8.9	9.3	21.1	10.2	12.4	13.8	NS	26.9	9.8	88	5.7	9.4
	3	76.6	116.2	30.1	12.4	85.0	63.5	17.5	49.9	65.2	79.5	1.025	18.8

Physical properties: 1 = bulk density (g / cm^3) 2 = saturated hydraulic conductivity (mm / h), resistance to penetration (kgf/cm^2), The significance of experimental factors graduations is presented in the chapter "Material and Method"; NS = nonsignificant at 5% significance threshold.

Differentiation between the two maintenance systems in terms of BD and RP values was more evident on TE (a_3) versus ECC (a_1) and SEE (a_2). In case of BD this difference was almost similar in all 4 depths investigated, while in case of PP and K_{sat} it was more obvious on the depths of 35-40 cm and 55-60 cm, compared to 5-10 cm and 15-20 cm depths. Also, this difference was more evident for RP versus BD and K_{sat}, on the first two depths, and for K_{sat} versus to BD and RP on depths located deeper (table 2).

C. The influence of technological traffic on two soil management systems on some physical soil properties (interaction of experimental factors B /C)

On average on the three soil types and the four depths studied, compared to the weakly compacted zone located on the trees row axis (c_1), on average for the three zones of compaction of the interval between trees rows (C_2, C_3, C_4), in case of cultivated soil, BD was higher by 12.3%, RP by 88% and K_{sat} values were reduced by 42%. In case of the sod srips system, the BD was higher by 12.7%, RP by 88% and K_{sat} value was reduced by 72%. In the same conditions, between the three compaction zones of the interval between trees rows generally there were not significant differences on any of the two soil management systems. On average on the three soil types and the four compaction zones, compared to 5-10 cm depth, on the other 3 depths, in case of cultivated soil system, the BD was higher from 0.7 to 4.3%, and K_{sat} value lower by 4-35% and PR lower by 6-16%. In the same conditions, in case of soil maintenance system as mowed sod strips, BD value was higher by 4.7 to 8.7%, RP by 6-7%(only on 35-40 and 50-60 cm depths), and K_{sat} values were reduced by 12-46%.

Table 2

The influence of management system on three soil types on some of their physical properties (interaction of experimental factors A / B)

Soil depth (cm)	Physical property	Interaction of experimental factors A / B							
		a_1		a_2		a_3		LSD 5%	
		b_1	b_2	b_1	b_2	b_1	b_2	c	d
5-10	1	1.41	1.31	1.42	1.30	1.38	1.23	0.07	0.03
	2	15.1	24.4	18.2	23.3	23.9	28.8	8.03	8.73
	3	116.8	62.4	136.8	91.8	49.2	25.9	32.9	31.3
15-20	1	1.38	1.38	1.45	1.34	1.46	1.29	0.08	0.09
	2	16.2	17.9	18.0	15.0	20.3	34.4	NS	13.4
	3	85.9	58.6	121.8	88.0	45.8	23.2	29.2	50.7
35-40	1	1.47	1.37	1.45	1.37	1.43	1.29	0.07	0.06
	2	5.0	16.5	6.0	15.9	29.7	23.4	8.6	4.5
	3	97.4	77.4	140.6	99.2	44.2	16.6	30.7	53.0
55-60	1	1.50	1.42	1.48	1.44	1.44	1.28	0.05	0.08
	2	4.7	13.2	5.8	12.9	26.8	15.5	NS	14.4
	3	75.1	78.0	138.9	93.6	48.9	19.4	30.3	17.5

Physical property: 1 = bulk density (g / cm^2) 2 = saturated hydraulic conductivity (mm / h), resistance to penetration (kg.f/cm^2), LSD 5%: C = Constant a, b Variable, d = constant b, a variable, NS =nonsignificant at 5% significance threshold.

Table 3

Influence of technological traffic on two management systems on three soil types on some of their physical properties (interaction of experimental factors A /B)

Soil depth	Physical property	Interaction of experimental factors A / B									
		b1				b2				LSD 5%	
		d	c_2	c_3	c_4	d	c_2	c_3	c_4	e	f
5-10	1	1.28	1.44	1.45	1.45	1.17	1.35	1.28	1.28	0.06	0.08
	2	34.5	12.1	17.0	12.6	48.1	12.5	18.7	22.6	8.4	9.3
	3	45.6	79.3	156.9	119.2	36.6	74.2	54.8	74.5	30.4	38.0
15-20	1	1.30	1.47	1.48	1.44	1.28	1.40	1.35	1.30	0.06	0.09
	2	34.2	15.6	11.3	11.7	15.4	32.4	23.9	12.0	14.7	20.1
	3	45.0	94.2	108.5	90.3	41.8	73.8	57.5	53.5	43.3	33.7
35-40	1	1.39	1.42	1.52	1.47	1.21	1.41	1.37	1.39	0.06	0.08
	2	22.5	18.1	8.2	5.6	23.8	14.8	24.9	11.0	8.7	10.0
	3	63.8	66.2	125.9	120.4	34.0	78.2	62.2	83.2	31.8	35.5
55-60	1	1.37	1.52	1.51	1.48	1.22	1.44	1.43	1.41	0.06	0.06
	2	24.0	8.7	10.9	6.1	29.8	11.0	9.3	5.3	10.0	13.7
	3	64.7	69.8	86.4	119.0	35.1	60.8	72.7	86.1	26.5	35.0

Physical properties: 1 = bulk density (g / cm) 2 = saturated hydraulic conductivity (mm / h), resistance to penetration (kgf/cm2), DL 5%: e = constant b, c variable, f = constant c, b variable, NS =nonsignificant at 5% significance threshold.

On average on the three soil types and the four depths studied, compared with sod strips, in the case of cultivated soil, on the weakly compacted zone (c_1), BD value was significantly higher by 9.8%, RP by 48.5%, and K_{SAT} lower by 2%. Under same conditions, on average of the three compaction zones fron the interval between trees

rows (c_2, c_3, c_4), BD values were higher by 7.3%, RP values by 48.6% and the K_{SAT} values were smaller by 48% (table 3).

D. The influence of experimental factors on the nature and intensity of correlations between soil physical properties studied

Of the three soils studied, higher number of significant correlations was reported for the SEE, followed by ECC, and on the last place was TE. The two soil management systems recorded the same number of significant correlations, but the correlation coefficient values were much higher especially on the depths of 5-10 cm and 15-20 cm on the cultivated soil, versus it maintenance as mowed sod strips.

Analyzing the depth distribution of the number of significant correlations we see that it was almost like on the four depths studied, manifesting however a slight tendency to increase in depth. Highest number of significant correlations (64%) was recorded in the relationship between BD and RP, followed by the BD and K_{SAT} (62%) and on the last place was the number of significant correlations between K_{SAT} and RP (43%, table 4).

Table 4

Influence of experimental factors on the nature and intensity of correlations between the studied soil physical properties

Gradations of experimental factors	Soil depth (cm)											
	5-10			15-20			35-40			55-60		
	correlations calculated*)											
	1	2	3	1	2	3	1	2	3	1	2	3
a_1	0.64***	0.79***	0.62***	0.47**	0.55**	NS	0.65***	0.74***	0.36*	0.59***	0.42*	NS
a_2	0.63***	0.58***	0.52**	0.55***	0.68***	0.60***	0.39*	0.37*	0.58***	0.66***	0.59***	0.82***
a_3	NS	0.63***	NS	NS	0.73***	NS	NS	0.75***	NS	NS	0.58***	NS
b_1	0.60***	0.68***	0.66***	0.41**	0.41**	0.71***	NS	0.31*	0.81***	0.47**	0.31*	0.64***
b_2	0.56***	0.56***	0.47***	0.30*	0.53***	NS	0.56***	0.59***	0.34*	0.55***	0.40**	0.63***
a_1b_1	0.80***	NS	NS	0.69**	0.77***	0.52*	0627**	0.57*	0.63**	0.83***	NS	NS
a_1b_2	0.61*	NS	NS	NS	NS	NS	NS	0.78***	NS	NS	NS	NS
a_2b_1	0.62*	NS	NS	0.81***	0.76***	0.89***	NS	NS	0.80***	0.67**	NS	0.57*
a_2b_2	0.70**	NS	NS	NS	0.56*	NS	0.54*	NS	NS	0.76***	NS	0.64**
a_3b_1	NS	NS	NS	NS	0.51*	NS	NS	NS	NS	NS	NS	NS
a_3b_2	NS	NS	NS	NS	0.62*	NS	NS	0.62**	NS	0.50*	NS	NS

*) correlations calculated: 1 = between bulk density and hydraulic conductivity (negative character correlations); 2 = between bulk density and penetration resistance; 3 = between hydraulic conductivity and penetration resistance (negative character correlations); NS =nonsignificant at 5% significance threshold

The data presented in tables 1-3 showed that, as effect of the technological traffic over a period of approximately 20 years in an intensive orchard of apple trees, versus to the weakly compacted zone located on the axis of trees row (c_1), on all three compaction zones located on the interval between tree rows (c_2, c_3, c_4) it was achieved a soil compaction to a depth of 55-60 cm. The soil maintained as mowed sod strips versus of soil maintained cultivated reduced the degree of compaction especially on the soil layers located between 5- 10 cm compared with the deeper soil layers. Primarily this could be explained by the direct influence of herbs, both by their aerial side, but also through their roots. The positive values of physical properties of soil maintained as mowed sod strip were significantly differentiated from those on the soil maintained cultivated even at depths of 55-60 cm. Reducing soil compaction in case of mowed sod strips system compared with cultivated one it was also presented by the other authors (Hogue and Nielsen, 1987). In contrast, this reduction is not consistent with the results presented by Gras (1965), Miller (1962), Iancu (2000).

Between the three physical properties of soil analyzed it is worth to emphasize the greater separation power of experimental factors effects by RP followed by Ksat and on last place is BD.

CONCLUSIONS

1. On ECC and SEE, compared with TE on the four soil depths investigated, bulk density (BD) was significantly greater by 3.8-8.8%, penetration resistance (PR) by 165 - 241% and saturated hydraulic conductivity (Ksat) by 30-144% lower.

2. The maintenance of cultivated soil on interval between trees rows versus its management as mowed sod strips on the 4 depths investigated, resulted in a significant increase of BD by 6.5% to 10.2%, of RP values by 34 - 67% and a significant reduction by Ksat values with 22-37%.

3. In the four soil depths investigated, compared with the weakly compacted zone (C_1), the average of BD on the other three compaction zones (C_2, C_3, C_4) was significantly higher by 8.8 to 13.7%, of RP by 65-127% and K_{sat} value significantly reduced by 36-232%.

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EVOLUTION OF SOIL COMPACTION IN A HIGH DENSITY APPLE ORCHARD UNDER THE INFLUENCE OF SOIL EROSION CONTROL TREATMENTS AND TECHNOLOGICAL TRAFFIC

EVOLUTIA COMPACTĂRII SOLULUI ÎNTR-O PLANTAȚIE INTENSIVĂ DE MĂR SUB INFLUENȚA SISTEMULUI DE AMENAJARE ANTIEROZIONALĂ ŞI A TRAFICULUI TEHNOLOGIC

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Abstract. *The investigations were carried out in an orchard established in 1984 on a hillside with a 6-12 % slope. The following factors were experimented: A Factor - the performing year of determinations, with 2 graduations; B Factor - the soil, with 3 graduations and C Factor - erosion control system with 2 graduations. On average on the three soil types and two soil erosion control systems, in the forth year versus twentieth year after tree planting the used compacted soil indices showed a reducing of soil compaction on the 0-20 cm soil depth. On average on two time periods and three soil types, inside of contour line soil erosion control system versus the alley cropping system (ACS) on the four analyzed soil depths, the compaction indices 1 (CI_1) was significantly higher by 9- 12,7% and the compaction indices 3 (CI_3) by 112-174%.*

Key words: soil erosion control treatments: apple orchard

Rezumat. *Cercetările s-au efectuat într-o plantație înființată în anul 1984 situată pe un versant cu o pantă de 6-12%. S-au experimentat factorii: Factorul A - Perioada de timp de la plantarea pomilor la care s-au efectuat determinările, cu 2 graduări. Factorul B - Solul, cu 3 graduări şi Factorul C - Sistemul de amenajare antierozională cu 2 graduări. În medie pe cele 3 tipuri de sol şi cele 2 sisteme de amenajare antierozională a terenului, în perioada de timp situată la 4 ani față de cea situată la 20 de ani de la plantarea pomilor, indicii intensității de compactare utilizați au arătat o reducere a procesului de compactare în special pe stratul de sol de 0-20 cm. În medie pe cele 2 perioade de timp şi în cadrul sistemului de amenajare antierozională CL față de sistemul STTL, pe cele 4 adâncimi de sol analizate, IC_1 a fost semnificativ mai ridicat cu 9-12,7%, iar IC_3 cu 112-174%.*

Cuvinte cheie: sisteme de amenajare antierozională; livadă de măr

INTRODUCTION

In high density apple orchards located on sloping lands, soil erosion control systems have a great importance in defining the degree of soil compaction. To reduce the intensity of this process, Isac and Iancu (1982) introduced a new tree cropping system by planting the trees in bands separated by technological traffic lanes (the alley cropping system). The study of soil physical properties values within this new tree cropping system has shown its superiority versus the classical tree cropping system on contour line (Iancu, 2001, Iancu et al., 1997). The purpose of this paper was to highlight the differentiation of technological traffic effects on the degree of soil

compaction in two - soil erosion control systems - after a relatively long period of time since trees planting (20 years). In this sense, within the Research Institute for Fruit Growing Pitesti - Maracineni some investigations were conducted.

MATERIAL AND METHOD

The researches were carried out in a high density apple orchard established in 1984 on a hillside with a length of 200 m and a slope of 6-12% in the studied area. It was organized the following experimental scheme: A factor: period (years) after trees planting, with graduations: a1 = 4 (1978), a2 = 20 (2004). Factor B: soil type, with the following graduations: b_1 = eutricombosol with colluvic character (ECC), b2 = slightly eroded eutricombosol (SEE) b3 = typical eutricombosol (TE). Factor C: soil erosion control system, with graduations: c_1 = cropping system with tree rows oriented along the general direction of the contour lines (CL), c_2 = alley cropping system (ACS). In the CL system, the distance between trees rows was 3.6 m and along the row was 1.5 m. For this tree cropping system, technological traffic was done on each interval between 2 tree rows. Within the alley cropping system (ACS) 10.5 m wide tree bands were performed in which the planted trees were separated by 3,6 m alleys designed for the technological traffic. Within tree bands, trees were planted in rows oriented up-down the hill. The rows were 2 m, spaced, while trees were 1.2 m spaced along the row. For both cropping systems the intervals between tree rows were kept sodded. On the tree row direction, along a 0.8 – 1.0 m wide band in case of CL and 0.6 m in case of ACS, the soil was maintained as cultivated through mechanical works in case of CL and only through manual works in case of ACS. Soil samples were taken in 4 replications from zones located on the trees row axis and at mid interval between rows, for both cropping systems. Samples were collected on depths 5-10 cm, 15-20 cm, 35-40 cm, 55-60 cm. It was determined the bulk density (BD), the saturated hydraulic conductivity (Ksat) and resistance to penetration (RP).

RESULTS AND DISCUSSIONS

A. Influence of the period after tree planting and the soil erosion control system on the compaction intensity on three soil types

On average, for experimental factors B and C, in the 4th year after trees planting versus 20th year, compaction index characterized by bulk density (CI_1) was significantly higher by 3.1 to 8.6% in the first two soil depths investigated and significantly reduced by 4.9% in the 55-60 cm depth. In the same conditions, the compaction index characterized by saturated hydraulic conductivity (CI_2) did not significantly differentiate between the two periods after trees planting at any of the four soil depths investigated. Compaction index characterized by resistance to penetration (CI_3), in the 4th year after trees planting, versus 20th year, was significantly higher by 39% only on the first depth studied (5-10 cm). On average, on the experimental factors A and C, on ECC and SEE, versus TE, CI_1 was significantly higher by 5.6 -6.7% only on 35-40 cm depth. In the same conditions, on TE, versus SEE, the CI_2 was significantly higher by 115% in 5-10 cm depth. Instead, on the depth of 35-40 cm, the same index on ECC presented a significantly higher value by 60%, compared to SEE and 70% versus TE. On average, on the same experimental factors A and C, CI_3 did not significantly differentiated on the three soil types on any of the four soil depths studied. On average, on the experimental factors A and B, in

the CL system versus ACS one, in the four soil depths studied, CI_1 was significantly higher by 9-12.7% and CI3 by 112-174%. In the same conditions, the CI_2 significantly differentiated the two soil erosion control systems in the same sense as CI_1 and CI_3, but only on 5-10 cm and 55-60 cm depths (table 1).

Table 1

Evolution of soil compaction intensity in a high density apple orchard under the influence of soil erosion control treatments and technological traffic

Soil depth (cm)	Compaction index (CI)	A factor graduations			B factor graduations				C factor graduations		
		a_1	a_2	LSD 5%	b_1	b_2	b_3	LSD 5%	c_1	c_2	LSD 5%
5-10	1	1.15	1,06	0,05	1,10	1.11	1,11	N.S	1,15	1,06	0,06
	2	1,30	1.42	N S	1,40	0.85	1.82	0 84	0,89	1,91	0,70
	3	2,11	1.52	0,28	2.22	1,63	1.59	N.S	2,61	1,01	0,67
15-20	1	1.05	- 02	0,02	1.03	1.04	1,02	N.S	1.08	0,98	0,04
	2	1,58	2 88	N.S	2,72	1.18	2,78	N.S	2,14	2,32	NS
	3	1,47	1,49	N S	1,73	1,26	1,46	N S	2,10	0,86	0,52
35-40	1	1,00	1,05	N S	1,05	1,04	0,98	0.06	1 08	0,96	0,05
	2	1,02	1.11	N.S	1,44	0,85	0,90	0 39	1.03	1,09	NS
	3	1,20	1,56	N.S	1,56	1,25	1,31	N S	1.87	0,88	0,40
55-60	1	1,01	1.06	0,04	1,04	1.06	1,02	N.S	1,10	0,98	0,05
	2	4,66	2.00	N.S	3,28	2 07	4,63	N S	2,24	4, 42	2,17
	3	1,16	1.72	N S	1,89	1.18	1.25	N S	2.11	0.77	0,80

Compaction index (CI) = ratio of medium compacted zone located in mid-interval between trees rows and weakly compacted zone situated on the tree row axis for**:** CI_1 = bulk density; CI_2 = hydraulic conductivity; CI_3 = resistance to penetration**.** The significance for graduations of experimental factors A, B, C was presented in the text at chapter "Material and Method"; NS = nonsignificant at 5% significance threshold.

B. Influence of the erosion control system on soil compaction intensity during the investigation periods (interaction of experimental factors A, C)

At 4 years from trees planting (a_1), in case of CL system, versus ACS, on the four soil depths investigated, CI1 recorded significantly higher values by 2-13% and at 20 years from trees planting (a_2) by 7-22%. In the same conditions, the CI2 was significantly higher by 40-219% and 97-356% respectively. A significant difference, but only at 5-10 cm depth, in the same sense as in CI3, was also recorded in the case of CI2. In case of the same interaction of experimental factors A, C, it is interesting to follow the compaction index values for each of two soil erosion control systems (CL and ACS) at the two moments of making observations (a_1 and a_2). Thus, for CL system, in situation a_2 versus a_1, CI_1 values have increased by 11-14% within first two depths and decreased by 5-10% for 35-40 and 55-60 cm depths. Instead, for ACS system, in situation a_2 versus a_1, the CI_1 value decreased by 1-6%. A more obvious difference between the two moments of determinations, for each soil erosion control

system was recorded in case of CI3, both in terms of its values and the distribution of these values on the four depths (Table 2).

Table 2

Influence of the erosion control system on the soil compaction during the two to investigation periods

Soil depth (cm)	Compaction index (CI)	*a1*		*a₂*		LSD %	
		c_1	c_2	c_1	c_2	e	f
5-10	1	1,02	1,00	1,17	0,96	0,07	0,05
	2	0 83	1,76	0,79	2,06	1,00	N.S
	3	3,21	1,00	2,01	1.02	0,95	0,40
15-20	1	1,03	0,96	1,14	0.96	0,07	N.S
	2	0,99	2,18	3,30	2,45	N.S	N.S
	3	2,06	0,88	2,14	0,85	0,73	N.S
35-40	1	1,11	0,99	1,06	0,97	0,06	0,03
	2	0,85	1,18	1,21	1,00	N.S	N.S
	3	1,4	1,00	2,34	0,76	0,57	0.65
55-60	1	1,21	1,09	1.10	1,02	0,08	0.07
	2	3,57	5 74	0.90	3,10	N.S	N S
	3	1,39	0,92	2,82	0,62	1,03	1,10

Compaction index CI 1, CI 2, CI 3 the same significance like in table 1; LSD = 5%; e = constant a, c different, f = constant c, a different. The significance of graduations of a_1, a_2, c_1, c_2 was presented in the text at chapter "Material and Method"; NS = nonsignificant at 5% significance threshold

C. Influence of the soil erosion control system (c_1, c_2) on the compaction intensity on three soil types (b_1, b_2, b_3) (interaction of experimental factors B, C)

Over each of the three soils studied, in case of CL planting system, compared with ACS system, the CI_1 value was significantly higher in nearly all the soil depths studied. The differences were more obvious by SEE, followed by TE and on the last place was ECC. Also, for each of the three soils studied, the two soil erosion control systems were differentiated in the same direction but with a greater intensity by CI_3 than that by CI_1. In this case, of all the three soils studied the most obvious differentiation was recorded on TE. Similarly as in the case of CI_1 and CI_3, also CI_2 differentiated clearly much higher degree of compaction in the mid-interval between trees rows versus the zone located on the tree row axis, in the CL system compared with ACS system (table 3).

D. Influence of experimental factors on the nature and intensity of correlations between the three compaction intensity indices (CI_1, CI_2 and CI_3).

The number and intensity of correlations between indicators used to estimate the degree of compaction was essentially similar to a_1 and a_2. These characteristics were also similar in the two soil erosion control systems (CL and ACS). Of the three soil types on which it was worked, the highest number of significant correlations and a higher degree of their intensity was recorded on TE versus the other two soils.

Analyzing the number of significant correlations for each soil erosion control system within the two investigations periods it is found that the highest number was

recorded in the determinations made at 20 years from trees planting in ACS system (interaction of a_2c_2).

Table 3

Influence of soil erosion control system (c_1, c_2) on the process of compaction on three soil types (b_1, b_2, b_3)

Soil depth (cm)	Compaction index (CI)	b1		b2		b3		LSD 5%	
		C1	c2	C1	c2	C1	c2	e	f
5-10	1	1,08	1,00	1,13	0.98	1,07	0,96	0,08	0,06
	2	0,51	2,30	0,45	1,24	1,46	2,19	1,22	NS
	3	3,06	1,37	2,53	0,73	2,25	0,93	1,16	NS
15-20	1	1,04	1,06	1.15	0,93	1,06	0,90	0.08	0,08
	2	3,96	1.48	0,85	1,52	1,62	3,94	2,47	3,00
	3	2,34	1,12	1,82	0,70	2,14	0,78	0,09	NS
35-40	1	1,02	1,04	1,11	0,98	1,13	0,92	0,08	NS
	2	1,57	1,31	0,68	1,02	0,85	0,95	NS	0,55
	3	2 04	1.09	1,60	0,90	1 98	0,65	0,70	NS
55-60	1	1,13	1,06	1,18	1,04	1,15	1,07	0,10	NS
	2	5,11	1,45	0,36	3,79	1,24	8,02	3,75	3,89
	3	3,02	0,76	1.53	0,83	1,78	0.72	1.38	1.47

CI_1, CI_2, CI_3 the same significance like in table 1; The significance for graduations of experimental factors B, C (b_1, b_2, b_3, c_1, c_2) is presented in the text at chapter "Material and Method"; LSD = 5%; e = constant b, c different; f = constant c, b different; NS = nonsignificant at 5% significance threshold

Of the four soil depths, the highest number of significant correlations (52% of the total number of calculated cases) recorded on 15-20 cm, followed by 55-60 cm depth (42%). On the other two depths were recorded an equal number of significant correlations, respectively 8, representing 24% of all calculated cases.

Therefore, in the present paper we used the ratios between the two compaction zone (mid-interval between tree rows face of row axis) referring to the BD, K_{sat} and RP physical properties. We named these ratios as compaction indices. We calculated thus, for each of the three physical properties determined, these compaction indices which we considered as better indicators of the compaction intensity dynamics.

Data presented in table 1 showed that, between the two periods for determining the soil physical condition, was recorded generally an improvement of soil physical condition. Of the three types of soil on which we worked, the greatest compaction was achieved on the ECC and SEE, versus the TE. Within the CL system, compared to ACS one, soil compaction intensity characterized by the three compaction indices, was much higher. Analyzing the dynamic of compaction intensity within each planting system, it was noted that this process was more obviously on the first two soil depths studied in CL system. Even in this system, on the soil depths of 35-40 cm and 55-60 cm, a decrease in compaction intensity it was recorded in time. But this was very evident at all four soil depths analyzed in ACS system.

This decrease of compaction intensity in time could be explained by the positive effect of herbs from bands located between trees rows. The above, looks so, an obvious superiority of ACS planting system over CL for both the intensity of

compaction process and different evolution of this process during relatively long time analyzed period.

Table 4

Influence of experimental factors on the nature and intensity of correlations between the 3 indices of soil compaction process (CI1, CI2 and CI3)

Graduations of experimental factors	Soil depth - (cm)											
	5-10			15-20			35-40			55-60		
	Calculated correlations											
	1	2	3	1	2	3	1	2	3	1	2	3
a_1	0.719 ***	0,431 *	0,483 *	0,688 ***	0.603 **	NS	NS	NS	NS	NS	0,594 **	NS
a_2	NS	NS	NS	0,47*	NS	0,753 ***	NS	0,71 ***	NS	0,624 **	0,779 ***	0,404*
b_1	NS	NS	NS	0,515 *	NS	0,934 ***	NS	0.684 **	NS	0,624 **	0,905 ***	NS
b_2	NS	0,624 **	NS	NS	NS	NS	0.517 *	NS	NS	0,613 *	0,608 *	NS
b_3	NS	NS	0,595 *	0,698 **	0,603 *	0,581 *	NS	0,636 **	0,689 **	NS	0,759 ***	NS
c_1	NS	NS	NS	0,496 *	NS	0,881 ***	NS	NS	NS	NS	0,478 *	NS
c_2	0,452*	NS	NS	0,631 ***	NS	NS	NS	NS	NS	NS	0,748 *	NS

Calculated correlations: 1 = between compaction index related to bulk density (CI_1) and compaction index related to Ksat (CI_2) (negative character correlations); 2 = between CI_1 and compaction index related to resistance penetration (CI3); 3 = between CI_2 and CI_3 (negative character correlations); NS =nonsignificant at 5% significance threshold

The significance for graduations of experimental factors is presented in the text at chapter "Material and Method";

CONCLUSIONS

On average, for the three soil types and the two soil erosion control systems, in period of 20 years versus the 4 year one after trees planting, compaction intensity indices used showed a reduction in the compaction process, especially on the 0-20 cm soil layer. On average, for the two time periods and in the CL soil erosion control system versus ACS system, on the four soil depths analyzed, CI_1 was significantly higher by 9-12.7% and CI_2 by 112-174%. Under same conditions, CI_3 has differentiated the two soil erosion control systems in the same sense but only on 5-10 and 55-60 cm depths. Of the three soils studied, the lowest intensity of soil compaction was recorded on TE versus ECC and SEE.

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EXPERIMENTAL VALIDATION OF THE SUPER ELLIPSE TYRE-GROUND CONTACT PATCH

VALIDAREA EXPERIMENTALĂ A MODELULUI SUPERELIPSEI PENTRU FORMA PETEI DE CONTACT DINTRE PNEU ŞI SOL

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Abstract. *The aim of this paper is to evaluate the validity of the Keller relationship for the case of 13.6 R38 tractor tire, using experimental data referring to the tire-ground contact patch. Using tire characteristics resulted in a shape exponent n=2.706 when the Keller relationship is used; the analysis of experimental data led to n=2,709±0.251. An analysis was developed in order to evaluate the goodness-of-fit between the contact patch area given by the super ellipse model and experimental data, which resulted in a Pearson correlation coefficient of 0.899 and in 75% of the model values being within the 95% confidence interval of the experimental data.*

Key words: contact patch, super ellipse, wheel load

Rezumat. *Scopul lucrării este de a verifica relaţia lui Keller pentru pneul de tip 13.6 R38, folosind date experimentale referitoare la pata de contact. Folosind relaţia lui Keller şi caracteristicile pneului rezultă exponentul n=2,706, în timp ce prin prelucrarea datelor experimentale am obţinut n=2,709±0,251.S-a realizat o analiză a corespondenţei dintre datele experimentale şi cele furnizate de către modelul superelipsei, rezultând un coeficient de corelaţie de 0,899, în timp ce 75% din valorile furnizate de către model se încadrează în intervalul de încredere de 95%.*

Cuvinte cheie: pată de contact, superelipsă, sarcină pe roată

INTRODUCTION

Many traction models assume that the tire - soil contact patch is symmetrical; Grecenko (1995) suggested that it has an elliptical shape and its area could be obtained by multiplying the product of the length and width of the contact area by a coefficient with values between 0.8 and 0.9. Hallonborg (1996) used a super ellipse model for the tire-ground contact area; the value of the positive exponent in the equation defined the shape of the contact patch.

McKyes (1985) developed a simple formula in order to compute the area of the contact patch, using the diameter and width of the tire.

Schjønning P., Lamande M. et al. (2008) also took into account the super ellipse to describe the symmetrical shape of the contact patch, with values of the exponent comprised between 2.45 and 4.51, depending upon tyre inflation pressure and model.

Saarilahti (2002) made a comparison of the footprint area given by different models and concluded that, for the same tire, the contact patch area given by different models had values comprised between 0.05 m^2 and 0.25 m^2.

Keller (2005) also considered the contact patch as a super ellipse and made measurements of the vertical stress below tires using compression cells. He developed an equation relating the shape exponent of the super ellipse to some tire characteristics and remarked a good agreement with the model taken into account (Diserens, 2002).

In this paper the experimental results obtained in a previous research activity were investigated in order to evaluate whether the super ellipse model for the contact area could be considered for the case of the romanian 13.6R38 tractor tires and, in the eventuallity of an affirmative answer, whether the Keller relationship, obtained for the same type of tires, is valid, taking into account that lower tire pressures and higher wheel loads were used in his experiments (70...150 kPa; 11...15 kN).

MATERIAL AND METHOD

The experimental researches were developed with the help of a specially designed test rig, as shown in fig.1.

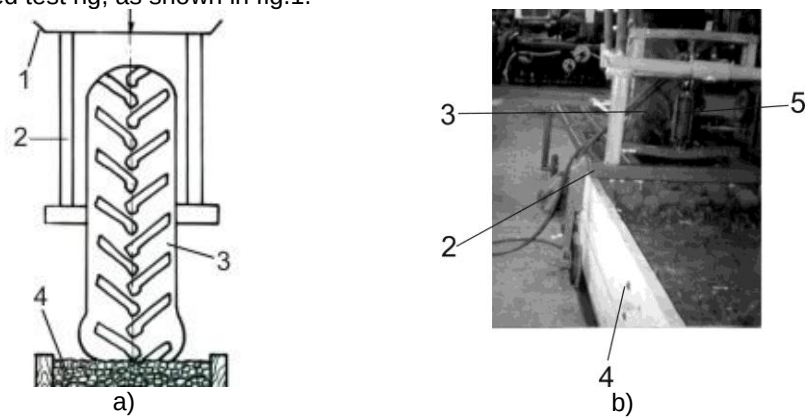


Fig. 1. The test rig
a) schematics; b) rear view; 1-loading tray; 2-frame; 3-wheel; 4-soil channel; 5-hydraulic cylinder

Wheel loading was achieved by adding weights in the tray (1); the contact area was recorded and measured for the testing conditions presented in Table 1.

The equation of the super ellipse is:

$$\left(\frac{x}{a}\right)^n + \left(\frac{y}{b}\right)^n = 1,$$

where a and b are the half axes of the super ellipse and n is a positive real number that determines the shape of the super ellipse.

In order to calculate the positive exponent in the equation of the super ellipse, the longitudinal and coresponding transversal dimensions of the contact patches were measured. A system of ecuations was then developed and then solved, thus allowing calculation of the major axis, the minor axis and the exponent involved in the super ellipse equation. The MathCAD software was used for solving the system of equations.

Table 1

Testing conditions and tire dimensions

Tire pressure [kPa]	Wheel load [kN]	Unloaded tire diameter [m]	Unloaded tire width [m]
200	5.39	1.58	0.367
	6.52		
180	5.39		
	6.52		

Three sets of measurements were made for each contact patch; the mean values and standard deviations were then calculated.

Keller (2005) found that the shape parameter of the super ellipse is dependent of the tire dimensions:

$$n = 2.1 \cdot (b \cdot d)^2 + 2,$$

where b is the tire width and d is the outer diameter.

The super ellipses were traced using a free super ellipse calculator and plotter, available at http://www.perbang.dk/superellipse/.In order to evaluate the goodness-of-fit between the shape of the real contact patch and the super ellipse, the corresponding areas were compared and the corresponding images were superimposed.

In order to evaluate the goodness-of-fit between model and experimental data in terms of contact patch area the following criteria were considered (Schunn&Wallach, 2005):

- percentage of points within 95% confidence interval of data (Pw95CI) – represents the percentage of model predictions that lie within the 95% confidence interval of each corresponding experimental data point;
- mean absolute deviation (MAD) – represents the mean of the absolute value of the deviation between each model prediction and its corresponding data point:

$$MAD = \frac{\sum_{i=1}^{n} |m_i - d_i|}{n}$$

where m_i is the model mean for point i, d_i is the data mean for each point i and n is the number of points being compared;

- mean scaled absolute deviation (MSAD):

$$MSAD = \sum_{i=1}^{n} \frac{|m_i - d_i| \cdot \sqrt{m_i}}{n \cdot s_i}$$

where m_i is the number of values contributing to each experimental data mean d_i (in our case $m_i = 3$) and s_i is the standard deviation for each data mean. A MSAD value of 1.5 means that, on average, the model is 1.5 standard errors off from the experimental data.

- Pearson correlation coefficient r^2.

RESULTS AND DISCUSSIONS

Analysis of the available contact patches according to the metodology presented in the previous section led to the results shown in table 2.

As expected, the effect of increased wheel load and lower tire pressure is

the increase of the super ellipse major and minor axes and is also reflected in an increased area of the contact patch.

Table 2

Super ellipse characteristics (average values)

Item	Wheel load [kN]/Tire pressure [kPa]			
	5.39/200	6.52/200	5.39/180	6.52/180
major axis - 2a [m]	0.257	0.295	0.277	0.360
minor axis -2b [m]	0.200	0.210	0.207	0.208
n	3.076	2.449	2.432	2.391
contact area – A [m^2]	0.04918	0.05206	0.04461	0.05901

In the meantime the value of shape exponent was not significantly affected by the variations of wheel load and tire pressure; the mean value of the shape factor was:

$$n = 2.709 \pm 0.251.$$

Taking into account the outer diameter and width of the unloaded tire and using the Keller relationship led us to:

$$n = 2.706,$$

which means only 0.12% difference between the mean experimental value and the one given by the above mentioned formula.

The real contact patch areas are presented in table 3, while the results of the goodness-of-fit analysis are shown in figure 2 and table 4.

Table 3

Contact patch area (measured) [m^2]

Wheel load [kN]/Tire pressure [kPa]			
5.39/200	6.52/200	5.39/180	6.52/180
0.04908±0.00115	0.05393±0.00063	0.0406±0.00070	0.057±0.00104

From table 4 and figure 2 it is obvious that the measured data fit with the ones predicted by the super ellipse model, in terms of area of the contact patch: Pearson correlation coeficient is 0.899, the super ellipse model is 2.9 standard errors off from the experimental data and 3 of the 4 values predicted by the model are within the 95% confidence interval of the experimental data.

Table 4

Results of the goodness-of-fit analysis

Item	Value
Pw95CI	75%
MAD	0.0023
MSAD	2.901
r^2	0.899

The superimposed images of the super ellipses and contact patches are presented in figure 3 and also prove the goodness-of-fit between the calculated super ellipse contact patches and the real ones.

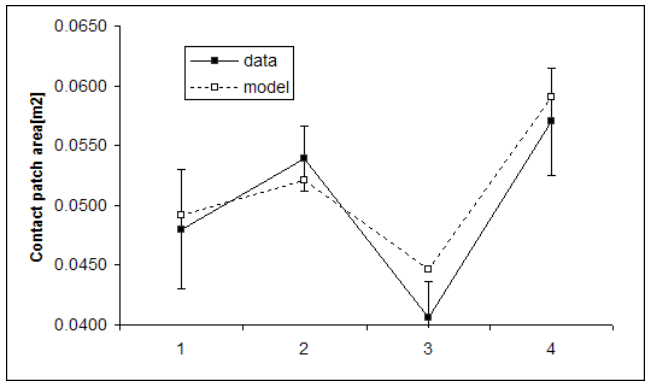
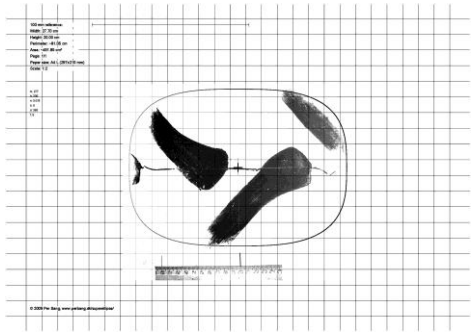
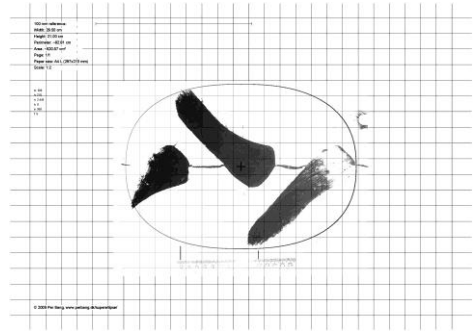


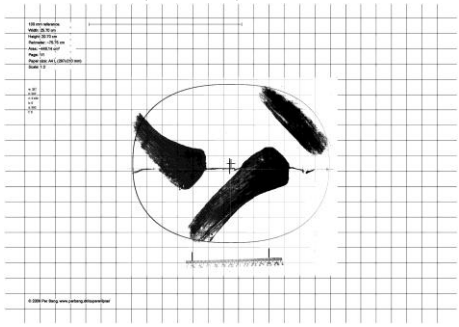
Fig. 2. Goodness-of-fit analysis



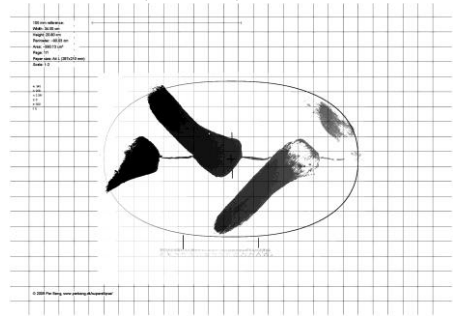
5.39 kN; 200 kPa; n=3.076±0.110



6.52 kN; 200 kPa; n=2.449±0.098



5.39 kN; 180kPa; n=2.432±0.121



6.52 kN; 180 kPa; n=2.391±0.117

Fig. 3. Superimposed images of contact patches and super ellipses

CONCLUSIONS

1. The super ellipse equation for the tire-ground contact patch was investigated in the terms of goodness-of-fit with real data;

2. The relationship developed by Keller was used in order to compute the shape factor involved in the super ellipse equation;

3. The difference between the calculated shape factor and the average one, obtained by interpretation of real tire-ground contact data, was les then 0.15%.

4. Evaluation of data referring to the area of the contact patch confirmed the validity of the Keller relationship with the Pearson correlation coefficient r^2=0.899 and 3 of the 4 values given by the super ellipse model being within the 95% confidence interval of real data.

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COPPER IN SOILS AND IT'S IMPLICATIONS IN NUTRITION OF FODDER PLANTS, IN LIMITROPHE AREA OF IASI

CUPRUL DIN SOL ŞI IMPLICAŢIILE SALE ASUPRA NUTRIŢIEI PLANTELOR FURAJERE, ÎN ZONA LIMITROFĂ IAŞULUI

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Abstract. *In Romania, the contain of copper in the ceverals principals types of soils are oscillated between 3,4 ppm since 42,0 ppm, variation wich is usually associated with the contain of clay and organic substance, determining factors in the variability of this chemical element. Paper presents and analyse the contain of accessible copper, in higher horizon of somes soil's perimeter, belong some live-stock farms, wich are placed in close vicinity of Iasi*
Key words: pollution, copper allowable limit

Rezumat. *In Romania, continutul de cupru al principalelor tipuri de soluri variaza in limite largi , de la 3,4 ppm pana la 42,00 ppm, variatie care de obicei este asociata cu continutul de argila si materie organica, factori determinanti in variabilitatea acestui element. In lucare se prezinta si se analizeaza continutul solurilor in cupru accesibil, in orizontul superior al unor perimetre de sol, apartinand unor societati cu profil agrozootehnic, situate in vecinatatea municipiului Iasi.*
Cuvinte cheie: poluare, limita admisibila a cuprului

INTRODUCTION

Copper is a transitional metal as part of the group IB of the periodic system and that along with other micronutrients except boron, fulfills the role plant enzyme, catalytic and metabolic.

In some areas, especially in areas adjacent to large conurbations, industrial pollutants, the chemical element content of soil exceeds the range of concentration where the effect is beneficial or friendly and may become one nutrient one pollutant, through specific mechanisms.

So, why copper is what makes an indicator of ecological reconstruction strategies and the basis for researches, research conducted in a more comprehensive study, which covered the soil-plant-animal relationship, conducted over two years of research, in 2007 and 2008, in two areas adjacent municipality of Iasi.

Total Cu content of the upper horizon of different soils, shows a wide range of variation (0.1 - > 200 ppm), the most common values being between 20 and 30 ppm (Davidescu, 1999). The total value of 100 ppm, it is rarely found in general, values which are associated with fine soil texture, or areas

with geochemical anomalies, land contaminated by systematic application of treatments with fungicides based on Cu or various industrial and organic wastes.

Total Cu content of the upper horizon of the main soil types in Romania vary widely, from 3.4 ppm to 42.00 ppm. This variation is associated with the existence of large differences between soil clay content and organic matter, variability factor for total Cu (Dumitru,1994).

The accessible content (extractable in HCl 1N) in the upper horizon of the main soil types in Romania ranging from 2.00 ppm (psamosoils) and 15.9 ppm in alluvisols.

MATERIAL AND METHOD

The research took place at the Research Station for Cattle Dancu - Iasi and sheep farm Raducaneni SC Daniela Ltd.

The main soils in the study area are chernozems Dancu, with subtypes typically, bills of exchange and argic, regosol with softness subtype, predominantly subtype cambic chernozem, mezocalcaric poorly degraded and for Raducaneni is specific an aluviosol Raducaneni Gleyic, salt pelic, proxicalcaric, clay loamy / clay Lutoasa, evolved a gleisol cenic.

We collected soil samples from the upper horizon (0-20 cm) of agricultural land in two locations, Dancu (6) and Raducaneni (7), were dried in oven for 3 hours at 105°C, then brought to a grain size ≤ 0.02 mm.

Disaggregation of soil samples for Cu determination was made by treating concentrated in two stages on sand bath at 400-450 ºC. Solutions were brought to 100 ml bottle flask with 2%. Each vial was added prior to the mark, 10 ml of 1% CsCl solution.

Each sample was subjected to 4 determinations:

- Determination by atomic absorption spectrometry with flame ionization (ASA-FL). Camera: ASA-FL spectrometer Vario 6.0 monoelement lamp. Flame: acetylene / air. Wavelength: 283.30 nm. The lamp current intensity: 3.00 mA. Acetylene flow: 65 L/hour. The stoichiometric C/O flame: 0.13. Flame height: 9 mm. Nebulizer: 1.3. Ionization buffer: 0.1% CsCl. Interference: Cu (216.5 nm), Fe (216.7 nm) We (216.6 nm), Sb (217.6 nm), Pt (216.5 nm) - two determinations

- Determination by X-ray fluorescence spectrometry Camera: X-ray fluorescence spectrometer Epsilon 5 model. Standard working conditions after the device's technical manual.- one determination.

- UV-VIS Spectrophotometric determination. Device: UV-VIS spectrophotometer model MPM 1500, quartz cuvettes with 1 cm thick. Dithizone method, extraction in chloroform. Spectro Dithizone method, extraction in chloroform. Spectro at 500 nm- one determination.

RESULTS AND DISCUSSIONS

The results obtained from determinations are presented in tables 1, 2, 3.

Table 1

Specifications

Type of sample	Agricultural soils
No. samples	13
Location test	Iasi Metropolitan Area (table 1)
Requirements	Heavy metals Pb

Table 2

Results analysis

No. harvest	Area	No. Laboratory test	Pb (µg/g)
1	Raducaneni (Corn of Beslegii)	AV-1	33,0744±3,1728
2	Raducaneni (Ostrov 1)	AV-2	33,4352±1,8041
3	Raducaneni (Canal 2)	AV-3	30,8251±3,3422
4	Raducaneni (after Pompa)	AV-4	30,9937±2,7164
5	Raducaneni (after Pompa)	AV-5	33,8034±1,9165
6	Raducaneni (Ostrov 2)	AV-6	37,8575±1,6837
7	Raducaneni (Canal 2)	AV-7	30,7929±1,8769
1	Dancu-Alfaalfa-scyte III(Sole Aron Voda)	AV-8	33,4808±1,2410
2	Dancu-Sudan grass (sole Chirita)	AV-9	34,9525±2,0137
3	Dancu-Soy(sole Securitate)	AV-10	34,8581±1,3252
4	Dancu-Corn (sole Aron Voda)	AV-11	36,5498±1,4228
5	Dancu- Green grss(sole Bazin)	AV-12	35,0920±0,2774
6	Dancu-Green corn sillage (sole Securitate)	AV-13	37,8885±0,7308

Table 3

Specifications

Specifications	**Pb**
Average deviation	0,8717
Standard deviation (mean square error)	1,1380
Dispersion selection	1,5789
Mean squared error of the mean selection	0,5690

Following the variation of copper in soil samples from the two locations can see that:

- Raducaneni area, copper content in soil ranged from 39.7063 ± 0.9110 micrograms per gram (Island) and 34.1054 ± 2.0596 micrograms / gram, values exceeding the average accepted in Romania 20.00 micrograms per gram, but less than the alert level (fig. 1)

- Dancu area soils with copper content is lower, it varies between ± 4.2576 28.4781 micrograms per gram and 21.6149 ± 2.4977 micrograms / gram, values beyond accepted the least average.

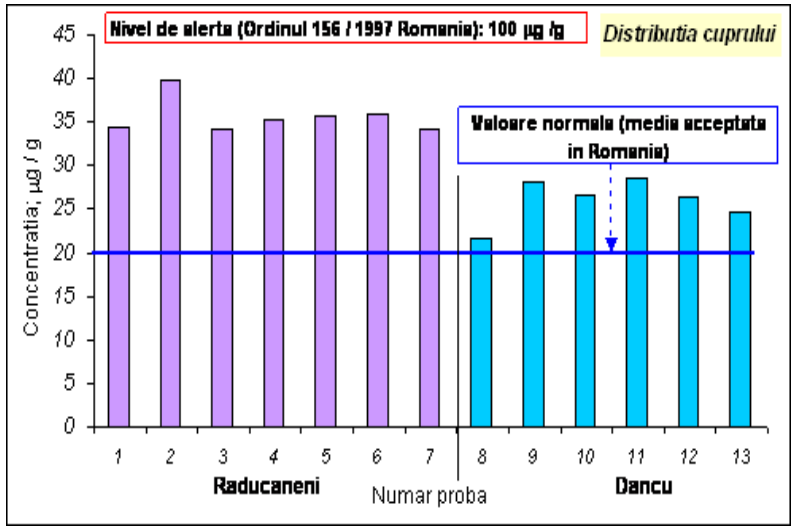

Fig. 1. Distribution of copper on the sole for locations Raducaneni and Dancu

CONCLUSIONS

1. Excessive levels of Cu in the nutritional environment, are toxic to most plants. Toxicity of Cu in agricultural soils is due to human activity, the result of excessive accumulation of soil contamination by treatment with various agents based on Cu. Symptoms of Cu toxicity is reduced plant growth and root system.

2. For both areas studied, Raducaneni and Dancu are exceeded normal values of copper in soil and 20 mg / g (average accepted in Romania) but not reached the alert level.

3. Copper content in the soil of Raducaneni location is greater than Dancu area, with a maximum of 39.7063 mg / g in Sola Island 1, it is exceeding the alert level.

4. High values of this element in soils Raducaneni area, are due to repeated splashes over the years with copper-based fungicides, the land being used as an orchard for many years.

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RESEARCH ABOUT THE CONTAIN OF AGRICULTURAL SOILS IN LEAD, FROM METROPOLITAN AREA OF IASI

CERCETĂRI CU PRIVIRE LA CONŢINUTUL ÎN PLUMB AL SOLURILOR CU UTILIZARE AGRICOLĂ DIN ZONA METROPOLITANĂ A IAŞULUI

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Abstract *The average is subjected to somes various sources of contamination with lead, the most important as incidence have to remind the exploitation mining industry, mils and factories, poison gas from cars, using chemicals wich contain lead (paints, container, insecticides). Paper presents the variation of levels in adjacent of urban's soils, respective Iasi zone, known that the degree of some geography industrialization zone makes to grow up his concentration in soil.*
Key words: heavy metals, lead, contamination, admissibility

Abstract *Mediul este supus unor surse variate de contaminare cu plumb, dintre care cu incidenţă frecventă se amintesc exploatările miniere, uzinele, gazele de eşapament, utilizarea de produse ce conţin plumb (vopsele, recipienţi, insecticide etc.). Lucrarea prezintă variaţiile conţinutului de plumb din solurile adiacente unei zone urbane, respectiv zona Iaşiului, cunoscut fiind faptul că gradul de industrializare a unei zone geografice influenţează concentraţia acestuia în sol.*
Cuvinte cheie: metale grele, plumb, contaminare, admisibilitate.

INTRODUCTION

Enhancing complex interactions of biological and biochemical that occur between components of chemical fertilizers and elements from the culture of plants in various agroecosisteme, above the normally accepted, is the starting point in the study undertaken and also a warning for agrochemical research and agricultural practice. Causes of high content in soil, especially of heavy metal elements can be multi geogena some nature (Lacatusu,2001), especially the nature of anthropogenic. Intensity of the negative effect of heavy metal concentration is dependent on both the size of this concentration as well as a series of physical and chemical attributes of soil such as defining: content in organic matter, texture, reaction, redox potential, etc.

Spread of microelements restrictive environment, lead, who undertook the study, covered the small proportion recycle (Budoi,2001), only one third, rest contributing to the contamination of the environment. Toxicity levels of lead in soil for plants can not be measured easily but generally agreed that a concentration of lead in soil, ranging between 100 and 500 mg kg-1 is considered excessive (Kabata – Pendias si Pendias, 2001). Maximum allowable

limits (MRL) established by Kloke (1980) are used in different countries, including in our country and for lead is at value 150.0 mg/kg.

The work is part of a much larger study, which concerned the entire circuit elements in a trophic chain soil-plant-animal, close to the city of Iasi, study was undertaken over two years of research and which allowed the formulation of conclusions about the translocation of soil and feed on the animal organism, especially of trace elements with impact on food security. We consider appropriate to make public the study results for lead in soil, showing its variations and the existence of potential risk than normally acceptable limits.

MATERIAL AND METHOD

The research took place at the Research Station for Cattle Dancu that the administrative point of view is on land of the commune Holboca territory and on municipality of Iasi, in wich main soil types are chernozems, with typical subtypes, bills of exchange and argic, prevailing subtype classically cambic chernozem, mezocalcaric poorly degraded and into sheep farm Raducaneni, SC apartinad Daniela Ltd. Raducaneni-Iasi dominated by an aluviosol gleyic, salt pelic, proxicalcaric, clay loamy / clay lutoasa, evolved on a gleisol cenic.

Soil samples were collected from the upper horizon (0-20 cm) of agricultural land in two locations, Dancu (6) and Raducaneni (7). Samples were dried in oven for 3 hours at 105°C, then brought to a grain size ≤ 0.02 mm.

Disaggregation of soil samples for Pb determination was made by treating concentrated in two stages on sand bath at 400-450 ºC. Solutions were brought to 100 ml bottle flask with 2%. Each vial was added prior to the mark, 10 ml of 1% CsCl solution.

For each sample, each four determinations were made: two by Spectophotometric atomic absorption flame ionization, a determination by X-ray fluorescence Spectophotometric and a determination by molecular absorption Spectophotometric UV-VIS.

1. Determination by atomic absorption spectrometry with flame ionization (ASA-FL). Camera: ASA-FL spectrometer Vario 6.0 monoelement lamp. Flame: acetylene / air. Wavelength: 283.30 nm. The lamp current intensity: 3.00 mA. Acetylene flow: 65 L / hour. The stoichiometric C / O flame: 0.13. Flame height: 9 mm. Nebulizer: 1.3. Ionization buffer: 0.1% CsCl. Interference: Cu (216.5 nm), Fe (216.7 nm) We (216.6 nm), Sb (217.6 nm), Pt (216.5 nm).

2. Determination by X-ray fluorescence spectrometry Camera: X-ray fluorescence spectrometer Epsilon 5 model. Standard working conditions after the device's technical manual.

3. UV-VIS Spectrophotometric determination. Device: UV-VIS spectrophotometer model MPM 1500, quartz cuvettes with 1 cm thick. Dithizone method, extraction in chloroform. Spectro Dithizone method, extraction in chloroform. Spectro at 500 nm.

RESULTS AND DISCUSSIONS

In order to determine the relevance of analytical results, standard procedures were applied statistical calculation are presented in tables 1, 2, 3.

Table 1

Specifications

Type of sample	Agricultural soils
No. samples	13
Location test	Iasi Metropolitan Area (table 1)
Requirements	Heavy metals Pb

Table 2

Results analysis

No. harvest	Area	No. Laboratory test	Pb (µg/g)
1	Raducaneni (Corn of Beslega)	AV-1	33,0744±3,1728
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3	Dancu-Soy(sole Securitate)	AV-10	34,8581±1,3252
4	Dancu-Corn (sole Aron Voda)	AV-11	36,5498±1,4228
5	Dancu- Green grss(sole Bazin)	AV-12	35,0920±0,2774
6	Dancu-Green corn sillage (sole Securitate)	AV-13	37,8885±0,7308

Table 3

Specifications

Specifications	Pb
Average deviation	0,8717
Standard deviation (mean square error)	1,1380
Dispersion selection	1,5789
Mean squared error of the mean selection	0,5690

In the two microzone lead concentration in the studied soils ranged from 30.7929 mg/g to 33.8034 mg/g in micro Raducaneni; in micro Dancu, lead concentration in soils was between 33.4808 mg/g and 37.8885 g/g.

Comparing the contents of lead, the two microzone respectively Raducaneni and Dancu, finds a higher concentration of lead in soil from the area Dancu Raducaneni area. We believe that this is due to the industrial area of Iasi, much closer to Dancu.

Accepted normal value of concentration in Romania, according to Order 156/1997 is 20µg/g. Compared to this normal value, concentration of lead in soil is much higher because the two areas of industrial and heavy traffic, butbelow the alert level, which according to same order, is 50µg/g. (figure 1).

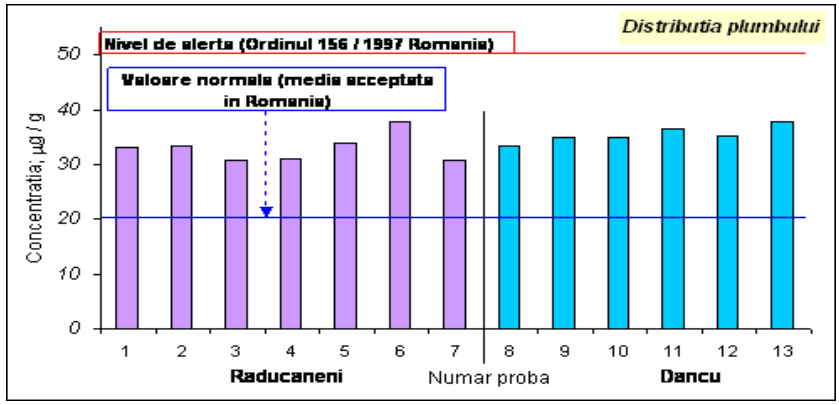

Fig. 1. Distribution of the sole lead for locations Raducaneni and Dancu

CONCLUSIONS

1. Dancu location area of study, recorded higher values of lead content in soil from the area Raducaneni, due to greater proximity of the industrial area of Iasi, Iasi's especially CET.

2. Values of lead in soils in both locations exceeding 20 mg/g, average value considered acceptable in Romania, that a maximum of 37.8885 mg/g for sample No. 6 location Dancu (sole corn silage) and 37,8575 mg/g for sample location No.6 Raducaneni (sole Ostrov).

3. The maximum values of lead in soil, for both locations, do not exceed the alert level of 50 mg/g (Order 156/1977 Romania).

4. Because salts are less soluble lead in soil, feed contamination with this element of risk is low, and if there is, it is caused by other sources.

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RESEARCH ON THE INFLUENCE OF CHEMICAL FERTILIZERS THE GROWTH OF SPECIES DENDROLOGICAL ORNAMENTAL

CERCETĂRI PRIVIND INFLUENŢA ÎNGRĂŞĂMINTELOR CHIMICE ASUPRA CREŞTERII UNOR SPECII DENDROLOGICE ORNAMENTALE

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Abstract: *This paper presents the results of research conducted during 2006-2009 on the application of chemical fertilizer NPK (20.20.0.) doses of 0.075 kg / pl., 0.100 kg / pl, 0.125 kg / pl., 0.150 kg / pl. the trees of Juniperus scopulorum "Skyrocket" Sarge and Chamaecyparis lawsoniana "BluePiramidal" (A. Murr.) Parl., and 0010 kg / pl., 0015 kg / pl., 0020 kg / pl., to sapling Chamaecyparis lawsoniana 'BluePiramidal (A. Murr). Parl. and Thuja occidentalis fastigiata Jaeg.*

Key words: trees, ornamental seedlings, annual increases, fertilization.

Rezumat. *Lucrarea prezintă rezultatele cercetărilor efectuate în perioada 2006-2009 cu privire la aplicarea îngrăşămintelor chimice N.P.K. (20.20.0.) în doze de 0,075 kg/pl.,0,100 kg/pl, 0,125 kg/pl., 0,150 kg/pl. la arborii din speciile Juniperus scopulorum „Skyrocket" Sarg şi Chamaecyparis lawsoniana „Blue Piramidal"(A.Murr.)Parl. şi 0.010 kg/pl., 0.015 kg/pl., 0.020 kg/pl., la puieţii de Chamaecyparis lawsoniana „BluePiramidal" (A.Murr.)Parl., Thuja occidentalis fastigiata Jaeg.*

Cuvinte cheie: arbori, puieţi ornamentali, creşteri anuale, fertilizare.

INTRODUCTION

Chemical elements within the chemical structure of substances energy, of which the most important are carbohydrates**,** fats and proteins, which by anaerobic or aerobic degradation, provide the energy needed life processes (Davidescu D, Davidescu V. 1969).

The paper presents some aspects concerning the influence of chemical fertilizers on annual increases in some species of ornamental dendrological. To achieve the proposed objective was to determine annual increases in length.

MATERIAL AND METHOD

Experience has been done in the nursery Dendrological of Fruit Growing Research Station Iasi, which includes trees: *Chamaecyparis lawsoniana Blue Pyramid* "(A. Murr.) Parl. and *Juniperus scopulorum* "*Skyrocket"* Sarge. and sapling: *Chamaecyparis lawsoniana 'BluePiramidal* (A. Murr.) Parl., *Thuja occidentalis fastigiata* Jaeg. Ages of experiments plants were the trees of *Chamaecyparis lawsoniana Blue Pyramid* "(A. Murr.) Parl. and *Juniperus scopulorum 'Skyrocket'*

Sarge 10 years and the sapling *Chamaecyparis lawsoniana 'Blue Pyramid'* (A. Murr.) Parl. and *Thuja occidentalis fastigiata* Jaeg for five years.

Experimental plots planted with ornamental trees have an area of 60 m^2, planting distance between rows being 0.50 m and plant distance on the place being 0.50 m blank version includes 42 copies, variants V1, V2 V3, V4, each 48 copies parcel seedlings *Chamaecyparis lawsoniana 'Blue Pyramid'* (A. Murr.) Parl. having an area of 4.14 m^2, the distance between rows being 0.16 m and juveniles between plants per row was 0.13 m. For the sapling of *Thuja occidentalis fastigiata* Jaeg. planting area was 5.04 m^2, the distance between rows being 0.17 m and between plants per row of 0.13 m. The method was the settlement experiences of blocks.

Tree, complex chemical fertilizers were used by scattering the around the plant, a circular area equal to 1 ½ crown projection, the first year of planting, and later on a radius which increases every year with 10 to 12 cm in saplings application fertilizer was the interval between the lines. After scattering, fertilizers were incorporated into the soil by digging. Experimental trees were variants: *Juniperus scopulorum "Skyrocket"* Sarge. and *Chamaecyparis lawsoniana 'Blue Pyramid'* (A. Murr.) Parl.:

Vm = unfertilized control, V1 = 0075 kg / pl, V2 = 0.100 kg / pl, V3 = 0.125 kg / pl, V4 = 0.150 kg / pl, and for seedlings of *Chamaecyparis lawsoniana 'Blue Pyramid'* (A. Murr.) Parl. and *Thuja occidentalis fastigiata* Jaeg.

Vm = unfertilized control, V1 = 0010 kg / pl, V2 = 0.015 kg / pl, V3 = 0.020 kg / pl. Measurements were made annual increases in the first decade of November for each tree and sapling in part.

RESULTS AND DISCUSSIONS

Ornamental trees to fertilization, there are a multitude of factors influence the nutrients, so it can be a type scheme fertilization, valid for all species. (R. Mateescu 2002.). In this context, at Fruit Growing Research Station Iasi, in the nursery dendrological the period 2006-2009 were performed works by fertilization with chemical fertilizers (NPK) (20.20.0.) dose different, the trees of *Juniperus scopulorum "Skyrocket"* Sarge., *Chamaecyparis lawsoniana 'Blue Pyramid'* (A. Murr.) Parl. and seedlings of *Chamaecyparis lawsoniana 'Blue Pyramid'* (Murr A..) Parl., *Thuja occidentalis fastigiata* Jaeg. *Juniperus scopulorum skyrocket* Sarge. in trees from measurements made the variants (table 1) in 2006 the highest average annual increases to V2 recorded 0.28 m by 0.10 m higher than the control version fertilized, the smallest increase was in version V1 of 0.18 m value it is equal to version control. In 2007 the average annual increases it is equal to version control. In 2007 the average annual increases V2 was higher at 0.19 m, 0.02 m higher than the untreated version V4 average increases recorded values up to 0.16 m version control and variants V1, V3, with values equal to 0.17 m. In 2008 the average increases highest annual value was equal to 0.19 m, V1 and V4 with 0.02 m higher than in unfertilized witness. Average annual increases in V3 being equal witness the fertilization of 0.17 m. In 2009 the average annual increases V4 was higher by 0.27 m to 0.05 m higher than the untreated control.

On trees *Chamaecyparis lawsoniana 'Blue Pyramid'* (A. Murr.) Parl. (table 1). In 2006 the average annual increase was highest in V1 of 0.15 m, 0.02 m higher than the untreated control. Variants V2 and V4 have 0.15 m, 0.02 m higher than the untreated control. Variants V2 and V4 have recorded values up to

0.13 m option controls the media in 2007, Annual increases were greatest in V4 of 0.13 m to 0.3 m higher than unfertilized witness at V1 average annual increases equal to the witness being 0.10 m. In 2008, the largest average annual increases were in V1, the 0.22 m to 0.14 m higher than unfertilized witness and lowest Annual increases in V4 was 0.12 m by 0.04 m higher than the control. In 2009 highest average increases V3 had a 0.22 m 0.12 m higher than in controls, the lowest value was recorded at V1 increases by only 0.14 m 0.04 m higher than unfertilized witness.

Table 1

Annual increases in trees Juniperus scopulorum "Skyrocket" Sarge. and Chamaecyparis lawsoniana 'Blue Pyramid' (A. Murr.) Parl.

Var.	Amount of fertilizer given		ANNUAL INCREASES (m)							
			Juniperus scopulorum „Skyrocket" Sarg.				*Chamaecyparis lawsoniana „Blue Piramidal "*(A.Murr.) Parl			
	UM Kg/pl.	UM Kg/var.	2006	2007	2008	2009	2006	2007	2008	2009
V_m	-	-	0.18	0.16	0.17	0.22	0.13	0.10	0.08	0.10
V_1	0.075	3.60	0.18	0.17	0.19	0.25	0.15	0.10	0.22	0.14
V_2	0.100	4.80	0.28	0.19	0.18	0.22	0.13	0.12	0.13	0.20
V_3	0.125	6.00	0.22	0.17	0.17	0.23	0.14	0.11	0.20	0.22
V_4	0.150	7.20	0.26	0.16	0.19	0.27	0.13	0.13	0.12	0.21
			DL 5% = 1,60 m DL 1% = 2,30 m DL 0,1% = 3,30 m				DL 5% =1,18 m DL 1% =1,69 m DL 0,1% = 2,49 m			

Following measurements on variants (table 2) to sapling *Chamaecyparis lawsoniana 'Blue Pyramid'* (A. Murr.) Parl. In 2006 the highest average annual increases were in the V3 version 0.14 m 0.02 m higher unfertilized sea to witness, the lowest average increases recorded a V1 of 0.12 m, with values up to witness the unfertilized. In 2007, the greater average increases in variant V2 was 0.11 m by 0.02 m higher greater average increases in variant V2 was 0.11 m by 0.02 m higher compared to untreated control, the lowest recorded average annual increases a V3 variant, with equal amounts of witnesses of 0.09 m. In 2008 the higher average annual increases have been variants V1 and V3, with values equal to 0.13 m to 0.03 m higher than unfertilized witness. In 2009 highest average annual increases were in V1 with values of 0.11 m by 0.02 m higher than unfertilized witness. Lowest average annual increases V3 was at 0.09 m is equal to version control fertilized. *Thuja occidentalis fastigiata* Jaeg. in sapling. In 2006 the higher average annual increases occurred in the V3 0.10 m, 0.03 m higher unfertilized sea to witness the smallest average annual increases in 2006 was the V1 of 0.07 m, equal to the witness unfertilized. In 2007 increases the largest was also to V3 of 0.09 m 0.03 m higher than the witness unfertilized and lowest average in 2007 was 0.06 in V1 of equal value with version control. In 2008 the largest annual increases were recorded in V3 with values of 0.18 m and the lowest values of annual increases were in V1 of 0.12 m. In 2009 the highest values of

annual increases were in V2 of 0.09 m, 0.03 m higher than unfertilized witness, variants V1 and V3 average annual increases ranged between 0.07 m - 0.08 m.

Table 2

Annual increases (m) in seedlings of *Chamaecyparis lawsoniana 'Blue Pyramid'* (A. Murr.) Parl. and *Thuja occidentalis fastigiata* Jaeg.

Var.	Amount of fertilizer given		ANNUAL INCREASES (m)							
			Chamaecyparis lawsoniana „Blue Piramidal "(A.Murr.) Parl				*Thuja occidentalis fastigiata* Jaeg.			
	UM Kg/pl.	UM Kg/var.	2006	2007	2008	2009	2006	2007	2008	2009
Vm	-	-	0.12	0.09	0.10	0.09	0.07	0.06	0.10	0.06
V1	0,010	0,210	0.12	0.10	0.13	0.11	0.07	0.06	0.12	0.07
V2	0,015	0,490	0.13	0.11	0.12	0.10	0.08	0.07	0.15	0.09
V3	0,020	0,735	0.14	0.09	0.13	0.09	0.10	0.09	0.18	0.08
			DL 5% = 0,69 m DL 1% = 1,04 m DL 0,1% = 1,67 m				DL 5% = 0,56 m DL 1% = 0,85 m DL 0,1% = 1,37 m			

CONCLUSIONS

1. Following measurements increases annual variations in tree and ornamental seedlings resulted in higher annual growth variations where fertilizers were applied to unfertilized witness.

2. After statistical calculation between the two species of annual increases trees there was a higher average annual growth of trees *Juniperus scopulorum "Skyrocket"* Sarge. compared with annual increases of trees *Chamaecyparis lawsoniana 'Blue Pyramid'* (A. Murr.) Parl.

3. Making comparison of annual increases in the following statistical calculations two species of seedlings found higher annual growth *Chamaecyparis lawsoniana 'Blue Pyramid'* (A. Murr.) Parl. *Thuja occidentalis fastigiata* Jaeg versus.

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VARIETY AND FERTILIZATION EXTRARADICULARE INFLUENCE ON SOYBEAN IN CONDITIONS PRDUCŢIEI OF THE FIELD JIJIA LOWER

INFLUENŢA SOIULUI ŞI A FERTILIZĂRII EXTRARADICULARE ASUPRA PRDUCŢIEI DE SOIA IN CONDIŢIILE DIN CÂMPIA JIJIEI INFERIOARE

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Abstract. *The research was conducted during 2004-2006 with a total of four varieties of soybean, two conventional varieties (Column and Triumph) and two varieties of genetically modified (AG 0801 and SR 2254 RR) and the fertilizations were used Basfoliar and Folifag.*
Key words: soybeans, fertilization, varieties, genetically modified.

Rezumat. *Cercetările s-au efectuat in perioada 2004-2006 cu un număr de patru soiuri de soia, două soiuri clasice (Columna şi Triumf) şi două soiuri modificate genetic (AG 0801 şi SR 2254 RR), iar ca fertilzanţi extraradiculari s-au folosit Basfoliar şi Folifag.*
Cuvinte cheie: soia, fertilizare, soiuri, plante modificate genetic

INTRODUCTION

Soy has a high capacity to adapt to different climatic conditions of soil, but best results are obtained in warm temperate zone with sufficient moisture and suitable soil.

Minimum germination temperature is around the 70C, as for sunflower. Plants bear after sunrise, for a short time temperatures of -20 ..- 30C stage seed-lobe and single leaf formation. Soybeans the moisture requirements are high, recording the specific consumption of between 300 and 700. The germination requires 120 to 150% water to dry seed weight.

The critical period for water entered the stage of formation of reproductive organs, flowering and seed filling. Insufficient water in this period fall flowers and pods, seeds formed remain low and production is reduced to about 50%. Water consumption varies in relation to the supply level of the soil, vegetation duration varieties, production potential, environmental conditions.

Soybeans requirements for light is like a short day plant. By early sowing, days short of the beginning of vegetation have an important role in meeting the requirements of medium late varieties.

MATERIAL AND METHOD

The environmental conditions of SC AGROFRUCT PLUGARI SA placed an experience as follows:

A factor – fertilizing with three graduations,
a_1 – $N_0P_{80}K_{80}$,
a_2 – $N_{64}P_{80}K_{80}$,
a_3 - $N_{96}P_{80}K_{80}$,
B factor – The extra-radiele fertilizing with three graduations,
b_1 – Not fertilized,
b_2 – Basfoliar
b_3 – Folifag,
C factor – Soibean varieties,
c_1 – Triumf,
c_2 – Columna,
c_3 – AG 0801 RR,
c_4 – S 2254 RR

RESULTS AND DISCUSSIONS

The most productive kind of experience was the variety which performed classic Column largest soybean seed production compared with the Triumph variety has some smaller productions (table 1).

Table 1

The influence of variety on seed production in conventional soybeans in 2006

Variety	Seed production (kg/ha)	% compared to Mt.	Difference (kg/ha)	**Significance**
Average	3196	100,00	martor	
TRIUMF	3180	99,50	-15,0	
COLUMNA	3212	100,5	-16,0	

DL 5% = 121,1 kg/ha
DL 1% = 129,0 kg/ha
DL 0.1% = 139,4 kg/ha

Table 2

Influence of variety on seed production in conventional soybeans in 2005

Variety	Seed production (kg/ha)	% compared to Mt.	Difference (kg/ha)	**Significance**
Average	3286	100,00	martor	
TRIUMF	3220	97,9	-66,0	
COLUMNA	3352	102,0	102,0	

DL 5% = 130,1 kg/ha
DL 1% = 142,0 kg/ha
DL 0.1% = 149,4 kg/ha

Table 3

Influence of variety on seed production in conventional soybeans in 2004

Variety	Seed production (kg/ha)	% compared to Mt.	Difference (kg/ha)	**Significance**
Average	2930	100,00	martor	
TRIUMF	2905	99,1	25,0	
COLUMNA	2955	100,8	-25,0	

DL 5% = 116,9 kg/ha
DL 1% = 136,8 kg/ha
DL 0.1% = 150,2 kg/ha

Genetically modified soybean in the period 2004 - 2006, the significant differences between the two varieties considered, which are seen in tables 4, 5 and 6.

Table 4

Influence of variety on the production of genetically modified soybean seeds in 2006

Variety	Seed production (kg/ha)	% compared to Mt.	Difference (kg/ha)	**Significance**
Average	3470	100,00	martor	
AG 0801	3630	104,61	160,0	***
SR 2254 RR	3480	100,28	10,0	

DL 5% = 140,0 kg/ha
DL 1% = 154,9 kg/ha
DL 0.1% = 174,7 kg/ha

In 2005 production of genetically modified soybean was lower than in 2006, performing a variety SR production 3040 kg / ha and a variety AG 0801 production of 3110 kg / ha, averaging 3075 kg / ha.

Table 5

Influence of variety on the production of genetically modified soybean seeds in 2005

Variety	Seed production (kg/ha)	% compared to Mt.	Difference (kg/ha)	**Significance**
Average	3075	100,00	martor	
AG 0801	3110	101.1	35.0	
SR 2254 RR	3040	98.9	9.9	

DL 5% = 131,0 kg/ha
DL 1% = 144,9 kg/ha
DL 0.1% = 184,7 kg/ha

In 2004 soybean production was achieved at higher than 2005 and almost equal to that ordinary in 2006. And in 2004 the genetically modified variety AG

0801 had the highest production with 70 kg more variety to SR and 90 kg more than average

Table 6

Influence of variety on seed production in genetically modified soybean in 2004

Variety	Seed production (kg/ha)	% compared to Mt.	Difference (kg/ha)	**Significance**
Average	3350	100,00	martor	
AG 0801	3440	102,68	90,0	
SR 2254 RR	3370	100,59	20,0	

DL 5% = 148,3 kg/ha
DL 1% = 162,3 kg/ha
DL 0.1% = 174,3 kg/ha

The influence of extra-radicle fertilizing on soybean seed production, in the tables below can be seen that experienced in 2004-2006, some options that have benefited from fertilizer production have made significant gains, other gains were lower compared with version control, fertilized.

Table 7

Influence of foliar fertilization on soybean seed production in conventional in 2004

Fertilization	**Seed production (kg/ha)**	**% compared to Mt.**	**Difference (kg/ha)**	**Significance**
Not fertilized	3086	100,0	martor	
Folifag	3132	101,5	46,0	
Basfoliar	3040	98,5	-46,0	

DL 5% = 125,3 kg/ha
DL 1% = 134,2 kg/ha
DL 0.1% = 195,7 kg/ha

In 2004 soybean production (classical) in variants fertilized with Folifag had the highest yields (3132 kg / ha), followed by variations unfertilized (3086 kg / ha) and variants fertilized with Basfoliar (3040 kg / ha), table 7.

Table 8

Influence of foliar fertilization on soybean seed production in conventional in 2005

Fertilization	**Seed production (kg/ha)**	**% compared to Mt.**	**Difference (kg/ha)**	**Significance**
Not fertilized	3274	100,00	martor	
Folifag	3225	98,5	-49	
Basfoliar	3322	101,53	48	

DL 5% = 121,1 kg/ha
DL 1% = 129,0 kg/ha
DL0.1%= 139,4 kg/ha

The classic soy highest production were obtained in 2004 to variants which have been applied Folifag and in 2005, when he applied Basfoliar.

Table 9

Influence of foliar fertilization on soybean seed production in conventional in 2006

Fertilization	Seed production (kg/ha)	% compared to Mt.	Difference (kg/ha)	Significance
Not fertilized	3396	100,00	martor	
Folifag	3386	99,7	-10	
Basfoliar	3405	100,3	9,0	

DL 5% 132,5 kg/ha
DL 1% 144,6 kg/ha
DL 0.1% 156,3 kg/ha

In 2006 soybean production was 3405 kg / ha (table 9) in the classical variant fertilized with Basfoliar, 3386 kg / ha in the fertilized variant with the variant fertilized Folifag and 3396 kg/ha.

Table 10

Influence of foliar fertilization on the production of genetically modified soybean seeds in 2004

Extra-radicle fertilizing	Seed production (kg/ha)	% compared to Mt.	Difference (kg/ha)	Significance
Not fertilized	2918	100,00	martor	
Folifag	3326	113,98	987,7	***
Basfoliar	3227	110,58	888,7	***

DL 5% = 143,5 kg/ha
DL 1% = 157,9 kg/ha
DL 0.1% = 174,9 kg/ha

The largest genetic modified soybean yields were obtained in both variants Folifag fertilization in 2004, 2005 and in 2006.

Table 11

Influence of foliar fertilization on the production of genetically modified soybean seeds in 2005

Extra-radicle fertilizing	Seed production (kg/ha)	% compared to Mt.	Difference (kg/ha)	Significance
Not fertilized	3330	100,00	martor	
Folifag	3699	111,11	894,5	***
Basfoliar	3672	110,29	867,2	***

DL 5% = 146,7 kg/ha
DL 1% = 162,2 kg/ha
DL 0.1% = 180,5 kg/ha

In 2005, fertilization of influenced soybean production, the biggest production in variant fertilized with Folifag (3699 kg/ha), table 11, with a difference of 27 kg / ha compared to the fertilized with Basfoliar (3672 kg/ha).

Table 12

Influence of foliar fertilization on the production of genetically modified soybean seeds in 2006

Extra-radicle fertilizing	Seed production (kg/ha)	% compared to Mt.	Difference (kg/ha)	**Significance**
Not fertilized	3130	100,00	martor	
Folifag	3525	112.6	395.0	***
Basfoliar	3315	105.9	185.0	***

Dl 5% = 46,7 kg/ha
Dl 1% = 62,2 kg/ha
Dl 0.1% = 80,5 kg/ha

In 2006 production of the three levels of fertilization (table 12), were lower with yields conparativ obtained in 2004 and 2005. Yields ranged from 3525 kg / ha, the variants fertilized with Folifag and 3130 kg / ha in unfertilized variants.

CONCLUSIONS

1. The classic variety of soybean production has proven to be kind Column in 2005 (3352 kg/ha);

2. Variety AG 0801 in 2006 to realize what the best production of 3630 kg/ha of soybeans;

3. In 2005 it achieved the best production of soybean in extra radicle fertiling on genetically modified soybean varieties.

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THE INFLUENCE OF ORGANIC MANURE AND PLANT DENSITY ON PRODUCTION OF THREE POTATO CULTIVARS, IN ECOLOGICAL CONDITIONS OF MOLDAVIAN PLAIN

INFLUENŢA APLICĂRII ÎNGRĂŞĂMINTELOR ORGANICE ŞI A DESIMII DE PLANTARE ASUPRA PRODUCŢIEI UNOR SOIURI DE CARTOF, ÎN CONDIŢIILE DIN CÂMPIA MOLDOVEI

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Abstract. *In this paper we followed the influence of organic manure and plant density on potato tuber production, of three varieties: Rodeo, Fabula, Cleopatra. Another objective of this paper was the establish the influence of interaction: fertilization x density x cultivar, on potato tubers production.*
Key words: potato, organic fertilization, density, variety, production.

Rezumat. *În această lucrare am urmărit influenţa aplicării îngrăşămintelor organice asupra producţiei de tuberculi la soiurile de cartof: Rodeo, Fabula şi Cleopatra. Un alt obiectiv al lucrării a fost şi stabilirea desimii de plantare a celor trei soiuri de cartof, privind obţinerea unor producţii cât mai ridicate de tuberculi, cât şi influenţa interacţiunii dintre soiul cultivat, fertilizarea aplicată şi desimea de plantare asupra producţiei.*
Cuvinte cheie:cartof, fertilizare organică, desime, soi, producţie.

MATERIAL AND METHOD

Research method used was the subdivided parcels. Were used three varieties of potato: Rodeo, Cleopatra and Fabula, varieties of Dutch.

They used different types of organic manure (poultry litter, pigs manure, sheep manure, cattle manure) and chemical fertilizers ($N_{120}P_{120}K_{120}$), to determine the best formula for getting hight productions and high quality on potato tubers. The same was pursued and using two planting density of tubers.

Experimental factors:

FACTOR A - fertilization:

a_1 - unfertilized,
a_2 - $N_{120}P_{120}K_{120}$,
a_3 – pigs manure, 20 t / ha,
a_4 - poultry litter, 5 t / ha,
a_5 – cattle manure , 25 t / ha,
a_6 – sheep manure, 15 / ha.

FACTOR B - variety:

b_1- CLEOPATRA,
b_2- FABULA,
b_3- RODEO.

FACTOR C- plant density:

c_1 - 40 000 pl/ha,
c_2 - 70 000 pl/ha.

RESULTS AND DISCUSSIONS

Determining production test plot was based on normal production nests, those who have not found the front edge of the plot, no were neighboring voids along the line. Tubers have been reported in those deletions.

Table 1

Influence of fertilization on the production of tubers in 2009

Fertilization	Production (t/ha)	% of control	Diff. (t/ha)	Signif.
$N_{120}P_{120}K_{120}$	25.4	123.30	4.8	***
Cattle manure (25 t/ha)	25.2	122.33	4.6	***
Poultry litter (5 t/ha)	23.0	111.65	2.4	***
Sheep manure (15 t/ha)	21.1	102.43	0.5	
Pigs manure (20 t/ha)	20.7	100.49	0.1	
$N_0P_0K_0$	20.6	100.00	Control	-

DL 5%:1.3 t/ha
DL 1%: 1.8 t/ha
DL 0.1%: 2.3 t/ha

In 2009, fertilization with chemical fertilizer gave the best results from their application to obtain a yield of 25.4 t tubers/ha. If in 2008, the first two places in terms of production, lay cattle manure and poultry, in 2009 they are located on sites 2 and 3, after their application has been received production of 25.2 t tubers/ha and 23.0 t respectively tube/ha (worth close to that of 2008). Differences in production of these three variants, compared to the control, fertilized, are very significant positive. Lowest production was obtained from version control, unfertilized, 20.6 t tubers/ha **(**Berindei M. şi colab., 1962; Avram P., 1969; Dorneanu A., 1984; Dragomir Lucia; Avarvarei I. et al., 1997; Ianoşi S. et al., 1998; Greavu B., 2006)**.**

Table 2

Influence of variety on the production of tubers in 2009

Variety	Production (t/ha)	% of control	Diff. (t/ha)	Signif.
CLEOPATRA	27.5	140.3	7.9	***
FABULA	20.9	106.6	1.3	
RODEO	19.6	100.0	Control	

DL 5%: 1.8 t/ha
DL 1%: 2.9 t/ha
DL 0.1%: 5.4 t/ha

Variety Cleopatra, in 2009, achieved the highest production of 27.5 t tubers/ha, very positive year in terms of climate for this variety, topping it on first place. The difference of 7.9 t/ha to control variety, Rodeo, very significantly positive. Second place is situated variety fable, with a yield of tubers of 20.9 t/ha,

production affected by the collapse of more precipitation. In recent years have produced very low yields, being last. It is sensitive to a variety of climate conditions and drought beeing unsuitable the irrigated crop system. The lowest production was obtained from variety Rodeo, the tube 19.6 t/ha.

Table 3

The influence of density on tuber production in 2009

Plant density (thousand tube / ha)	Production (t/ha)	% of control	Diff. (t/ha)	Signif.
70	23.5	107.80	1.7	***
40	21.8	100.00	Control	

DL 5%: 0.6 t/ha
DL 1%: 0.9 t/ha
DL 0.1%: 1.1 t/ha

The tubers density 70000/ha were achieved large production difference of 1.7 t/ha, compared to the controls, (21.8 t/ha), is very significant **(**Bredt H. et al., 1982; Ceauşescu I. et al.; Diaconu Aurelia, 1987)**.**

Table 4

Influence of fertilization x variety interaction on the production of tubers, in 2009

Fertilization	Variety	Production (t/ha)	% of control	Diff. (t/ha)	Signif.
$N_{120}P_{120}K_{120}$	Cleopatra	30.9	169.78	12.7	***
Cattle manure	Cleopatra	29.9	164.29	11.7	***
Poultry litter	Cleopatra	26.9	147.80	8.7	***
Sheep manure	Cleopatra	26.8	147.25	8.6	***
Pigs manure	Cleopatra	26.1	143.41	7.9	***
$N_0P_0K_0$	Cleopatra	24.5	134.62	6.3	***
Cattle manure	Fabula	24.4	134.07	6.2	***
$N_{120}P_{120}K_{120}$	Fabula	23.7	130.22	5.5	***
$N_{120}P_{120}K_{120}$	Rodeo	21.7	119.23	3.5	*
Poultry litter	Rodeo	21.4	117.58	3.2	*
Cattle manure	Rodeo	21.4	117.58	3.2	*
Poultry litter	Fabula	20.7	113.74	2.5	
$N_0P_0K_0$	Fabula	19.1	104.95	0.9	
Sheep manure	Fabula	19.0	104.40	0.8	
Pigs manure	Fabula	18.4	101.10	0.2	
$N_0P_0K_0$	Rodeo	18.2	100.00	Control	
Pigs manure	Rodeo	17.5	96.15	-0.7	
Sheep manure	Rodeo	17.4	95.60	-0.8	

DL 5%: 2.6 t/ha
DL 1%: 3.5 t/ha
DL 0.1%: 4.7 t/ha

Following fertilization x variety interaction is seen that the first 6 places are located variety Cleopatra, achieving high production variants fertilized with chemical fertilizers, with the cattle manure, poultry litter, sheep manure, litter of pigs, and the variant fertilized. Differences in production compared to the control

were highly significant pozitive. The greatest tuber production, of 30.9 t/ha was obtained from variety Cleopatra fertilized with chemical fertilizers.

It is noted that in all varieties, the lowest yields were obtained in variants unfertilized or fertilized with manure from pigs or sheep manure, depending on the varieties responded to these types of fertilizers. Although it was expected that lower production to obtain a variety in a unfertilized variant, this variant was obtained from a fertilized with sheep manure, the variety Rodeo, 17.4 t tubers/ha. In version control, $N_0P_0K_0$ x Rodeo, achieved production of 18.2 t tubers/ha (Ianoşi S. et al., 1988; Geamănu Lidia et al., 1997; Greavu B., 2006).

Table 5

Influence the interaction between fertilization and density, the production of tubers, in 2009

Fertilization	Plant density (tub/ha)	Production (t/ha)	% of control	Diff. (t/ha)	Signif.
$N_{120}P_{120}K_{120}$	70000	26.8	141.05	7.8	***
Cattle manure	70000	26.6	140.00	7.6	***
$N_{120}P_{120}K_{120}$	40000	24.0	126.32	5.0	***
Cattle manure	40000	23.9	125.79	4.9	***
Poultry litter	70000	23.4	123.16	4.4	***
Poultry litter	40000	22.6	118.95	3.6	***
$N_0P_0K_0$	70000	22.2	116.84	3.2	***
Sheep manure	40000	21.2	111.58	2.2	*
Pigs manure	70000	21.1	111.05	2.1	*
Sheep manure	70000	21.0	110.53	2.0	*
Pigs manure	40000	20.2	106.32	1.2	
$N_0P_0K_0$	40000	19.0	100.00	Control	

DL 5%: 1,7 t/ha
DL 1%: 2.3 t/ha
DL 0.1%: 3.1 t/ha.

Fertilization interaction density, the higher the production, 26.8 t tubers/ha was obtained from the variant fertilized with chemical fertilizers and tube density 70000 tubers/ha, followed in the close-fertilized with manure from cattle version of the same density, resulting in a yield of 26.6 t tubers/ha. High yields were obtained and fertilized with poultry litter variations in both texture. Production are very significant differences compared to the positive control, tube $N_0P_0K_0$ x 40000 tubers/ha, who made the production of 19.0 t tubers/ha, was also the lowest production (Constantinescu Ecaterina, 1969; Mogârzan Aglaia et al., 2004; Axinte M. et al., 2006).

The interaction between variety and texture, in 2009 (table 6), Cleopatra variety in both texture, achieved the highest production: 28.3 t tubers/ha (the density of 70000 tubers/ha) and 26.7 t tubers/ha (the tube density of 40000 tubers/ha), differences of 9.5 t/ha respectively 7.9 t/ha compared to the control is very significant positive. Variant control obtained a yield of 18.8 t tubers/ha, being the smallest. It is noted that in all varieties, from the tube density 70000/ha were achieved the highest yields (Negrutti I., 1967; Scurtu D., 1978; Morar G., 1979).

Table 6

Influence of interaction between variety and density, the production of tubers, in 2009

Variety	Plant density (tubers/ha)	Production (t/ha)	% of control	Diff. (t/ha)	Semnif.
Cleopatra	70000	28.3	150.53	9.5	***
Cleopatra	40000	26.7	142.02	7.9	***
Fabula	70000	21.8	115.96	3.0	***
Rodeo	70000	20.5	109.04	1.7	*
Fabula	40000	20.0	106.38	1.2	
Rodeo	40000	18.8	100.00	Control	

DL 5%: 1.3 t/ha
DL 1%: 1.7 t/ha
DL 0.1%: 2.3 t/ha

CONCLUSIONS

1.In 2009, fertilization with chemical fertilizer gave the best results from their application to obtain an output of 25.4 t tubers/ha, as good results were obtained and the application of cattle manure and the birds, which were obtained tube production of 25.2 t/ha and respectively 23.0 t tubers/ha.

2. Variety Cleopatra, in 2009, achieved the highest production of 27.5 t tubers/ha, very positive year in terms of climate for this variety.

3. The tubers density 70000 tube/ha were achieved large production, 23.5 t tubers/ha.

4. Following fertilization x variety interaction, it is noted that production is higher, by 30.9 t tubers/ha was obtained from variety Cleopatra fertilized with chemical fertilizers, differences in production compared to the controls were very significantly positive.

5. Fertilization interaction density, the higher the production, 26.8 t tubers/ha was obtained from the variant fertilized with chemical fertilizers and tube density 70000 tubers/ha.

6. The interaction between variety and texture, variety Cleopatra was the biggest production: 28.3 t tubers/ha (the density of 70000 tubers/ha) difference of 9.5 t/ha compared to the control is very significant positive.

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THE INFLUENCE OF ORGANIC MANURE AND PLANT DENSITY ON STARCH CONTENT OF THREE POTATO CULTIVARS, IN ECOLOGICAL CONDITIONS OF MOLDAVIAN PLAIN

INFLUENŢA APLICĂRII ÎNGRĂŞĂMINTELOR ORGANICE ŞI A DESIMII DE PLANTARE ASUPRA CONŢINUTULUI DE AMIDON DIN TUBERCULI, LA TREI SOIURI DE CARTOF, ÎN CONDIŢIILE DIN CÂMPIA MOLDOVEI

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Abstract. *In this paper we followed the influence of organic manure and plant density on potato tuber starch content, of three varieties: Rodeo, Fabula, Cleopatra. Another objective of this paper was the establish the influence of interaction: fertilization x density x cultivar, on potato tubers starch content.*
Key words: potato, organic fertilization, density, variety, starch.

Rezumat. *În această lucrare am urmărit influenţa aplicării îngrăşămintelor organice asupra conţinutului de amidon din tuberculi la soiurile de cartof: Rodeo, Fabula şi Cleopatra. Un alt obiectiv al lucrării a fost şi stabilirea influenţei desimii de plantare a celor trei soiuri de cartof, asupra conţinutului de amidon, cât şi influenţa interacţiunii dintre cei trei factori asupra producţiei asupra calităţii tuberculilor.*
Cuvinte cheie:cartof, fertilizare organică, desime, soi, amidon.

MATERIAL AND METHOD

Research method used was the subdivided parcels. Were used three varieties of potato: Rodeo, Cleopatra and Fabula, varieties of Dutch.

They used different types of organic manure and chemical fertilizers (poultry litter, pigs manure, sheep manure, cattle manure and $N_{120}P_{120}K_{120}$) to determine the best formula for getting hight productions and high quality on potato tubers. The same was pursued and using two planting density of tubers.

Experimental factors:
FACTOR A-fertilization:
a_1 - unfertilized,
a_2 - N120P120K120,
a_3 – pigs manure, 20 t / ha,
a_4 - poultry litter, 5 t / ha,
a_5 – cattle manure , 25 t / ha,
a_6 – sheep manure, 15 / ha.

FACTOR B- variety:
b_1- CLEOPATRA,
b_2- FABULA,
b_3- RODEO.

FACTOR C- plant density:

c_1- 40 000 pl/ha,

c_2 - 70 000 pl/ha.

RESULTS AND DISCUSSIONS

Determining production test plot was based on normal production nests, those who have not found the front edge of the plot, no were neighboring voids along the line. Tubers have been reported in those deletions.

Table 1

Influence of fertilization on starch content of tubers in 2009

Fertilization	Starch content (%)	% of control	Diff. (% starch)	Significance
$N_0P_0K_0$	20.5	100.00	Control	
Pigs manure (20 t/ha)	20.2	98.54	-0.3	
$N_{120}P_{120}K_{120}$	19.7	96.10	-0.8	oo
Cattle manure (25 t/ha)	19.4	94.63	-1.1	ooo
Poultry litter (5 t/ha)	18.9	92.20	-1.6	ooo
Sheep manure (15 t/ha)	18.7	91.22	-1.8	ooo

DL 5%: 0.6 % starch
DL 1%: 0.8 % starch
DL 0.1%: 1.0 % starch

In 2009 there was a significant increase in starch content of tubers compared with 2007. Highest starch content occurred in tubers obtained from the variant unfertilized, 20.5%, followed by the variant fertilized with manure from pigs, where tubers had a 20.2% starch content. The variant fertilized with sheep manure, tubers had the lowest starch content, 18.7%, difference -1.8% starch compared to the controls very significantly negative (Comarovschi et al., 1978; Ciecko Z. et al., 2005; Alvarez C. E. et al.; Hamouz K. et al., 2006).

Table 2

Influence of variety on starch content of tubers in 2009.

Variety	Starch content (%)	% of control	Diff. (% starch)	Significance
CLEOPATRA	21.2	104.43	0.9	
RODEO	20.3	100.00	Control	
FABULA	17.3	85.22	-3	o

DL 5%: 0.4 % starch
DL 1%: 0.7 % starch
DL 0.1%: 1.4 % starch

Variety Cleopatra has the highest content of starch in tubers, 21.2% and the smallest variety Fabula, 17.3%. It is noted that in 2009, to all varieties increased starch tubers content.

Table 3

The influence of density on the starch content of tubers in 2009

Plant density (tub/ha)	Starch content (%)	% of control	Diff. (% starch)	Significance
70000	19.9	103.65	0.7	***
40000	19.2	100.00	Control	

DL 5%: 0.2% starch
DL 1%: 0.3% starch
DL 0.1%: 0.4 % starch

Planting density influenced the starch content of potato tubers, so that the tube density 70,000 / ha, tubers recorded a 19.9% starch content, the difference of 0.7% is very significant compared to the control, in which has a starch content of 19.2% (Scurtu D., 1978; Pytlarz- Kozicka M., 2005; Shah S. et al., 2006).

Table 4

Influence of fertilization interaction variety on tuber starch content, in 2009

Fertilization	Variety	Starch content (%)	% of control	Diff. (% starch)	Significance
Pigs manure	Rodeo	22.0	105.26	1.1	
Pigs manure	Cleopatra	21.9	104.78	1.0	
$N_0P_0K_0$	Cleopatra	21.7	103.83	0.8	
Poultry litter	Cleopatra	21.4	102.39	0.5	
$N_{120}P_{120}K_{120}$	Cleopatra	21.1	100.96	0.2	
$N_0P_0K_0$	Rodeo	20.9	100.00	Control	
$N_{120}P_{120}K_{120}$	Rodeo	20.9	100.00	0.0	
Cattle manure	Cleopatra	20.8	99.52	-0.1	
Sheep manure	Cleopatra	20.1	96.17	-0.8	
Sheep manure	Rodeo	19.9	95.22	-1.0	
Poultry litter	Rodeo	19.0	90.91	-1.9	oo
Cattle manure	Rodeo	18.9	90.43	-2.0	oo
$N_0P_0K_0$	Fabula	18.8	89.95	-2.1	ooo
Cattle manure	Fabula	18.4	88.04	-2.5	ooo
$N_{120}P_{120}K_{120}$	Fabula	17.1	81.82	-3.8	ooo
Pigs manure	Fabula	16.6	79.43	-4.3	ooo
Poultry litter	Fabula	16.3	77.99	-4.6	ooo
Sheep manure	Fabula	16.2	77.51	-4.7	ooo

DL 5%: 1.2 % starch
DL 1%: 1.6 % starch
DL 0.1%: 2.1 % starch

Following the interaction of two factors, it is noted that the largest starch content in the variety recorded Rodeo, 22.0% fertilized with manure from pigs, followed by variety Cleopatra, fertilized with the same type of fertilizer containing starch 21.9%.

Variety Fabula, occupies the last six places in all fertilization recording a lower starch content than other varieties, the differences compared to the control ($N_0P_0K_0$ x Rodeo-20.9%), very significantly negative.

The lowest starch content occurred in variety Fabula, 16.2%, fertilized with sheep manure (Winkelmann H.H., 2003; Fedotova L.S., 2004; Diviš J. et al., 2005; Groschi K.; Colla G. et al., 2006).

Table 5

Influence of interaction between fertilization and plant density, on starch content of tubers, in 2009

Fertilization	Plant density (tub/ha	Starch content (%)	% of control	Diff. (% starch)	Significance
N_0 P_0 K_0	70000	21.4	109.18	0.9	*
Pigs manure	70000	20.6	105.10	0.5	
$N_{120}P_{120}K_{120}$	70000	20.1	102.04	0.2	
Pigs manure	40000	19.8	101.02	0.1	
N $_0P_0$ K_0	40000	19.5	100.00	Control	
Cattle manure	70000	19.5	100.00	0.0	
$N_{120}P_{120}K_{120}$	40000	19.3	98.97	-0.2	
Cattle manure	40000	19.2	98.46	-0.3	
Poultry litter	70000	19.1	96.94	-0.3	
Poultry litter	40000	18.8	95.92	-0.4	
Sheep manure	40000	18.8	95.92	-0.4	
Sheep manure	70000	18.6	94.90	-0.5	

DL 5%: 0.7 % starch
DL 1%: 0.9 % starch
DL 0.1%: 1.2 % starch.

From Table 5 it is noted that following the interaction between fertilization and density, the highest content starch, 21.4% occurred in tubers obtained from unfertilized variant and tube density 70,000 / ha. The smalles proportion of starch and 18.6%, was obtained from tubers obtained from the variant fertilized with sheep manure and tube density 70,000 / ha (Mike Luiza et al., 2001; Kushwah V. et al., Axinte M. et al., 2006; Imbrea F. et al., 2007).

Table 6

Influence of interaction between variety and plant density, on starch content of tubers, in 2009.

Variety	Plant density (tub/ha)	Starch content (%)	% of control	Diff. (% starch)	Significance
Cleopatra	70000	21.2	107.07	1.4	***
Cleopatra	40000	21.2	107.07	1.4	***
Rodeo	70000	20.7	104.55	0.9	***
Rodeo	40000	19.8	100.00	Control	
Fabula	70000	17.8	89.90	-2.0	ooo
Fabula	40000	16.7	84.34	-3.1	ooo

DL 5%: 0.4 % starch
DL 1%: 0.6 % starch
DL 0.1%: 0.8 % starch

Following this interaction, it is noted that planting density had no effect on starch content in variety Cleopatra, having the same value of 21.2% in both texture, very significant differences compared to the positive control, in which there was a starch content of 19.8%. The lowest starch content was determined in variety Fabula, 16.7%, the density of planting of 40,000 tube / ha, the difference of 3.1% compared to Control, is very significantly negative.

CONCLUSIONS

1. In 2009 there was a significant increase in starch content of tubers. The largest percentage of starch occurred in tubers obtained from the variant unfertilized, 20.5%.

2. Variety Cleopatra has the highest content of starch in tubers, 21.2% and the smallest variety Fabula, 17.3%.

3. The tube density 70,000 / ha recorded the highest starch content, 19.9%.

4. Following the interaction between fertilization and variety is noted that the largest starch content in the variety recorded Rodeo, 22.0% fertilized with manure from pigs.

5. Variety Cleopatra, recorded the highest starch content in both texture, 21.2%.

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QUANTIFYNG THE EFFECT OF NUTRIENTS AND BIOSTIMULATORS UPON THE PRODUCTION OF WINTER WHEAT

CUANTIFICAREA EFECTULUI NUTRIENŢILOR ŞI BIOSTIMULATORILOR ASUPRA PRODUCŢIEI GRÂULUI DE TOAMNĂ

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Abstract. *In the environmental conditions of the Ezăreni-Iaşi in the 2008-2009 crop year we investigated the effect of fertilization of winter wheat , Boema variety, with nitrogen, phosphorus, potassium and extraradicular application of biostimulators on yield. The highest grain production was obtained from fertilization $N_{90}P_{90}K_{90}$, of 6428n kg/ha, 23.1% higher than in control fertilized variant ($N_0P_0K_0$), the difference being highly significant. Among biostimulators BCO -2K marks itself out with a yield of 6162 kg/ha with 7.5% higher than the average production experience, the difference being highly significant. The interaction of factors caused the greatest production of 7440.5 kg/ha, in variant $N_{90}P_{90}K_{90}$ x BCO-4K x tillering, with 47.89% higher than in control variant ($N_0P_0K_0$ x BCO - 4DMA x tillering).*

Key words: wheat, fertilization, biostimulators, production

Rezumat. *În condiţile ecologice de la Ezăreni-Iaşi în anul agricol 2008-2009 s-a cercetat efectul fertilizării grâului de toamnă, soiul Boema, cu azot, fosfor, potasiu şi aplicării extraradiculare a biostimulatorilor asupra producţiei. Cea mai mare producţie de cariopse s-a obţinut la fertilizarea cu $N_{90}P_{90}K_{90}$, de 6428 kg/ha, cu 23,1% mai mare decât în varianta martor nefertilizată ($N_0P_0K_0$), diferenţa fiind foarte semnificativă. Dintre biostimulatori s-a evidenţiat BCO -2K cu o producţie de 6162 kg/ha cu 7,5% mai mare decât producţia medie pe experienţă, diferenţa fiind distinct semnificativă. Interacţiunea dintre factori a determinat cea mai mare producţie de 7440,5 kg/ha în varianta $N_{90}P_{90}K_{90}$ x BCO -4K x înfrăţire, cu 47,89% mai mare, decât în varianta martor ($N_0P_0K_0$ x BCO - 4DMA x înfrăţire).*

Cuvinte cheie: grâu, fertilizare, biostimulatori, producţie

INTRODUCTION

In order to obtain high yields in wheat growing, fertilizer use is mandatory, but it requires the use of substances and needs a stimulating effect on plants physiological processes (G. Ciobanu et al., 1995, Hera Cr. et al., 1984; Ceban T. et al., 1997).

The research conducted so far have demonstrated a positive interaction between nitrogen and phosphorus fertilizers in order to achieve quality production (Hera Cr. et al., 1971).

In the world, but also in our country there have been done research on the fertilization treatments with extraroot biostimulative substances (Gherghen I. et al., 1988, Lidia Timuţa, 1998).

MATERIAL AND METHOD

In 2008-2009 experiments were performed at the Farm Ezăreni, in which it was intended the effect of chemical fertilizer and apply in different phenophase biostimulators on production in winter wheat.

The experiment was been subdivided in parcels acording to three factors:

A factor – Fertilization with five graduations:

a_1- $N_0P_0K_0$;

a_2- $N_{60}P_{60}K_{60}$;

a_3- $N_{90}P_{90}K9_0$;

a_4- $N_{120(90+30)}P_{90}K_{90}$;

a_5- $N_{160\ (90+30+40)}P_{90}K_{90}$;

B factor – Biostimulators with three graduations:

b_1- BCO-4 DMA;

b_2- BCO-4K;

b_3- BCO- 2K;

C factor - Age biostimulators application, with three graduations:

c_1- tillering and application of herbicides ;

c_2- heading stage;

c_3- full flowering.

Length plot was 8 m, width 2 m, in four repetitions.

The biostimulators used were obtained from Prof. Dr. Cornelius Oniscu., "Gheorghe Asachi" Technical University of Iasi.

The biostimulatorilor concentration was 25 ppm, with 625 l solution per hectare.

The biological material used was the Boema variety created by ICCPT Fundulea.

RESULTS AND DISCUSSIONS

Grain production was influenced by fertilization and the extraradicular application of biostimulators.

The application of chemical fertilizers determined increased grain production of 23.1% in variant fertilized with $N_{90}P_{90}K_{90}$ to variant control, the difference of 1208 kg/ha being very significant. (table 1).

The lowest production of 5220 kg/ha was obtained at unfertilized control variant.

The extraradicular application of biostimulators BCO -2K had the effect of increasing the production by 431.7 kg /ha to control variant, the difference being very significant (table 2).

Table 1

The influence of fertilization at winter wheat yield

Fertilization	Production (kg/ha)	% of variant control	Differences (kg/ha)	Significance
$N_{160}P_{90}K_{90}$	6016	115.2	796	***
$N_{120}P_{90}K_{90}$	5790	110.9	570	***
$N_{90}P_{90}K_{90}$	6428	123.1	1208	***
$N_{60}P6_0K_{60}$	6246	119.6	1026	***
$N_0P_0K_0$	5220	100.0	Control	

DL 5% 171.6 kg/ha
DL 1% 240.9 kg/ha
DL 0.1% 340.1 kg/ha

Table 2

The influence of biostimulators at winter wheat yield

Biostimulators	Production (kg/ha)	% of variant control	Differences (kg/ha)	Significance
BCO – 2K	6162.4	107.53	431.7	***
BCO – 4K	5927.9	103.44	197.2	**
BCO – 4 DMA	5730.7	100.0	Control	

DL 5% 127.6 kg/ha
DL 1% 172.0 kg/ha
DL 0.1% 228.3 kg/ha

The aplication of biostimulators both during the heading stage and in the full flowering stage caused the decrease of the production with 51.3 respectively 87.6 kg/ha (table 3), differences being not statistically assured.

Table 3

The influence of period of the biostimulators application at winter wheat yield

Period of the biostimulators application	Production (kg/ha)	% of variant control	Differences (kg/ha)	Significance
Tillering	5986.6	100.0	Control	
Heading stage	5935.3	99.14	-51.3	
Full flowering	5899.0	98.54	-87.6	

DL 5% 129.0 kg/ha
DL 1% 170.4 kg/ha
DL 0.1% 220.3 kg/ha

The interaction between fertilization and biostimulators led to favorable effects on production, exceeding the maximum unilateral effects.

At the fertilization with $N_{60}P_{60}K_{60}$ and application of BCO -2K, the production achieved was of 7076.77 kg /ha with a difference from the control of 1922.9 kg, thus very significant (table 4).

High yields were also obtained at the variants of $N_{90}P_{90}K_{90}$ x BCO-4DMA, $N_{90}P_{90}K_{90}$ x BCO - 4K and $N_{160}P_{90}K_{90}$ x BCO - 2K of 6681.3, 6437.8, 6428.7 kg/ha .

Table 4

The influence of intercation between fertilization and biostimulators at winter wheat yield

Fertilization	Biostimulators	Prod. (kg/ha)	% of variant control	Dif. (kg/ha)	Significance
$N_{60}P_{60}K_{60}$	BCO – 2K	7076.7	137.31	1922.9	***
$N_{90}P_{90}K_{90}$	BCO – 4 DMA	6681.3	129.64	1527.5	***
$N_{90}P_{90}K_{90}$	BCO – 4K	6437.8	124.91	1284.0	***
$N_{160}P_{90}K_{90}$	BCO – 2K	6428.7	124.74	1274.9	***
$N_{60}P_{60}K_{60}$	BCO – 4K	6319.3	122.61	1165.5	***
$N_{90}P_{90}K_{90}$	BCO – 2K	6167.2	119.66	1013.4	***
$N_{120}P_{90}K_{90}$	BCO – 2K	5885.8	114.20	732.0	***
$N_{160}P_{90}K_{90}$	BCO – 4K	5841.3	113.34	687.5	***
$N_{120}P_{90}K_{90}$	BCO – 4K	5785.9	112.26	632.1	***
$N_{160}P_{90}K_{90}$	BCO – 4 DMA	5779.4	112.14	625.6	***
$N_{120}P_{90}K_{90}$	BCO – 4 DMA	5698.0	110.56	544.2	**
$N_{60}P_{60}K_{60}$	BCO – 4 DMA	5340.8	103.63	187.0	
$N_0P_0K_0$	BCO – 4K	5255.0	101.96	101.2	
$N_0P_0K_0$	BCO – 2K	5253.8	101.94	100.0	
$N_0P_0K_0$	BCO – 4 DMA	5153.8	100.00	Control	

DL 5% 312.5 kg/ha
DL 1% 421.2 kg/ha
DL 0.1% 559.1 kg/ha

At the unfertilized variants at all three biostimulators, the obtained values were close to control production.

The interaction of the three factors caused the greatest production of grain of 7470.5 kg/ha in variant $N_{90}P_{90}K_{90}$ x BCO-4K x tillering, the difference from controls being of 2419.0 kg / ha (table 5).

At the variants fertilized with $N_{60}P_{60}K_{60}$ to which were applied BCO-2K biostimulators in the heading and full flowering biophase there were obtained high yields with 42.98 respectively 42.21% higher than those of control variant.

The unfertilized variants to which BCO-4K BCO-2K biostimulators were applied and in the heading stage, achieved lower production with 138.2 and 215.7 kg/ha than the control variant $N_0P_0K_0$ x BCO - 4DMA x tillering.

Table 5

The influence of intercation between fertilization,biostimulators and period of applying at winter wheat yield

Fertilization	Biostim.	Period of the biostim. application	Prod. (kg/ha	% of variant control	Dif. (kg/ha)	Semnif.
$N_{90}P_{90}K_{90}$	BCO – 4K	Tillering	7470.5	147.89	2419.0	***
$N_{60}P_{60}K_{60}$	BCO – 2K	Full flowering	7222.8	142.98	2171.3	***
$N_{60}P_{60}K_{60}$	BCO – 2K	Heading stage	7183.8	142.21	2132.3	***
$N_{160}P_{90}K_{90}$	BCO – 2K	Heading stage	7089.0	140.33	2037.5	***
$N_{90}P_{90}K_{90}$	BCO– 4DMA	Full flowering	7062.8	139.82	2011.3	***
$N_{90}P_{90}K_{90}$	BCO – 2K	Heading stage	7013.8	138.85	1962.3	***
$N_{60}P_{60}K_{60}$	BCO – 4K	Tillering	6983.5	138.25	1932.0	***
$N_{60}P_{60}K_{60}$	BCO – 2K	Tillering	6823.5	135.08	1772.0	***
$N_{120}P_{90}K_{90}$	BCO – 4K	Full flowering	6758.3	133.79	1706.8	***
$N_{90}P_{90}K_{90}$	BCO– 4DMA	Heading stage	6589.5	130.45	1538.0	***
$N_{120}P_{90}K_{90}$	BCO – 2K	Heading stage	6505.0	128.77	1453.5	***
$N_{160}P_{90}K_{90}$	BCO – 4K	Full flowering	6468.3	128.05	1416.8	***
$N_{90}P_{90}K_{90}$	BCO– 4DMA	Tillering	6391.5	126.53	1340.0	***
$N_{90}P_{90}K_{90}$	BCO – 4K	Heading stage	6271.3	124.15	1219.8	***
$N_{60}P_{60}K_{60}$	BCO – 4K	Heading stage	6227.0	123.27	11755	***
$N_{160}P_{90}K_{90}$	BCO – 2K	Tillering	6218.0	123.09	1166.5	***
$N_{160}P_{90}K_{90}$	BCO– 4DMA	Tillering	5997.3	118.72	945.8	**
$N_{120}P_{90}K_{90}$	BCO– 4DMA	Tillering	5981.5	118.41	930.0	**
$N_{160}P_{90}K_{90}$	BCO – 2K	Full flowering	5979.0	118.36	927.5	**
$N_{90}P_{90}K_{90}$	BCO – 2K	Full flowering	5881.5	116.43	830.0	**
$N_{120}P_{90}K_{90}$	BCO– 4DMA	Heading stage	5878.3	116.37	826.8	**
$N_{120}P_{90}K_{90}$	BCO – 2K	Tillering	5848.3	115.77	796.8	**
$N_{160}P_{90}K_{90}$	BCO– 4DMA	Full flowering	5807.8	114.97	756.3	**
$N_{160}P_{90}K_{90}$	BCO – 4K	Tillering	5798.3	114.78	746.8	**
$N_{60}P_{60}K_{60}$	BCO – 4K	Full flowering	5747.5	113.78	696.0	*
$N_{90}P_{90}K_{90}$	BCO – 2K	Tillering	5606.3	110.98	554.8	*
$N_0P_0K_0$	BCO – 2K	Tillering	5593.3	110.73	541.8	
$N_{90}P_{90}K_{90}$	BCO – 4K	Full flowering	5571.5	110.29	520.0	
$N_{160}P_{90}K_{90}$	BCO– 4DMA	Heading stage	5533.3	109.54	481.8	
$N_{120}P_{90}K_{90}$	BCO – 4K	Full flowering	5320.3	105.32	268.8	
$N_{120}P_{90}K_{90}$	BCO – 2K	Full flowering	5304.0	105.00	252.5	
$N_{120}P_{90}K_{90}$	BCO – 4K	Heading stage	5279.3	104.51	227.8	
$N_{60}P_{60}K_{60}$	BCO– 4DMA	Full flowering	5271.0	104.35	219.5	
$N_{160}P_{90}K_{90}$	BCO – 4K	Heading stage	5257.3	104.07	205.8	
$N_{120}P_{90}K_{90}$	BCO– 4DMA	Full flowering	5234.3	103.62	182.8	
$N_0P_0K_0$	BCO– 4DMA	Heading stage	5069.0	100.35	17.5	
$N_0P_0K_0$	BCO– 4DMA	Tillering	5051.5	100.00	Control	
$N_0P_0K_0$	BCO – 4K	Heading stage	4913.3	97.26	-138.2	
$N_0P_0K_0$	BCO – 2K	Heading stage	4835.8	95.73	-215.7	

DL 5% 542.1 kg/ha
DL 1% 723.7 kg/ha
DL 0.1% 949.5 kg/ha

CONCLUSIONS

1. The increase of wheat production depending on application of chemical fertilizers with nitrogen, phosphorus and potassium;

2. The chemical fertilizers applied in dose of $N_{160}P_{90}K_{90}$ have increased the production by 15.2%;

3. The interaction between fertilization and biostimulators caused highly significant increases in production between 37.31% and 12.14%;

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EFFECT OF BIOSTIMULATORS ON SOME BIOLOGICAL FEATURES OF WINTER WHEAT

EFECTUL BIOSTIMULATORILOR ASUPRA UNOR ÎNSUŞIRI BIOLOGICE ALE GRÂULUI DE TOAMNĂ

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Abstract. *In laboratory conditions we have investigated the effect of applying some biostimulators in different concentrations, the germination process (energy and germination capacity), the lenght of roots and coleoptil at winter wheat, variety Boema. In all treatments there was no difference between the percentage of germination energy and germination capacity. The highest percentage of germination occurred in the following biostimulators: BCO-4K of 96.12%, BCO-2K+ zinc acetate with 94.5% germination; BCO-4DMA – 95.5% germination; BCO-2DMA + zinc acetate with 93.87%germination.*

Key words: wheat, germination, biostimulators, length of coleoptil

Rezumat. *În condiţii de laborator s-a cercetat efectul aplicării unor biostimulatori, în concentraţii diferite, asupra procesului de germinaţie (energie şi capacitate germinativă), a lungimii rădăcinilor şi coleoptilului la grâul de toamnă, soiul Boema. La toate tratamentele nu s-au evidenţiat diferenţe între procentul de germinare privind energia şi capacitatea germinativă. Cel mai ridicat procent de germinaţie s-a înregistrat la următorii biostimulatori: BCO-4K cu 96,12%; BCO -2K + acetat de zinc cu 94,50% germinaţie; BCO -4DMA cu 95,5% germinaţie; BCO -2DMA + acetat de zinc cu 93,87 % germinaţie .*

Cuvinte cheie: grâu, germinaţie, biostimulatori, lungimea coleoptilului

INTRODUCTION

The biostimulators are biologically active substances that affect plant growth and development.

Seed germination in a shorter time and plant growth hawe a particularly important role in plant development (Toma Doina Liana et al., 1995**).**

The participation of growth stimulators in germination and plant growth processes were proved by many researches that found increasing breathing wich precids and favours before and carbohydrate hydrolysis of seed reserves, transportation and use during the growing stage (Oniscu C., Trofin Alina, 2002; Trofin Alina ,2003).

In literature it was observed that seed treatment with solutions of amino acids and aromatics ureide resulted in more uniform and explosive germination of seeds (Bireescu L. et al.,1999).

MATERIAL AND METHOD

Experience was with the two factors:

Factor A – Biostimulators with eight graduations

a_1 – BCO -2DMA
a_2 – BCO -4DMA
a_3 – BCO -2K
a_4 – BCO -4K
a_5 – BCO -2DMA + Zinc acetate
a_6 – BCO -4DMA + Zinc acetate
a_7 – BCO -2K + Zinc acetate
a_8 – BCO -4K + Zinc acetate

Factor B – Concentration with ten graduations

b_1 – 50 ppm
b_2 – 33.33 ppm
b_3 – 25.5 ppm
b_4 – 20 ppm
b_5 – 16.66 ppm
b_6 – 12.5 ppm
b_7 – 10 ppm
b_8 – 5 ppm
b_9 – Water
b_{10} – Zinc acetate

The biological material used, Boema variety, was created by ICCPT Fundulea.

The biostimulators use belonging class fenoxialchil sulfamoil carboxylic acids which have very low toxicity and are biodegradable.

They were obtained from Prof. Dr. Cornelius Oniscu.,from "Gheorghe Asachi" Technical University of Iasi.

The treatments were applied by soaking the seeds for 24 hours.

The seeds were placed on the crinkled paper moistened with boiled water and cooled, then were placed in germination chamber at an average temperature of 20° C.

RESULTS AND DISCUSSIONS

The following treatments performed on grains wheat with biostimulators, there were obtained equal values regarding the germination energy and germination capacity.

The highest germination energy value is obtained for the variant treated with BCO - 4K biostimulator, by 96.12% (table 1). The control version, treated with water showed the lowest value of 88.00% germination energy.

The biostimulators application in different concentrations determined the modification of the germination energy winter wheat grain. The highest germination energy was obtained at concentrations of 10.00 and 5.00ppm of 96.25% (table 2).

Table 1

The influence of biostimulators on germination energy at wheat

Biostimulators	*Germination energy (%)	% of variant control	Differences	Significance
BCO – 4K	96.12	109.22	8.12	***
BCO – 4DMA	95.50	108.52	7.50	***
BCO – 2K	95.00	107.95	7.00	***
BCO – 2DMA	94.25	107.10	6.25	***
Water	88.00	100.00	Control	

* Germination energy was equal to germination capacity

DL 5% 3.12
DL 1% 4.11
DL 0.1% 5.13

Table 2

The influence of biostimulators concentrations on germination energy at wheat

Concentration (ppm)	Germination energy (%)	% of variant control	Differences	Significance
50	95.50	108.52	7.50	***
30.33	96.00	109.09	8.00	***
25.00	94.75	107.67	6.75	***
20.00	95.00	107.95	7.00	***
16.66	92.25	104.82	4.25	*
12.50	95.75	108.80	7.75	***
10.00	96.25	109.37	8.25	***
5.00	96.25	109.37	8.25	***
Water	88.00	100.00	Control	

DL 5% 4.11
DL 1% 4.69
DL 0.1% 5.34

Seed treatment with growth stimulators and zinc acetate resulted in lower germination energy alternatives to treated only with growth stimulators.

The variant treated with BCO-2K + zinc acetate achieved the highest germination energy value of 94.5% (table 3).

Table 3

The influence of biostimulators on germination energy at wheat

Biostimulators	Germination energy (%)	% of variant control	Differences	Significance
BCO–2K + zinc acetate	94.50	107.38	6.5	***
BCO–2DMA +zinc acetate	93.87	106.67	5.87	***
BCO−4DMA+zinc acetate	93.37	106.10	5.37	***
BCO–4K + zinc acetate	93.00	105.68	5.0	***
Zinc acetate	93.00	105.68	5.0	***
Water	88.00	100.00	Control	

DL 5% 3.26
DL 1% 3.89
DL 0.1% 4.73

The BCO -2DMA + zinc acetate and BCO - 4DMA+ zinc acetate biostimulators have obtained similar values of germination energy of 93.87% and 93.37%, the differences from the control (5.87 respectively 5.37%) are very significant.

As a result of treatment with growth stimulators it was observed the modification of embryonic root length from version control treated with water.

The highest value was obtained in the variant treated with BCO-4K with 7.79% more than control version (table 4).

Table 4

The influence of biostimulators on embryonic root length at wheat

Biostimulators	Embryonic root length (mm)	% of variant control	Differences (mm)	Significance
BCO – 4K	139.06	107.79	10.06	-
BCO – 2K	133.95	103.83	4.95	-
Water	129.00	100.00	Mt.	
BCO – 2DMA	122.91	95.27	-6.09	-
BCO – 4DMA	114.83	89.01	-14.17	000

DL 5% 12.1mm
DL 1% 13.2 mm
DL 0.1% 13.9 mm

12.50 ppm concentration achieved the lowest embryonic root length of 11.55 mm less than control version. The greatest length was 139.80 mm concentration of 16.66 ppm (table 5).

Table 5

The influence of biostimulators concentrations on embryonic root length at wheat

Concentrations (ppm)	Embryonic root length (mm)	% of variant control	Differences (mm)	Significance
50	130.10	100.85	1.10	-
30.33	131.52	101.95	2.52	-
25.00	125.37	97.18	3.63	-
20.00	128.72	99.78	-0.28	-
16.66	139.80	108.37	10.80	***
12.50	117.45	91.04	-11.55	000
10.00	130.57	101.21	1.57	-
5.00	117.97	91.44	-11.03	000
Water	129.00	100.00	Control	

DL 5% 6.1 mm
DL 1% 7.2 mm
DL 0.1% 7.9 mm

Measurements show that the length of coleoptil differences were obtained down to three of the four variants treated with growth stimulators. The BCO-2DMA treated variant achieved a value greater than 0.97 mm control version being significant (table 6).

Table 6

The influence of biostimulators on coleoptil lenght at wheat

Biostimulators	Coleoptil lenght (mm)	% of variant control	Differences (mm)	Significance
BCO – 2DMA	48.27	102.05	0.97	*
Apă	47.3	100.00	Martor	
BCO – 4DMA	46.19	97.65	-1.11	0
BCO – 4K	43.78	92.55	-3.52	000
BCO – 2K	41.07	86.82	-6.23	000

DL 5% 0.96 mm
DL 1% 1.23 mm
DL 0.1% 1.67 mm

At most concentrations were obtained negative differences coleoptil length. Lowest concentration of 42.15 mm was recorded at 12.5 ppm (table 7).

At concentrations of 25.00, 12.50, 10.00 and 5.00 ppm there were achieved highly significant differences less than the control version treated with water.

Table 7

Influence of biostimulators concentrations on the coleoptil length at wheat

Concentrations (ppm)	Coleoptil lenght (mm)	% of variant control	Differences (mm)	Significance
50	45.07	95.28	-2.23	00
30.33	45.70	96.61	-1.6	0
25.00	44.57	94.22	-2.73	000
20.00	46.77	98.87	-0.53	-
16.66	48.42	102.36	1.12	-
12.50	42.15	89.11	-5.15	000
10.00	43.35	91.64	-3.95	000
5.00	42.6	90.06	-4.7	000
Water	47.30	100.00	Control	

DL 5% 1.36 mm
DL 1% 1.73 mm
DL 0.1% 2.31 mm

CONCLUSIONS

1. The highest germination energy value was obtained for the variant treated with BCO - 4K biostimulators of 96.12%;

2. At concentrations of 10 respectively 5 ppm of biostimulators it was achieved the highest germination energy of 96.25, the differences from the control version, being highly significant;

3. Differences between control version and those treated with growth stimulators and zinc acetate, the germination energy terms, are statistically assured being highly significant;

4. The longest embryonic roots of 139.06 mm was obtained in the variant treated with BCO - 4K;

5. For the concentration of 16.66 ppm it was obtained the highest value of embryonic root length;

6. Following the treatments performed with BCO-2K and BCO-4K biostimulators were obtained differences in coleoptil length very significant in less.

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THE ORGANIC PHOSPHORUS MINERALIZATION PROCESS AND CARBOHYDRATES TRANSFORMATION IN CARBONATE CHERNOZEM

PROCESUL DE MINERALIZARE A FOSFORULUI ORGANIC ŞI DE TRANSFORMARE A CARBOHIDRAŢILOR DIN CERNOZIOMUL CARBONATIC

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Abstract. *This work aimed to study the biochemical and microbiological parameters involved in the organic phosphorus mineralization process and conversion of carbohydrates in the soybean plants rhizosphere (as soil improving – plant) according to P and Fe mineral nutrition and water content level of cultivation, the effect of seed and soil, respectively, inoculation, with rhizobacteria Pseudomonas aureofaciens. The rhizospheric soil was examined in general microbial activity by analyzing potential dehydrogenase activity, alkaline phosphatase and invertase activity and mobile phosphorus content. The results revealed that both fertilizers (P and Fe) have managed the most beneficial effect on the accumulation of plant green mass. Fertilization with P also contributed to increased enzymatic activity values. Temporary water stress conditions had little impact on the investigated biochemical parameters. Seed inoculation resulted in increased alkaline phosphatase activity values.*

Key words: carbonate chernozem, rhizospheric soil, extracellular enzymatic activity, mineral nutrition, water stress, soybean.

Rezumat. *Lucrarea de faţă a avut ca scop studierea unor parametri biochimici şi microbiologici, implicaţi în procesele de mineralizare a fosforului organic şi de transformare a carbohidraţilor în rizosfera plantelor de soia (în calitate de plantă-ameliorator a solului) în funcţie de nutriţia minerală cu P şi Fe, regimul hidric de cultivare, efectul inoculării seminţelor, şi respectiv a solului, cu rizobacteria Pseudomonas aureofaciens. În solul rizosferic s-a examinat activitatea microbiană prin detereminarea activităţii dehidrogenazice potenţiale, activităţile fosfatazică alcalină, invertazică şi conţinutul P_2O_5. S-a evidenţiat faptul că ambii fertilizanţi (P şi Fe) administraţi în comun au avut efect benefic asupra acumulării masei verzi a plantelor. Fertilizarea cu P a contribuit şi la majorarea valorilor activităţilor enzimatice a solului. Condiţiile de stres hidric temporar au avut un impact redus asupra parametrilor biochimici studiaţi. Inocularea seminţelor a dus la majorarea valorilor activităţii fosfatazice alcaline.*

Cuvinte cheie: cernoziom carbonatic, sol rizosferic, activitate enzimatică extracelulară, nutriţie minerală, stres hidric, soia.

INTRODUCTION

Proper nutrient management is a way to maintain crop plants productivity and resistance to adverse climatic conditions (Rotaru V., 2009, a). Moldavian soils, in most cases are characterized by a low content of mobile phosphorus (Andrieş S., 2007). Additional P fertilization affects Fe availability to plants, an important element in their metabolism (Rotaru V., 2009, b). Phosphorus cycle is also closely linked to the carbon cycle. Carbohydrate conversion determines the energy of biochemical processes resulting in soil. Also, recent studies have demonstrated high efficiency ways of fertilizer application in complex with biologically active substances that increase the recovery rate of nutrients and plant resistance to unfavorable environmental conditions (Emnova E., et.al, 2008).

Soybean plants due to their high potential of atmospheric nitrogen fixation, are considered important soil improving plants (Rotaru V., 2009,a), especially for remediation of perennial plantation soils.

Once all soil processes including transformation and mobilization of substances occur under the microbial influence (Tate R.L. III, 2001), it is important to analyze not only plant response to environmental changes but also soil extracellular enzymes activity, which further can be used as an index of soil biological potential. Dehydrogenase [EC 1.1.1.1], an intracellular enzyme is considered to exist in soils as part of intact cells and reflects the overall rate of oxidative activity of edaphic micro-flora. This enzyme is involved in hydrogen transfer reaction in the decomposition of organic substances. Alkaline phosphatase [EC 3.1.3.1] catalyzes the phosphoric acid's mono-ethers hydrolysis; it reflects the intensity of the biochemical mobilization of phosphorus in soil. Invertase (β-fructofuranosidase) [EC 3.2.1.26], an enzyme involved in the carbon cycle catalyzes the hydrolytic decomposition of organic matter: β-D-fructo-furanosides, including the D-fructose, sucrose and glucose (Khaziev F.H., 1990).

The aim of the research was to study biochemical and microbiological parameters involved in organic phosphorus mineralization, carbohydrates conversion in soybean plants' rhizosphere (as nitrogen-fixing and soil improving plants) according to P and Fe nutrition, water condition of cultivation, and the effect of seed (and soil, respectively) inoculation with rhizobacteria *Pseudomonas aureofaciens.*

MATERIAL AND METHOD

To achieve the proposed aim the experience was assembled under controlled conditions in pots of 5kg of absolutely dry soil, carbonate chernozem, which had a low content of mobile phosphorus (0.9 mg P_2O_5/100g of soil). Each pot had four plants. Soybean plants were represented by "Licurici" and "Zodiac" genotypes. All seeds were treated with nitrogen-fixing bacteria of the genus *Rhizobium* before sowing.

Four different trophic treatments were analyzed: N, NP, NFE, NPFe, NP + Riz (the last included seed treatment with bacterial preparation Rizosideps (Riz) created on the basis of the strain of the rhizospheric bacteria *Pseudomonas aureofaciens* CNMN PsB-03 (10^7cels/1seed). Nitrogen was administered in dose of 50 mg N/kg soil as $Ca(NO_3)_2 \cdot 4H_2O$, in all pots. Phosphorus was applied as a salt KH_2PO_4, 100 mg

P_2O_5/kg soil, KCl was introduced where was no P adding. Iron was applied at the roots as EDTA (6 mg Fe/kg soil).

The influence of plant nutrition with P and Fe was studied in optimal moisture conditions 70%WHC (water holding capacity of soil) and deficient for growth and development of soybean plants, 35%WHC. Initially the plants were grown under 70%WHC; soil moisture was maintained by the method of pot weighing. Plants were subjected to low moisture for 14 days at the blooming - flowering stage. Enzymatic potential analysis was performed on rhizospheric soil samples that were collected, air-dried, protected from direct light, sieved through 2mm sieve and homogenized.

The analyzed parameters were green plant mass accumulation (by direct weigh), in the soil were estimated following rhizospheric enzymatic activities [3] DH - dehydrogenase, by Galstean method, INV - invertase, by modification of Ciunderova, Alk-P - alkaline phosphatase by Galstean method, and P_2O_5 - mobile phosphate content by Macighin method (Arinushkina E.V., 1970).

RESULTS AND DISCUSSIONS

The data analysis (table 1), regarding the green plants' mass as a parameter of their growth, revealed that the application of adequate P nutrition stimulated the development of aerial part of soybean plants of both genotypes and reached values of 19.4 and 18.9 g for "Licurici" and "Zodiac", respectively. Root administration of Fe also showed a beneficial effect, by green plant mass accumulation up to 12.6 and 12.3 g. Application of both fertilizers contributed more pronounced over the parameter in both optimal and deficient moisture content ($p<0.05$). Created temporary drought conditions clearly reduced the values of this parameter, by 12.5 – 30% for "Licurici" and by 6.7 – 19.6% for "Zodiac". Seed treatment with bio-preparation Rizosideps led to increasing green mass of soybean plants "Zodiac" comparing to NP – without bacterial inoculation by 8.7%, especially in the dry conditions. Thus it is proved its capabilities to mitigate the consequences of low soil moisture for soybean plants (Emnova E., et.al, 2008).

The level of soil DH activity for "Licurici" plants was lower in the control in comparison with P additional fertilization. The adding in the soil, besides the nitrogen background, of both fertilizers, increased this activity comparing to NFe, up to 23%. There were no statistical significant difference between NP and NPFe.

Based on the fact that potential DH activity did not change obviously in the presented study, while plants have reacted promptly to such factors as mineral fertilizer application and temporary deficiency of moisture, we assumed that the resistant rhizospheric microbial community keeps its activity.

Thus assuring catabolic metabolism of glucose at a stable level, characteristic to a particular soil type. Data on the minor impact of temporary drought on the dehydrogenase activity were confirmed by our previous results (Daraban O., 2009). Overall DH activity did not depend on the researched soybean genotype. Water regimes and bacterial inoculation also did not clearly influence the given parameter.

Table 1

Enzyme activity values in carbonate chernozem from soybean plants growing in different water and trophic conditions, and seed inoculation with bio-preparation Rizosideps

Treatment			**DH activity**, TPF, mg/ 100 g soil/24h		**Alk-P activity**, PP, µg/ 100g soil/1h		**P_2O_5 content**, mg/100g soil		**INV activity**, Glucose, mg/ 100g soil/24h		**Green mass** accumulation, g, per 1 plant	
			70% WHC	**35 %** WHC	**70 %** WHC	**35 %** WHC	**70%** WHC	**35%** WHC	**70%** WHC	**35%** WHC	**70%** WHC	**35%** WHC
Licurici	**N**		17,1	24,2	76,8	64,1	0,29	0,40	680,0	685,0	11,7	9,4
		SD	*1,7*	*0,8*	*2,5*	*10,9*	*0,08*	*0,04*	*30,2*	*39,7*	*1,1*	*0,3*
	NP		25,3	26,9	63,8	69,2	10,65	12,02	764,1	734,0	19,4	14,9
		SD	*2,1*	*2,3*	*3,3*	*6,3*	*1,10*	*0,74*	*15,6*	*52,4*	*0,8*	*0,8*
	NFe		20,8	23,1	61,9	51,0	--	--	652,2	692,9	12,6	11,0
		SD	*1,3*	*1,3*	*4,5*	*18,3*	--	--	*27,3*	*70,1*	*0,4*	*0,2*
	NPFe		25,6	25,8	82,0	72,4	10,55	11,88	746,3	735,6	23,6	17,7
		SD	*2,3*	*1,7*	*5,0*	*16,3*	*0,83*	*1,35*	*28,1*	*75,5*	*0,3*	*0,7*
	NP+ Riz		26,6	25,9	82,9	83,9	9,53	11,69	762,5	753,1	19,0	13,3
		SD	*1,5*	*1,2*	*1,4*	*6,9*	*0,18*	*0,77*	*49,8*	*59,3*	*2,1*	*0,4*
Zodiac	**N**		22,0	27,7	75,3	60,9	0,26	0,40	664,4	637,5	12,3	10,0
		SD	*1,8*	*2,5*	*9,3*	*7,6*	*0,04*	*0,04*	*28,2*	*41,1*	*0,6*	*1,3*
	NP		22,5	23,6	69,8	52,3	6,75	7,04	776,3	735,6	18,9	15,2
		SD	*0,4*	*1,4*	*5,9*	*3,0*	*0,72*	*0,29*	*63,5*	*56,7*	*0,8*	*0,5*
	NFe		23,4	24,5	64,4	59,6	--	--	652,5	696,9	12,3	11,5
		SD	*1,2*	*1,4*	*7,9*	*3,8*	--	--	*58,1*	*52,9*	*1,2*	*0,9*
	NPFe		24,6	25,1	62,8	63,1	7,98	8,61	777,9	770,2	21,9	19,0
		SD	*2,0*	*2,9*	*8,1*	*6,9*	*0,59*	*0,62*	*69,7*	*31,0*	*1,5*	*1,9*
	NP+ Riz		23,0	25,6	74,3	52,9	6,08	7,36	783,8	774,4	18,8	16,5
		SD	*1,6*	*1,0*	*2,1*	*1,8*	*0,66*	*0,58*	*47,5*	*63,0*	*0,7*	*0,8*

Note: Dehydrogenase activity (DH); 1,3,5-Triphenyltetrazolium formazan (TPF);
Alkaline Phosphatase activity (Alk-P), Phenolphtalein (PP); Invertase activity (INV);
SD –standard deviation.

However, in conditions of temporary stress, in the control (N) it was observed that DH activity values were higher than those recorded at 70%WHC, for the "Licurici" by 41.5% and by 25.9% for the "Zodiac" genotype.

It is known, from the literature, that inorganic P administration, affects alkaline phosphatase activity (Wright AL, Reddy KR, 2001). But according to data of Ştefanic (Ştefanic G., 1994) concentrations below 20 mg P_2O_5/100g of soil has no inhibitory effect on soil phosphatase activity. The results showed that application of Fe, at 70%WHC, led to a decrease in activity of this enzyme, from 76.8 (N) to 61.9 (NFe) µg phenolphthalein (PP)/100g soil in 1 hour, for "Licurici" and from 75.3 (N) to 64.4 (NFe) µg PP for "Zodiac". It was observed that the process of mineralization of organic P, under optimum conditions, had a greater potential when both fertilizers (NPFe - treatment) are added in soil, compared to N, NP and NFe treatments. Inoculation of seeds with bio-preparation (NP + Riz) led to a slight increase in activity levels from Alk-P compared with NP treatment. Thus, for "Licurici" it was higher by 30 and 21%, this effect was reduced for the "Zodiac" variety, it showed an increasing of only 6% and 1% to 70 and 35%WHC, respectively. Not established some correlation between the content of P_2O_5 and Alk-P activity in analyzed soil samples.

P_2O_5 content in rhizospheric soil was higher ($p<0.05$) at 35%WHC, than in the optimal water conditions, due to decreasing green mass accumulation by soybean plants.

As an enzyme involved in carbohydrate metabolism was examined extracellular invertase. INV activity, as DH, did not show an obvious dependence from soybean genotype and soil moisture. It had a clear dependence on the fertilization with P, which contributed to increase this activity in rhizosphere by 7.2 – 16.8%. Supplementary Fe nutrition had a pronounced effect only in combination with P (the increase was by 7.4 - 20.8%). NFe treatment was not drastically distinguished from the control (N). The effect on soybean of seed treatment with bio-preparation Rizosideps (NP + Riz) led to a slight increase of this activity in case of 35%WHC (compared with NP) by 5.3% ($p<0.05$) for "Zodiac" and 2.6% for "Licurici", but it was statistically insignificant.

CONCLUSIONS

1. The smaller loss of soybean plants mass in low humidity conditions was found in case of together P and Fe fertilization.

2. Soil microbial activity, determined by the potential DH activity, was maintained at a stable level and did not show any drastic fluctuations.

3. Rhizosphere enzymatic potential indicates a closed link with soil trophicity, in particular the DH and INV activity with P introduction, and the Alk-P with Fe application.

4. Deficient soil moisture (temporary drought) did not significantly reduce the potential of the studied enzymes.

5. Seed inoculation with biological product had no negative effects on the studied parameters and led to Alk-P activity increasing, particularly in the "Licurici" plants' rhizosphere and INV activity under 35%WHC compared to control NP, for the "Zodiac" variety.

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IMPACT OF ORGANIC FERTILIZERS ON BIOCHEMICAL AND AGROCHEMICAL PROPERTIES OF TYPICAL CHERNOZEM SOIL

IMPACTUL ÎNGRĂŞĂMINTELOR ORGANICE ASUPRA PROPRIETĂŢILOR BIOCHIMICE ŞI AGROCHIMICE ALE CERNOZIOMULUI TIPIC

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Abstract. *Organic and organic+mineral fertilization systems with manure amendment, at the rate 15 t ha^{-1}, promote the chernozem soil biochemical and agro-chemical parameters amelioration, and the restoration of correlations in plant development. Specific biochemical parameters: the chernozem urease and phosphatase activities increase, but the invertase activity reduces in soil fertilized by manure in comparison to NPK amendment, only. The organic fertilization of field crops provides the regeneration effect on soil biochemical properties, favors the soil fertility restoration and the crops productivity increase.*

Key words: soil, fertilization system, soil enzyme activity

Rezumat. *Sistemul organic şi organo-mineral de fertilizare cu aplicarea gunoiului de grajd în cantitate de 15 t/ha contribuie la ameliorarea parametrilor biochimici şi agrochimici ai fertilităţii cernoziomului tipic, şi restabilirii relaţiilor corelative în dezvoltarea plantelor. Parametrii biochimici specifici: activitatea ureazică şi fosfatazică a cernoziomului tipic sporeşte, iar invertazică se reduce în sol fertilizat cu gunoi de grajd în comparaţie cu administrarea numai NPK. Fertilizarea organică are un efect regenerabil asupra proprietăţilor biochimice ale solului şi contribuie la reproducerea fertilităţii solului şi sporirii productivităţii plantelor de cultură*

Cuvinte cheie: sol, sistem de fertilizare, activitate enzimatică a solului

INTRODUCTION

From the land of Moldova, perennial plantations occupy around 300,800 ha (8.9% of agricultural land), including in horticulture - 4.1%, viticulture - 4.5%, other plantations - 0.3% (Programul complex, 2004). Deep plowing necessary before the establishment of perennial plantations reduce soil anti-erosion resistance. Soils under orchards which are located on the slopes is in an unprotected state during spring-summer similar to the fallow land and can be eroded. To establish an orchard on fruit-growing land, the soil should be prepared specifically: aligned, cleared, fertilizers are used to ensure nutrient system and improve soil physical properties. Research conducted on different soil types showed that land use in

orchards leads to compaction of top layer just in the first years of existence (Nagacevschi Tatiana, 2004). As a result, soil biological properties responsible for the movement of nutrients in the soil are deteriorated. Organic fertilizers can contribute to maintaining soil fertility and structure, especially after stubbing the old plantations.

The aim of this research was the study of biological (biochemical) and agrochemical properties of typical chernozem, fertilized with cattle manure.

MATERIAL AND METHOD

The research has been conducted on long-term experiment established in 1991 in the north of Moldova (Balceana steppe, 140 km north of Chisinau). The soil is typical chernozem (alluvial clay), with a horizon rich in organic C up to 92 cm.

Soil organic matter content was 4.65% (0-20 cm layer). pH - 6.6-7.1 (water) and 6.2 (salt solution). Total N content is 0.24-0.26%, P - 0.12-0.13%, K - 1.2-1.4%. Three fertilizing systems are studied: mineral fertilizers (kg active ingredient / ha, N - 300; P_2O_5 - 255, K_2O - 255); organic fertilizers (cattle manure, 15 t/ha), and organic-mineral fertilizer. Soil samples were collected on June 11, 2009, with a trepan from the top layer of soil (0-20 cm). Total organic carbon content was determined in air-dried soil samples by wet oxidation with potassium dichromate in an acidified medium, and then the quantification of its excess by the method of Tiurin (Arinushkina, 1970). pH values were measured using a glass electrode, based on the ratio of soil to 1 M KCl solution 1:2.5 (weight: volume).

Ammoniacal nitrogen ($N\text{-}NH_4^+$) was extracted with 0.05 N NaCl solution (1:30 ratio of soil to solution) and subsequently measured with Nessler reagent (Mineev, 1989). Inorganic phosphorus was extracted with 0.5 N acetic acid (1:25 ratio of soil to solution) after Ciricov (Mineev, 1989) and was measured by the method of Murphy and Riley (1962). Water content of soil and dry soil mass were determined immediately after sampling by drying for 6-24 hours at a temperature of 105°C.

Soil dehydrogenase activity (DH) (EC 1.1.1.1) was determined by a modified method of Galstean (1978). Urease activity (Ure) (EC 3.5.1.5) was measured by the method of Khaziev (1990). Alkaline phosphatase activity (AlkP) (EC 3.1.3.1) – by the method of Tabatabai and Bremner (1969). Invertase activity (Inv) (3.2.1.26 EC) – by the modified method of Ciunderova (1971) and Galstean (1978).

Data analysis was performed by use Microsoft Excel for Windows XP (Microsoft Office). Matrix with the same size was analyzed. Mean values were analyzed by Student t-test (bilateral test, type 3 with unequal variation). Correlational analysis was performed by calculating the Pearson coefficient (r) and the coefficient of determination (r^2). The values $r > 0.45$, $r^2 > 0.20$ and $P < 0.05$ give the limits of significance (Aon et al., 2001).

RESULTS AND DISCUSSIONS

Table 1 presents the soil chemical properties. Organic carbon content in typical chernozem fertilized with manure increased, although the difference was insignificant compared to that in soil fertilized with mineral fertilizers (MF). Mixed organic-mineral fertilization (OMF) provided the significantly ($P < 0.05$) highest level of organic matter in the investigated soil. Organic fertilizer (OF) increased the soil pH values and concentrations of mobile forms of nitrogen and phosphorus.

Analysis of dehydrogenase activity (DH) of soil samples showed lower values at mineral fertilization (MF) (2.33 mg TPF g soil^{-1} h^{-1} 30°C) and highest at mixed (OMF) and organic (OF) fertilization (2.83 and 4.08 mg TPF g soil^{-1} h^{-1} 30°C) (table 2).

Table 1

Agrochemical parameters of typical chernozem (0-20 cm upper layer)

Fertilization system	Total C (%)	pH (KCl)	N-NH_4^+ (µg N/ g soil)	Inorganic P (µg P/ g soil)	Water content (%)
Mineral (MF)	2.47 (0.14)	5.4 (0.2)	9.9 (0.4)	34.2 (5.1)	14.9 (0.9)
Organic (OF)	2.59 (0.20)	5.8 (0.6)	12.2* (0.8)	36.0 (11.5)	13.0* (0.4
Min+Org (OMF)	2.66* (0.19)	5.6 (0.5)	11.7* (0.9)	55.0* (2.3)	15.0 (1.0)

Note. Mean values of 4 replicates; in brackets is given standard deviation (SD)
* - significant difference against the mineral fertilization system, P <0.05

Urease activity (Ure) and phosphatase (AlkP) revealed the same trend. The lower values of Ure activity were observed at mineral fertilization (28.8 µg NH_3 g soil^{-1} h^{-1} 37°C) and significantly higher values were recorded at mixed and organic fertilization (respectively 39.9 and 47.4 µg NH_3 g soil^{-1} h^{-1} 37°C).

Mean alkaline phosphatase activity (AlkP) were equal at mineral and mixed fertilization (851-852 µg pNP g soil^{-1} h^{-1} 37°C), and insignificantly (P>0.05) higher at the organic fertilization (864 µg pNP g soil^{-1} h^{-1} 37°C). Activity of invertase (Inv) ranged from 630 µg Glu g soil^{-1} h^{-1} 37°C at mineral fertilization to significantly lower values at the mixed (592 µg Glu g soil^{-1} h^{-1} 37°C) and the organic (563 µg Glu g soil^{-1} 37°C). Thus, the chernozem urease and phosphatase activity typically increased and invertase activity reduced in soil fertilized with manure compared to the one fertilized with NPK, only.

Table 2

Biochemical parameters of soil at different fertilization systems

Fertilization system	DH[a] µg TPF g soil^{-1} h^{-1} 30°C	Ure[b] µg NH_3 g soil^{-1} h^{-1} 37°C	AlkP[c] µg pNP g soil^{-1} h^{-1} 37°C	Inv[d] µg Glu g soil^{-1} h^{-1} 37°C
Mineral (MF)	2.30 (0.38)	28.8 (9.6)	851 (17)	630 (14)
Organic (OF)	4.08 (3.05)	47.4* (22.6)	864 (18)	563* (21)
Min+Org (OMF)	2.83 (1.63)	39.9* (16.9)	852 (27)	592* (11)

Note. Mean values of 4 replicates; in brackets is given standard deviation (SD); DH[a] – dehidrogenase activity, Ure[b] –urease activity, AlkP[c] – alkaline phosphatase activity, pNP – para-nitrofenol, Inv[d] –invertase activity, Glu – glucose; * - significant difference against the mineral fertilization system, P <0.05

A positive correlation between levels of ammoniacal nitrogen and soil urease activity (Ure) was observed at all fertilization systems, the correlation coefficient (r) was for FM, OF and OMF systems, respectively 0.51, 0.68, 0.74. Also, a high positive correlation r = 0.76-0.79 between the values of ammoniacal

nitrogen and dehydrogenase activity (DH), that is the microbial activity, was revealed in soil amended with manure. Only for this last treatment of the studied soil a correlation between alkaline phosphatase activity and inorganic phosphorus content was found, and it was the negative correlation (r = -0.55). Urease and phosphatase activities were positively correlated with soil organic carbon content for the MF and OF fertilization systems. The summarized results lead to the conclusion that organic fertilization has a renewable effect on soil biochemical properties, contribute to reproduction of soil fertility. Organic fertilization system is recommended for implementation in sustainable agriculture.

CONCLUSIONS

1. Organic and organic + mineral fertilization systems in crop rotation with manure amendment, at the rate 15 t ha^{-1} surface, promote the biochemical and agro-chemical parameters amelioration, and the restoration of correlations in plant development.

2. Specific biochemical parameters: the chernozem urease and phosphatase activity increased, but the invertase activity reduced in soil fertilized by manure in comparison to NPK amendment, only.

3. The biotechnological, organic fertilization provides the regeneration effect on soil biochemical properties, favors the soil fertility restoration and it is recommended for the implementation in the sustainable agriculture.

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RESEARCHES REGARDING THE SOIL TILLAGE MACHINERY SYSTEMS FOR VINEYARDS

CERCETĂRI PRIVIND SISTEMELE DE MAŞINI PENTRU MECANIZAREA LUCRĂRILOR SOLULUI ÎN PLANTAŢIILE VITICOLE

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Abstract. *The experiments took place during the year 2009, in a Chaselas Dore variety vineyard, within the "Vasile Adamachi" experimental station and were aimed to establish the most adequate soil tillage system. The quality indices, average working speed and soil penetration resistance were evaluated, for five working variants. Interpretation of the experimental results allowed the establishment of most favorable variants for soil tillage, in accordance with the concept of sustainable agriculture and aiming to soil preservation.*

Key words: mechanization, soil tillage, technology

Rezumat. *Experienţele au fost desfăşurate în anul 2009, în plantaţia de viţă de vie cu soiul Chasselas dore din cadrul SDE „Vasile Adamachi" din Iaşi şi au vizat stabilirea sistemei de maşini pentru mecanizarea lucrărilor solului. Pentru aceasta s-au determinat indicii calitativi de lucru, viteza medie şi rezistenţa solului la penetrare pentru cinci variante tehnologice. În urma interpretării rezultatelor obţinute s-au stabilit variantele optime de tehnologii pentru mecanizarea lurărilor solului şi care corespund conceptului de agricultură sustenabilă, în principal pentru conservare solului.*

Cuvinte cheie: mecanizare, lucrările solului, tehnologie

INTRODUCTION

In the general context referring to the application of the sustainable agriculture concept and especially of soil conservation technologies in vineyards, several variants of soil tillage on the intervals between rows were experienced in 2009.

Four different non-conventional, conservative, tillage technologies were tested; a witness variant, using a classical tillage technology, was also taken into account.

The tested technologies included combined agricultural machinery and complex units, comprising sowing equipments, thus reducing both agricultural traffic and soil compaction.

Interpretation of experimental results allowed the selection of the best technological variant (in the terms of sustainable agriculture), assuring land protection and conservation

MATERIALS AND METHODS

The experiments took place in a vine plantation, Chasselas dore variety, established in 1985, with planting distances of 2.2 x 1.2 m and a density of 3787 plants/ha. The plantation is placed on a terrain with 8% slope, western - southwestern exposure and north - south rows orientation, along the contour lines. The prevailing soil is cambic chernozem, with a loamy clay texture and 20-24% humidity in the 0-40 cm depth layer.

Temporary soded with Facelia (*Phacelia tanacetifolia* L.) was applied to variants V4 and V3 because it prevents weed formation due to the quick development, the very dense foliage, the high biomass quantity and low requirements towards pedoclimatic factors.

This plant has a short growing season, emergence occurs in 8-10 days, it flowers 40-60 days after sowing, and the total flowering duration is about 50-60 days.

For all the five technological variants (table 1) the working quality indices were determined as a function of working speed; variant V1 was the witness variant, using the classical 2.25 m distance between the rows vineyard tillage machinery system (the PCV 1.8 cultivator plough, the DPV carried disc harrow and a cultivator equipped with arrow type active knives).

In variant V_2, the CV 5 soil scarificator was used for basic soil tillage, while the vibrocoulter V.F 7 was used for total cultivation.

The CV 5 scarificator has a working width of 150 cm and is composed of a V-shaped rigid frame on which five chisel type active knives are mounted; the overall mass is 215 kg.

The VF 7 vibrocultivator consists of a frame, seven double-elastic supports on which the working devices (arrow with equal wings and roller) are mounted. The working depth is adjusted with the help of the supporting wheel; two hydraulic cylinders allow the adjustment of the working width.

Table 1

Mechanization of soil tillage technologies in the vineyard plantation

Technology Variants	Aggregates used	Soil tillage	Traffic (no.crossings)
V_1 (witness)	SV 445 + PCV 1,8 SV 445 + DPV 1,5 SV 445 + PCV (Knives arrow)	Autumn ploughing Spring soil loosening Cultivation works	**5**
V_2	Aster 45 +CV 5 Aster 45 + V.F 7	Soil scarifier Cultivation works	**4**
V_3	Aster 45 + DL 1300 Aster 45 + DLV 1500	Fall soil tillage Sowing Facelia	**2**
V_4	Aster 45+ DPV 1,5 Aster 45 + DLV1500	Spring disc harrow work Sowing Facelia	**2**
V_5	Aster 45+ PCVM 1,8 cu Aster 45+ DL 1300 (Claw raising)	Fall soil loosening Cultivation works	**3**

In variants V3 and V4 the complex unit DLV 1500 was used for soded

The vertical rotor mill (DL-1300) can be used either as a stand alone machine, for germinative bed preparation after ploughing, or aggregated with the Vitigreen (DLV-1500) sowing machine, in order to prepare the germinative bed and soded.

The complex unit composed of mill and sowing machine requires 30-45 hp tractors, with the working devices being powered by the tractor's PTO at a speed of 540 rpm.

The working depth of the vertical rotor mill is adjusted via the Packer type roller. The Vitigreen sowing machine consists of a hopper with a capacity of 250 liters and nine distributors; its total weight is 110 kg.

The devices used for the evaluation of quality working are: furrow depth measurement dipstick, with 1 cm accuracy, simple metric frame, metric frame with a 50 mm mesh, electronic balance, timer, paper bags for collection of samples and electronic static penetrometer (Penetrologger type).

The quality indices were evaluated using the following relationships:

The average working depth (a_m) is calculated the relationship

$$a_m = \frac{\sum_{i=1}^{i=n} a_i}{n} \text{ cm}$$

where: a_i are the values of the working depths, measured with the dipstick; n - number of measurements (20 measurements on 100 m travel distance)

The **soil break-up degree** (G_{ms}) was computed using the relation

$$G_{ms} = \frac{\sum_{i=1}^{i=n} \frac{M_{sci}}{M_{sti}}}{n} \cdot 100,\%,$$

where: M_{sci} is the weighted mass of soil with clods having the dimension lower than the 5 cm conventional dimension; M_{sti} – overall mass of soil., n - number of measurements (samples taken), which must be at least three. ,

The soil samples are weighted with an accuracy of 10 grams and are drawn using the square metric frame (with one square meter area), on the working depth, in at least three random positions located on the diagonal plot.

Soil loosening degree (G_{as}) was computed with the relation

$$G_{as} = \frac{\sum_{i=1}^{i=n} \frac{h_i}{a_i}}{n} \cdot 100,\%,$$

where: h_i is the height of tillage soil with respect to the until aged soil (cm) a_i - working depth (cm), n - number of measurements taken (at least 10, along 100 m).

Plant mass coverage with soil (G_{av}) was determined with the relationship

$$G_{av} = \frac{\sum_{i=1}^{i=n} \frac{M_{vai}}{M_{vti}}}{n} \cdot 100,\%,$$

where: M_{vai} is weighted mass of plants covered with soil; M_{vti} – overall weighted mass of plants material, n - number of measurements taken (at least 3.)

The plant samples are weighed with 1 g accuracy and are collected (before and after ploughing) over one square meter surface, using the metric frame; there should be at least three repetitions, diagonally placed on the lot.

RESULTS AND DISCUSSIONS

The main results obtained in during the experimental researches are presented in table 2, being as follows:

The average working depth (a_m) has the minimum value of 3 cm for variant V3 and a maximum value 35 cm for V_2 variant. The maximum deviation from the imposed working depth was 1.6 cm for variant V_1 and was due to the downward forces acting upon the plough's active organs.

Soil break-up degree (G_{ms}) varies depending on the technology used, soil humidity and working speed of the unit.

Taking into account that the agro technical requirements impose a soil break-up degree of at least 90%, we concluded that the best option is V_3, which achieved a value of 98.76% for this index. Variants V_4 and V_5 led to relatively close results, with 85.93% and respectively 85.83%.

Table 2

Influence of speed on some soil tillage quality working indices

Variants	Average working speed *Km/h*	Quality indices			
		a_m *(cm)*	G_{ms} *%*	G_{as} *%*	G_{av} *%*
V_1	3,63	20	79,23	24,9	95,06
V_2	4,14	35	77,23	26,8	78,93
V_3	1,95	3	98,76	25,3	84,43
V_4	6,27	10	85,93	23,2	93,60
V_5	6,61	15	85,83	21,2	88,10

In terms of soil loosening **degree** (G_{as}), the experimental results for all the working variants were comprised between 21.2 and 26.8%, these being acceptable values from an agro technical point of view..

The best value when referring to **plant mass coverage with soil** (G_{av}) was recorded for variant V_1 (95.06%), while the lowest value was recorded for variant V_2 (78.93%).

Due to the 2.25 m distance between the rows, the displacement of the tillage units is always performed on the same ruts, thus resulting in a higher soil compaction on the tracks of the tractor wheel. In order to evaluate this effect, the penetration resistance was measured a week after the completion of the maintenance works (during the growing season); the average values of this index are presented for soil layers comprised zero and 40 cm depth. Compaction of soil is influenced both by the substrate upon which the working organs act and soil humidity.

The maximum value (1.06 MPa) was recorded for variant V_1, being still within the limits imposed by the requirements referring to normal growth and development of plant roots.

The values of penetration resistance that were recorded for the other technological variants are significantly lower, namely 0.42 MPa for variant V_3 and 0.56 MPa for variant V_2.

The requirements imposed by the sustainable agriculture concept are relatively easily met by the proposed soil maintenance technologies when the firm has adequate machinery systems.

In choosing the optimal soil maintenance system, soil erosion control should also be taken into account, as well as the risk of land and environment pollution and degradation, the final goal being to achieve an economically efficient production.

Table 3

Variation in penetration resistance as a function of depth

Variants	Depth (cm)	Penetration resistance			Average (MPa)	
		R_1	R_2	R_3	repeat	variants
V_1	0-10	0,84	0,89	1,09	0,94	**1,06**
	10-20	1,04	0,89	1,27	1,06	
	20-30	0,73	1,08	1,35	1,05	
	30-40	1,04	1,17	1,46	1,22	
V_2	0-10	0,31	0,19	0,28	0,26	**0,56**
	10-20	0,40	0,57	0,40	0,45	
	20-30	0,89	0,71	0,59	0,73	
	30-40	0,53	0,80	1,10	0,81	
V_3	0-10	0,35	0,43	0,24	0,34	**0,42**
	10-20	0,50	0,30	0,63	0,47	
	20-30	0,43	0,50	0,33	0,42	
	30-40	0,49	0,41	0,50	0,46	
V_4	0-10	0,32	0,25	0,33	0,30	**0,63**
	10-20	1,00	0,91	1,10	1,00	
	20-30	0,67	0,60	0,49	0,58	
	30-40	0,78	0,64	0,61	0,67	
V_5	0-10	0,43	0,58	0,65	0,55	**0.92**
	10-20	1,04	1,32	0,97	1,11	
	20-30	0,85	1,34	1,02	1,07	
	30-40	1,08	0,96	0,90	0,98	

CONCLUSIONS

1. Following to the developed experiments and interpretation of obtained data, the best technological options for mechanization in vineyards with a 2.25 m distance between rows was established.

2. When considering the criteria of reduction of both soil maintenance works and energy consumption, the use of unconventional systems, conservative tillage, highlighted that the best technological variants were, in order, V_3 followed by V_4 and V_5, which are mechanized tillage technologies regarded as alternatives to conventional technology.

3. When it is necessary to apply ploughing using the mouldboard plow 1.8 PCV, variant V_3 (or V_4) should be considered, using this equipment to perform autumn soil tillage (instead of using the disk harrow or the vertical rotor mill).

4. Application of variant V_1 requires generally higher costs per unit of surface due to the higher number of operations during the growing season (high fuel consumption), coupled with lower values of the quality indices taken into account.

5. V_3 and V_4 variants are more favorable than the other ones because a single pass (in spring) with the complex unit consisting of the DL 1300 vertical rotor mill 1300 and the 1500 Vitigreen sowing machine leads to soded with facelia of the space between rows, thus making useless other additional operations and facilitating the access of equipments in rainy periods.

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RESEARCH REGARDING A COMPLEX AGGREGATE FOR THE ESTABLISMENT OF VEGETABLE CROPS AIMING THE ENERGETIC CONSUMPTION REDUCTION AND PRESERVATION OF THE AGRO PRODUCTIVE POTENTIAL OF THE SOIL

CERCETĂRI ASUPRA AGREGATULUI COMPLEX PENTRU ÎNFIINŢAREA CULTURILOR DE LEGUME ÎN SCOPUL REDUCERII ENERGIEI ŞI CONSERVAREA STRUCTURII SOLULUI

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Abstract. *In the framework of a CEEX project accomplished by SCDL Buzau, has been realised an experimental model of a complex aggregate that execute in one step the preparing of germinative bed, open the ditches, administering fertilizers and sowing the vegetable cultures in spring, of the ploughed in autumn soils. The device used by the complex aggregate is made of a dismountable crankshaft drive from the synchron power take-off shaft and put in oscillatory movement tillers articulate mounted with parallelogram mechanisms, with mounted blades at 45 degree angle with a special clamping devices, distributed so that they cover the area on the furrow of 900 mm. The target of the preparing germinative bed section was to crumble, aerate and destroy the weeds from the soil in the spring. The aggregate is recommended for small and medium farms, the tests have been made in the spring time on soils ploughed in autumn.*

Key words: complex aggregate, fuel consumption, preserving agro productive potential of the soil

Rezumat. *În cadrul proiectului CEEX/2005 al SCDL Buzău a fost realizat un model experimental de agregat complex care să execute dintr-o singură trecere pregătirea patului germinativ, deschiderea rigolelor, modelarea solului, administrarea îngrăşămintelor starter şi semănatul culturilor de legume primăvara în arătură efectuată toamna. Secţia de pregătit patul germinativ foloseşte un arbore cotit acţionat de la priza de putere a tractorului, care transformă mişcarea de rotaţie în mişcare oscilatorie, pe care o imprimă unui element paralelogram pe latura inferioară a căruia se află montate organe active în formă de lamă înclinate la 45 de grade, care execută mărunţirea solului. Organele active în formă de lamă sunt astfel repartizate încât pe lăţimea de lucru a brazdei de 900 mm execută două treceri suficiente pentru a mărunţi, a afâna solul şi a distruge buruienile răsărite în primăvară. Agregatul complex este recomandat fermelor legumicole mici şi mijlocii, încercările fiind efectuate primăvara în terenurile arate toamna.*

Cuvinte cheie: agregat complex, consum de combustibil, conservarea structurii solului

INTRODUCTION

In Romania and in other countries with a tradition in vegetable growing, there have been developed aggregates that make administering fertilizers and sowing (Toma D., 1972), or administering fertilizers and modelling the soil in only one step (Bernacki H., 1972). There have also been attempts to execute in one step the preparing of the germinative bed with the cutter coupled at the soil modelling machine but the aggregates remained in the prototype phase or the production has been stopped after a small number of copies.

MATERIAL AND METHOD

The complex aggregate (fig.1) made in the SCDL Buzau's mechanization laboratory within CEEX 43 project is dedicated to the small and medium vegetable farms and it is made of the germinative bed preparing, the ditch opening, the chemical fertilizers administering and the sowing departments. The aggregate research has been made in the research area of SCDL Buzau.

Fig. 1. Complex aggregate

Fig. 2. Preparing the germinative bed section

1. Preparing the germinative bed section (fig. 2), that works on the active organs blade type principle bent at 45 degrees with a oscillator movement, disposed on three sections, with seven active organs on a 900 mm work area, displaced so that each active organ makes two passes on the same work belt, gave satisfying results regarding the fiability and the qualitative work index. The aggregate has been tested in two contexts: directly in the autumn ploughing and prepared with the disk harrow in the spring time. No differences have been noticed in any of the situations about the work quality, so that the main qualitative indexes registered the below values:

- Soil crumbling degree: Gms = 92,4 %
- Weed perish degree: Gdb = 98 %

2. The soil modelling section is made of the arrow type active organs, assembled on the aggregate frame in front of the modelling section that helps forming the ditches, level and compact the drill. The arrow type active organs help adjust the work depth necessary especially on the soils that have been compacted during the winter. The qualitative indexes for the soil modelling department registered the below values:

- The medium deviation comparing to the medium work depth = 0,045 am
- The maximum deviation = 0,093 am

- The standard deviation Sa = 0,045 am
- The work depth variation coefficient Ca = 0,044
- The soil levelling degree Gns = 95%

3. The fertilizing department, made of a bunker that has two distribution machines on it's inferior side, is in serialized manufacture at MAT Craiova where it has been purchased from and is mounted on the aggregate frame behind the preparing of the germinative bed section. The section has the role of administering the starter fertilizer through two tubes placed in front of the active organs of the preparing of the germinative bed section, which incorporates it in the soil. The distributors are activated from the tractor's synchronic power take-off through the crankshaft of the germinative bed to a chain drive, a spiral wheel spiral reducer and the final chain transmission. The fertilizer feed is adjusted by changing the chain transmission report and through the variation of the distributor's active surface, that ensures sowing norms between 50-400 kg/ha.

The fertilizing equipment is homologated by the builder works and determining the qualitative work indexes is no longer necessary.

Fig. 3. Transmission for fertilizing and sowing section

Fig. 4 Sowing section with double discs drill

The sowing section was made using the bins endowed with seed distribution of the multifunctional aggregate AM-9 machines, made by MAT Craiova and consists in four seed bins with an adjustable active surface, mounted on the aggregate frame, that receive the movement through a chain transmission from the spiral wheel spiral reducer, a chain transmission made of two groups with seven chain wheels each and a chain transmission from the agitators axis to the distributor axis (Fig. 3).

The sowing section transmission can make 24 transmission reports, and by adjusting the distributor's active surface according to the 10 gradations on the rules mounted on the bins, the number of possible adjustments of the feed is 240.

The seed/hectare norm for the species in the research is 1-30 kg/ha.

The sowing section is foreseen with tubes that drive the seeds and double disk drilling on which are mounted some work depth limitation cylinders (Fig. 4).

The double disk drills are mounted on a bar of the cultivator through the parallelogram type devices that allow copying the soil dishevelment maintaining the drills position horizontal and in order to adjust the penetration force of the drills the parallelogram elements are foreseen with springs that are mounted in various positions.

As the seed bins have been taken over by a machine in serialized manufacture and have been homologated, the qualitative work indexes have not been determined.

RESULTS AND DISCUSSIONS

The energetic and qualitative work indexes registration

The aggregate has been tested in two variants: directly in the autumn ploughing and prepared with the disk harrow in the spring time.

The energetic indexes: productivity and fuel consumption totally favour the complex aggregate, with significant differences (tables 1, 2, 3, figures 5, 6).

In order to compare the productivities for the traditional technologies with the complex aggregate technology the productivity was calculated in hours/one ha.

Table 1

Energetical indices of devices for setting up the vegetable crops – medium farms – classical version 1

Work – Device	Work speed (Ws) km/h	Work width (Ww) m	Time use coefficient (Kr)	Effective capacity (Wef) ha/h	Effective capacity (Wef) h/ha	Fuel consumption (Ql) l/ha
Fertilization F6	5,0	4.2	0,4	3,02	0,33	2,2
Preparing the germinative bed GD-3,2	6,3	3,2	0,5	3,6	0,27	7.2
Opening of the ditches MDR-6	3,6	4,2	0,6	3,3	0,30	3,0
The modeling MMS-1,4	3,1	1,4	0,7	1,09	0,9	6,3
Sowing SUP-29	4,3	2,6	0,5	4,0	2,0	2,1
TOTAL	-	-	-	-	3,8	20,8

Table 2

Energetical indices of devices for setting up the vegetable crops – small farms – classical version 2

Work – Device	Work speed (Ws) Km/h	Work width (Ww) m.	Time use coefficient (Kr)	Effective capacity (Wef) ha/h	Effective capacity (Wef) h/ha	Fuel consumption (Ql) l/ha
Fertilization F2	5,1	1,4	0,4	1,3	0,97	2,2
Preparing the germinative bed FPL-1,4	3,2	1,4	0,5	0,8	1,25	15
Opening of the ditches MDR-6	4,7	1,4	0,7	1,65	0,6	5,0
The modeling MMS-1,4	3,1	1,4	0,7	1,09	0,9	6,3
Sowing SU-1,4	4,1	1,4	0,5	1,03	0,97	3,3
TOTAL	-	-	-	-	4,69	31,8

Table 3

Energetical indices of the experimental model of complex aggregate

Work - Device	Work speed (Ws) Km/h	Work width (Ww) m.	Time use coefficient (Kr)	Effective capacity (Wef) ha/h	Effective capacity (Wef) h/ha	Fuel consumption (Ql) l/ha
Preparing the germinative bed, fertilization, opening of the ditches, the modeling, sowing AC-1,4	3,4	1,4	0,3	0,51	1,96	14,3

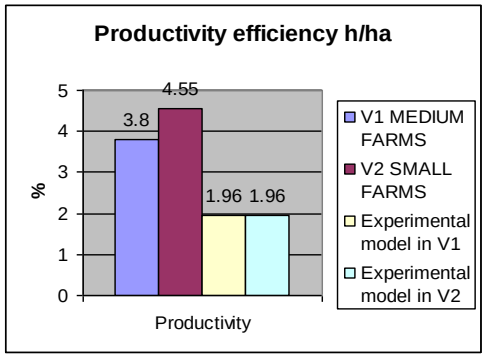

Fig. 5. Productivity efficiency

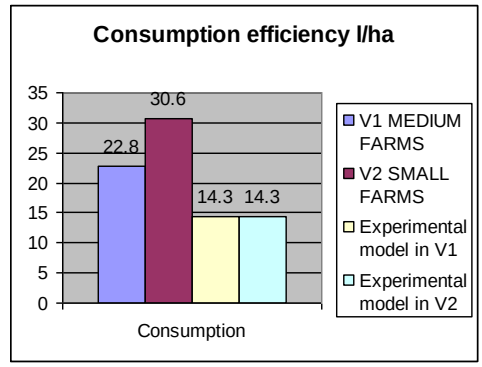

Fig. 6. Consumption efficiency

CONCLUSIONS

The qualitative work indexes illustrate a good field work of the complex aggregate. The preparing of the germinative bed section has a simple, fiable construction, with blade type organs, bent at 45 degrees, which make the soil crumbling and the weed perish with a reduced energetic consumption, because it selects the soil particles without providing them with a very high kinetic energy like the cutter. The blade type active organs have a simple clamping system which makes it easy to mount and change position in order to constitute the various work schemes.

The preparing of the germinative bed section can constitute the basis for making an agricultural machine that adds to the existent agricultural machines system a machine that completely reduces the horizontal rotor cutters that destroy the soil structure, have high energy consumption and have a negative impact on the environment.

The soil modelling section though coupling arrow type active organs at the modelling device ensures an optimal work depth regardless the soil compacting degree and eliminates an extra work on the field.

The administration of the starter fertilizers while sowing ensures a good healthy plant growth.

The sowing section is characterized by a larger broad of sowing norms because of the several transmission reports and the distributors with the variable active surface and by the sowing depth consistency ensured by coupling the machine frame with the drills through parallelogram elements and through mounting the depth limitation cylinders on the double disk drills.

The energetic indexes: productivity, fuel consumption, sliding and qualitative work indexes totally favour the complex aggregate, with significant differences.

In order to be tested in production conditions in 2009 the aggregate will be put in use by the project partners and the private producers.

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THE INFLUENCE OF MISTLETOE (*VISCUM ALBUM* SPP. *ABIETIS*) ATTACK ON FIR TREE (ABIES ALBA) IN SOLCA FOREST ARRONDISSEMENT SUCEAVA DISTRICT

INFLUENŢA ATACULUI PRODUS DE VÂSC (*VISCUM ALBUM* SSP. *ABIETIS*) ASUPRA BRADULUI IN OCOLUL SILVIC SOLCA JUDEŢUL SUCEAVA

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Abstract*. The present paper was elaborated as a consequence of a study made by the U.P. III Ilişeşti production unit, in the u.a. 26A and 27A organization units. The Solca Forest Range and it followed the debilitation of some fir trees caused by the attack produced by the mistletoe (Viscum album ssp. abietis). The mistletoe causes a strong physiological debilitation with effects on the growth of the trees, on the wood quality and a high vulnerability of these ones to strong winds, heavy snow falls, to the attacks of the pathogen agents, especially, insects and fungus. The main negative effect of the attack produced by the mistletoe is the wood qualitative degradation, leading to the death of the tree.*

Key words: *Viscum album* ssp. *abietis*, forest, damages, attack

Rezumat*. Lucrarea de faţă a fost elaborată în urma studiului efectuat în cadrul unităţii de producţie U.P. III Ilişeşti, în unităţile amenajistice u.a. 26A şi 27A, Ocolul silvic Solca şi a urmărit debilitarea unor arborete de brad cauzată de atacul produs de vâsc (Viscum album ssp. abietis). Vâscul provoacă o pronunţată debilitare fiziologică cu efecte asupra creşterii arborilor, a calităţii lemnului şi vulnerabilităţii ridicate a acestora la vânturi puternice, căderi abundente de zăpadă, la atacurile agenţilor patogeni, în special, insecte şi ciuperci. Principalul efect negativ al atacului produs de vâsc este degradarea calitativă a lemnului, conducând la moartea arborelui.*

Cuvinte cheie: *Viscum album* ssp. *abietis*, pădure, pagube, atac

INTRODUCTION

Of the three mistletoe subspecies *Viscum album* subsp. *album* L, *Viscum album* subsp. *Pini*, *Viscum album* subsp. *Abietis*, in Romania can be met only the *Viscum album album* and *Viscul album abietis subspecies.* The distribution of these two subspecies is not fully known. The *Viscum album abietis* subspecies is spread in the northern region of Romania (Maramures, Bucovina) and in Banat (Barbu, 1991).

The fir mistletoe is spread in a few places from Bucovina (Ilişeşti, Humor Monastery, Solca, Bucşoaia, Slătioara on Prihodişte, Putna), Maramureş (Bistra on Topolau, Gruiul popii, Petrova, Repedea on Holovraci, Dragomireşti on Turcusescu) and Dealul Lung in the Forest of Peltic (the Focsani region). The fir mistletoe is also spread in the Anina and Oravita Forest Range (Nanu, 1969) in Banat. Subsequent studies (Barbu, Barnoaia, 2005; Barbu, 2006) showed that the mistletoe was spread in the Forest Ranges of Văratec, Vaduri, Casin Monastery,

Agas in Moldova. At the same time it can be met in the Forest Range of Sinaia and Brasov (Şofletea, 1993). As a consequence of the attack produced by the mistletoe (*Viscum album* ssp. *abietis*) it was also pointed out the presence of some phytopathogen and entomophagous agents in the debilitated fir trees (Grudnicki, 2006). In our country it was described a specific drying type, met only in the fir tree from the edge of the habitat and only in the mistletoe parasitic species. It is present with a high frequency in the Anina-Oraviţa and Solca-Gura Humorului areas. It is usually met in 60-120 years old pure or mixed (age homogenous), in which the frequency of the trees attacked by the mistletoe exceeds 80% from the total of exemplars. The mistletoe installed itself 30-40 years ago in comparison with the periods when the dryings are registered.

MATERIAL AND METHOD

The researches were made on the range of the Solca Forest Range, the U.P. III Ilişeşti production unit and the 26A and 27A organization units that include mixture forests of fir, beech and spruce. The territory of the production unit is situated in two phytoclinamatic levels: the mixture mountainous level, FM2 and the beech forest mountainous- premountanous level, FM1+FD4. As part of the study, there were made test surfaces in which there were made observations and measurements; for estimating the attack produced by the mistletoe in the two organization units and there were placed two test surfaces of 20 x 50 m; in each of the two organization units there were determined the following characteristics: species, diameter at 1,30 m, height, the height of the crown, the damaging class, the Kraft class; the pointing out of all the defects at the level of the inventoried trees and the data processing by specific methods (Giurgiu, 1979). For the map representation of the areas where the mistletoe can be found was used the UTM mapping system (Universal Transverse Mercator) for the map of Romania with a network of 10 x 10 km (figura1). In their majority, the places have their coordinates indicated in a code formed by two letters followed by two numbers (ex. Ilişeşti MN 27).

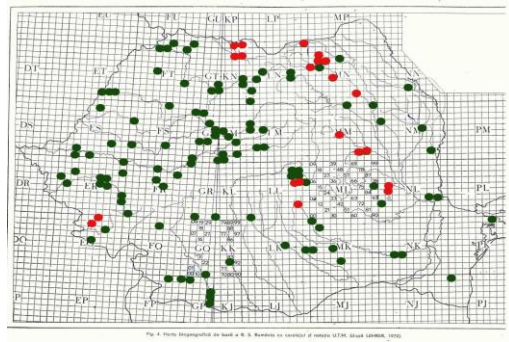

Fig. 1. The distribution of the *Viscum album album* and *Viscum album abietis* subspecies in Romania ● *Viscum album abietis* ● *Viscum album album* (Barbu, 2006)

RESULTS AND DISCUSSIONS

From the research made in the study area, it was highlighted the fact that

the trees that are predisposed to drying, there were discovered a series of typical symptoms such as: the obvious flattening of the top by the premature forming of the "stork nest"; the progressive rarefying of the crown from bottom to top and from inside to outside, the appearance of the dry branches in the crown, as a consequence of the premature fall of the needles from the inferior and middle third of the crown; the abnormal thickening of the branches and of the stem at the intersection of the branches on the stem, in the middle third of the crown; the appearance of the "greedy" branches on the stem and on the superior side of the Ist order branches; the diminution of the needles length and of the growths in the last years; abundant fructification (almost every year) in the sick trees, small cones; strong mistletoe attack that determines the 2-3 times thickening of the branches or of the stem in the middle third of the crown. Due to the lack of light, in the thick trees, the mistletoe installs itself on the taller trees (dominant and predominant), without producing very bad damages.

The trees from studied area were included in the four damaging classes (Barbu, 1995), that establish the main evolution phases of the attack and the outer symptoms that can be observed in the trees crown: class 0- characterized by the lack of the mistletoe attack (figure 2a); class 1- incipient attack with mistletoe bushes on the sideways branches (figure 2b); class 2- moderate attack with high frequency of the mistletoe bushes in the crown and with dry branches (figure 2c); class 3- strong attack with mistletoe bushes in the whole crown and on the stem, often with asymmetric crowns and dry top (figure 2d).

a. b. c. d.

Fig. 2. The framing of the parasite trees in damaging classes (a, b, c, d.) (original)

When the age of the attack is older (the last phase of the attack), there are no more mistletoe bushes in the crown, but the traces of the attack are obvious among the dry branches, the dry top and the deformations at the level of the branches and stem. Often, the trees whose crown is almost dry form on the stem a compensation crown (greedy branches) that often has a length bigger than the crown itself taking over the photosynthetic functions of this one. These crowns formed themselves in the last 15-20-25 years (figure 3 a,b). In this way, it can be explained the fact that the trees that are in the last phase of the attack (3rd class) have in the last years a remarkable growth.

a. b.

Fig. 3. The crown morphology. **a.** dry branches, the fall of the needles; **b.** the crown asymmetry, the stork nest (original)

The mistletoe haustoriums grow progressively and reach up to the host cambium area for absorbing water and mineral salts, confirming Frochot and Sallé's researches from 1980, Sallé 1983. The haustoriums exceed the cambium area and they passively deepen into the wood (they do not actively interact with the xylem but they are passively embedded into the wood). In the longitudinal section, the haustoriums have an elliptical shape, of different sizes, and in the tangential section they have the shape of nails. The cortical belts go along the liberian tissue and as a result they lead to the sideways extension of the mistletoe.

a. b.

Fig. 4. The mistletoe haustoriums effects. a. abnormal thickening of the branches; b. traces left by the haustoriums in the branches of the trees attacked at the insertion on the stem of the mistletoe (original)

The distribution analysis of the number of trees on diameters categories it is noticed on SP I Ilişeşti test surfaces 26A, that the highest weight of the infested trees is comprised between 50-58 cm diameters categories.

Taking into consideration that the SP I Ilişeşti 26A test surface is of 1000 m^2 and we have the following distribution, extra polling at each hectare, we will get the following percentages: 22% represents the trees from the 0 damaging class; 26% the trees form the 1 damaging class; 43% of the trees from the 2^{nd} damaging class; 9% of the trees from the 3^{rd} damaging class (figure 5).

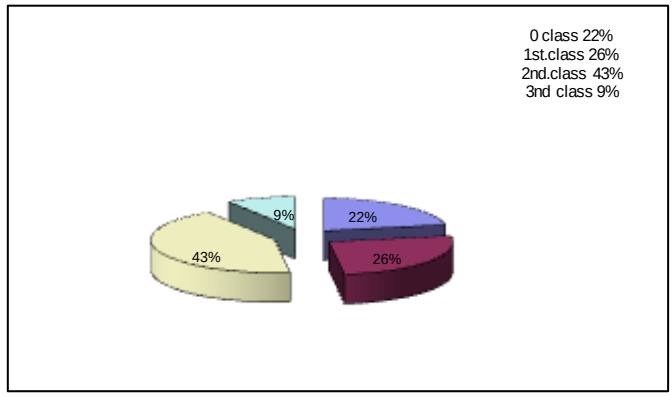

Fig. 5. The distribution of the number of trees on damaging classes (u.a. 26A)

In the SP II Ilişeşti 27A test surface the highest weight of the damaged trees, because of the attack produced by the mistletoe, it is comprised between the 36-48 cm diameter categories.

It is noticed that in the SP II Ilişeşti 27A test surface the percentage of the trees attacked by the mistletoe is over 70% from the total number of inventoried trees. The trees from the 1st class of damaging hold the biggest percentage (35%), followed by the trees from the 2nd and 3rd damaging class (25%), meaning 10% (figure 6).

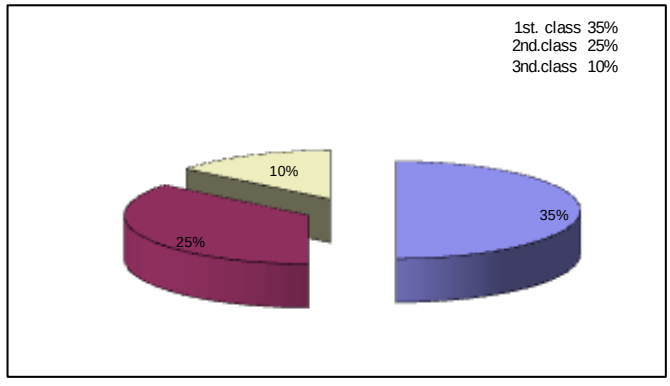

Fig. 6. The distribution of the number of trees on parasitic classes

It is noticed that the percentage of the healthy trees is of 30%, while the percentage of the trees attacked by the mistletoe is of 70%.

CONCLUSIONS

After the research it was observed: in the test surface placed in the 26A organization area the percentage of the trees attacked by the mistletoe is of 78%,

in comparison with the percentage of the test surface from the 27A organizational area which is of 70%;

In the SP I Ilişeşeti test surface, the damaging class the has the biggest weight is represented by the 2nd class with a percentage of 43%, while in the SP II Ilişeşti test surface the damaging class with the biggest weight is represented by the 1st damaging class;

As part of the SP I Ilişeşti 26A test surface the greatest weight of the trees attacked by the mistletoe is comprised between the 50-58 cm diameter categories, categories that differ in the case of the SP II Ilişeşti 27A test surface, being comprised between 36-48 cm;

The mistletoe exerts on the tress a pathological action that can be seen from two points of view: physiological and economical;

From here results that the mistletoe has on one side influences on the trees growth, and on the other side on the wood quality.

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RESEARCH ON PESTS FOUND IN FOREST NURSERIES IN NORTH-EAST OF MOLDAVIA DURING 2005-2009

CERCETĂRI CU PRIVIRE LA DĂUNĂTORII DEPISTAŢI ÎN PEPINIERELE SILVICE DIN NORD-ESTUL MOLDOVEI ÎN PERIOADA 2005 – 2009

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Abstract. *This work refers to the dynamics of pest species found in forest nurseries of the Forest Directorates Botosani, Iasi and Suceava during 2005-2009 and is the beginning of an extensive research in this area. Research results show that biotic pests represent the largest percentage of unhealthy factors, i.e. 93.81% and 72.60% of them are insects compared with plant parasites (19.81%) and harmful mammals (7.59%). The most dangerous pest for saplings from the forest nurseries are root insects (87.20% of all harmful insects), of which the highest share (70.87%) have Melolontha melolontha Larvae, followed by species of Elateridae with 13,20%. For the modern aplication methods of prevention and control of pests is essential to know and permanently follow these. This leads finally to produce a healthy and vigorous afforestation material to ensure the quality of afforestation works.*

Key words: pest, forest nurseries, root insects, saplings

Rezumat. *Lucrarea de faţă face referire la dinamica speciilor de dăunători depistaţi în pepinierele forestiere din cadrul Direcţiilor Silvice Botoşani, Iaşi şi Suceava în perioada 2005–2009 şi este începutul unei ample cercetări în acest domeniu. Rezultatele cercetării arată că dăunătorii biotici reprezintă cea mai mare pondere dintre factorii vătămători, adică 93,81%, iar dintre aceştia insectele reprezintă 72,60% faţă de paraziţii vegetali (19,81%) şi mamiferele vătămătoare (7,59%). Cei mai periculoşi dăunători pentru puieţii din pepinierele silvice sunt insectele de rădăcină (87,20% din totalul insectelor dăunătoare), dintre care ponderea cea mai mare (70,87%) o au larvele de Melolontha melolontha, urmate de speciile de Elateridae cu 13,20%. Pentru aplicarea unor metode moderne de prevenire şi combatere a dăunătorilor este absolut necesar cunoaşterea şi urmărirea în permanenţă a acestora. Acest lucru duce în final la producerea unui material de împădurit sănătos şi viguros care să asigure efectuarea unor lucrări de împădurire de calitate.*

Cuvinte cheie: dăunători, pepiniere forestiere, insecte de rădăcină, puieţi

INTRODUCTION

When you want to realize a sustainable management of the forests it's absolutely necessary to resolve some important problems like assuring high quality wood saplings.

For this reason, it's mandatory that beside the technical works that must be done and that are foreseen by the existing instructions, to apply modern methods of preventing and controlling the pests existing in the forest nurseries and forest cultures.

The present paper is the beginning of a research concerning the pests from the forest nurseries and young plantations from the North-East of Moldavia and refers to the species of pests found in the forest nurseries of the Forest Directorate Botosani, Iasi and Suceava in the period 2005-2009.

MATERIAL AND METHOD

In their essence, the research analyzed the dynamics of the species of pests found in the nurseries in the Forest Directorates of Botosani, Iasi and Suceava in the period 2005-2009 and also the applied methods of preventing and controlling.

Inside the Botosani Forest Directorate was gathered and analyzed some data about the species of the pests found in the nurseries inside 6 forest districts with the annual average surface infested of approx. 26.85 ha.

From Iasi Forest Directorate was gathered and analyzed information about the species of pests from the nurseries inside 8 forest districts.

The annual average surface which was infested was of approx. 47 ha and for the Suceava Forest Directorate was gathered and analyzed information about the species of pests from the nurseries inside 25 forest districts with an annual infested area of approx. 114.30 ha.

These documentations were elaborated based on the tracing and prognosis studies made by the forest districts and county administrations supported by the data offered by IACS laboratories, according the methods specific to the ROMSILVA National Administration of Forests.

The data were analyzed according to the infested area and according to the intensity of the pests attack.

RESULTS AND DISCUSSIONS

In the period of the years 2005-2009 the forestry species planted in the forest nurseries from the North-East of Moldavia suffered a series of harms due to the action of some species of forest pests.

Regarding the nature of harms, the results of the research indicate the majority participation of the biotic pests with 93.81% in relation to the abiotic ones with 6.19%, their action mostly depending on the different composition of the nurseries (coniferous, broadleaf forests) and also the evolution and the intensity of the climatic factors in a different way for each forest directorates.

Among the harmful factors, the insects represent 68%, the vegetal parasites 19%, the harmful mammals 7% and the abiotic factors represent only 6%, according to table 1.

Table 1

Statistical rate (%) of pests inside the forest nurseries of Forest Directorates of Botosani, Iasi and Suceava calculated in percents according to the infested area during 2005-2009

Forest Directorate	Pests	Statistical rate (%)				
		2005	2006	2007	2008	2009
Botoşani Forest Directorate	Insects	52,30	65,84	58,07	56,55	51,93
	Vegetal parasites	29,17	30,48	31,87	30,77	30,34
	Harmful mammals	7,37	2,71	4,50	4,75	3,66
	Harmful abiotic factors	11,16	0,97	5,56	7,93	14,07
Iaşi Forest Directorate	Insects	72,00	54,91	63,88	61,59	59,09
	Vegetal parasites	14,95	19,46	21,59	25,13	17,64
	Harmful mammals	5,93	17,12	6,71	10,82	8,75
	Harmful abiotic factors	7,12	8,51	7,82	2,46	14,52
Suceava Forest Directorate	Insects	87,44	90,41	79,28	89,08	79,18
	Vegetal parasites	3,52	4,67	10,39	3,53	5,27
	Harmful mammals	7,46	3,03	8,86	5,55	9,53
	Harmful abiotic factors	1,58	1,89	1,47	1,84	6,02

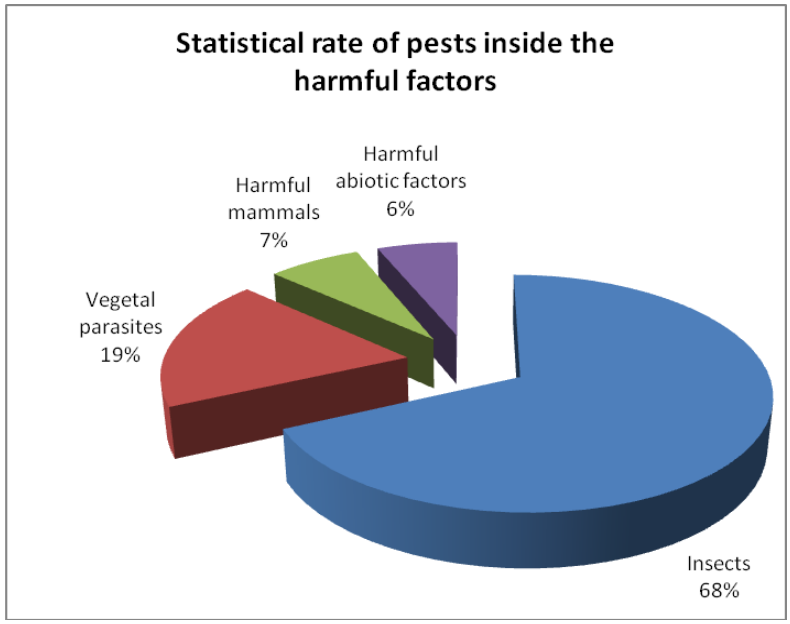


Fig.1. Statistical rate of pests inside the harmful factors

The harmful insects detected in the nurseries inside the 3 forest administrations were classified after the nature of their attack:

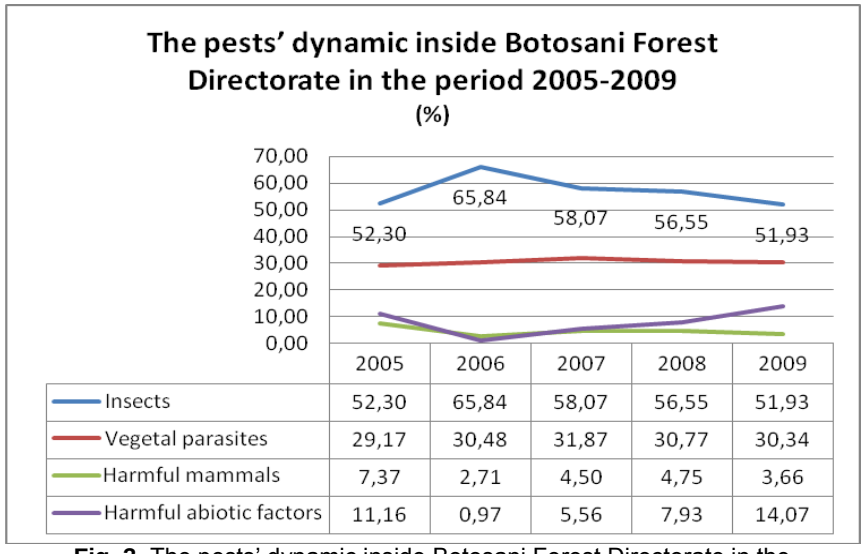
1. insects that attack the root: *Melolontha melolontha* – cockchafer larvas; *Agriotes* spp. *Elateridae* family – wireworms; *Gryllotalpa gryllotalpa* – mole cricket;
2. insects that attack the stem: *Cryptorrhynchus lapathi* – poplar and willow's moth; *Paranthrene tabaniformis; Otirrhynchus* sp.;
3. defoliating insects: *Hyphantria cunea, Earias chlorana, Melolontha melolontha* – beetles, *Melasoma populi,* mites, *Trips fuscipennis, Stereonychus fraxini* –ash leaves weevil;
4. sucking insects: *Aphrophora, Caliroa* spp., *Cameraria ohridella.*

Detected vegetal pests (18.59%) are:

1. root vegetal pests: *Fusarium* sp.,*Pytium, Phytophora;*
2. stem, sprout and branch vegetal pests: *Botrytis cinerea;*
3. leaves vegetal pests: *Microsphaera abbreviate, Rhythysima a., Lophodermium* sp., *Cocomyces hiemalis, Guignardia* spp.*)*

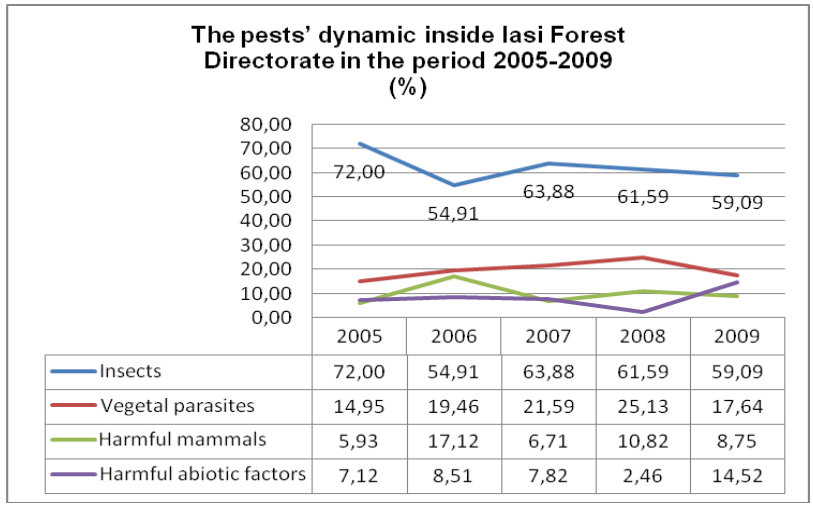
The harmful mammals are mostly represented by *Talpa europaea*- the mole, *Lepus europaeus* – the hare, *Spalax microphtalmus istricus* and *Apodemus sp.* – mice and represent the smallest rate of harm of 7.12% among the harmful factors in the forest nurseries.

The dynamic of the harmful factors in the period 2005-2009 inside each abovementioned forest directorate is presented in the figures 3,4,5 and was calculated in percents according to the infested area by each category of pests.



	2005	2006	2007	2008	2009
Insects	52,30	65,84	58,07	56,55	51,93
Vegetal parasites	29,17	30,48	31,87	30,77	30,34
Harmful mammals	7,37	2,71	4,50	4,75	3,66
Harmful abiotic factors	11,16	0,97	5,56	7,93	14,07

Fig. 3. The pests' dynamic inside Botosani Forest Directorate in the period 2005-2009



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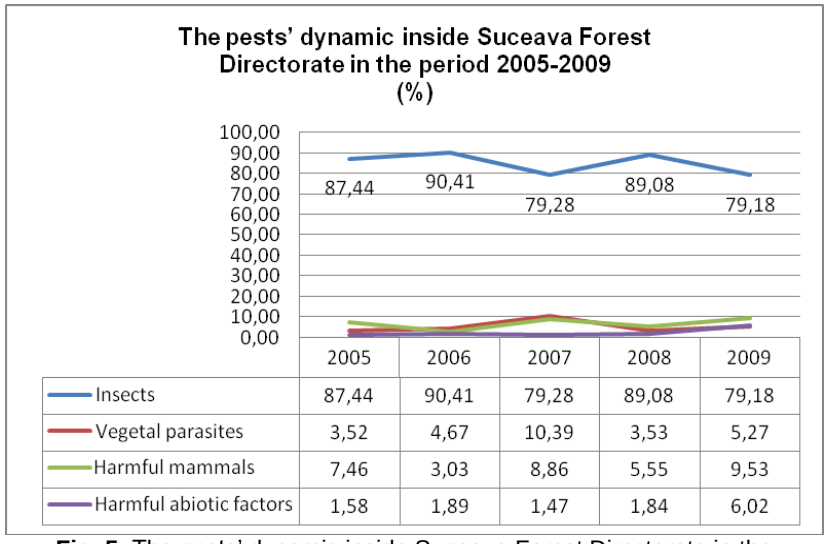
Harmful mammals	5,93	17,12	6,71	10,82	8,75
Harmful abiotic factors	7,12	8,51	7,82	2,46	14,52

Fig. 4. The pests' dynamic inside Iasi Forest Directorate in the period 2005-2009



	2005	2006	2007	2008	2009
Insects	87,44	90,41	79,28	89,08	79,18
Vegetal parasites	3,52	4,67	10,39	3,53	5,27
Harmful mammals	7,46	3,03	8,86	5,55	9,53
Harmful abiotic factors	1,58	1,89	1,47	1,84	6,02

Fig. 5. The pests' dynamic inside Suceava Forest Directorate in the period 2005-2009

The highest rate among the harmful insects as infested area are the root insects which represent 87.20% from the total of the harmful insects, and among these the most popular pests are *Melolontha melolontha* larva with 70.87% followed by the species from *Elateridae* family – wireworms with 13.20% and *Gryllotalpa gryllotalpa* with 3.13%.

As it can be noticed from fig. 3, 4 and 5 the rate of the harmful insects from the total of the harmful pests in the forest nurseries is on the decrease in the last 2-

3 years, in average with 13.19% for Botosani Forest Directorate, with 11.23% for Suceava Forest Directorate and with 12.91% for Iasi Forest Directorate. We can also observe an increase of the harmful abiotic factors which is between 4 and 12% and certain sustainability of the vegetal parasites and of the harmful mammals.

CONCLUSIONS

1. The biotic pests represent the highest rate (93.81%) between the harmful factors, and among these, the insects represent 72.60% towards the vegetal parasites (19.81%) and harmful mammals (7.59%).

2. Analyzing the evolution of the harmful insects it can be observed a decrease of their rate in the last 2-3 years with 11 up to 13%.

3. The most dangerous pests for the saplings in the nurseries are the root insects (87.20% from the total of the harmful insects), and among these the most popular pests are *Melolontha melolontha* larva with 70.87% followed by the species from *Elateridae* family – wireworms with 13.20% and *Gryllotalpa gryllotalpa* with 3.13% the latter are met very rarely.

4. The intensity of the attack of the root insects in the period 2005-2009 was from weak to very strong for the *Melolontha melolontha* larva and generally weak for the species from *Elateridae* family, and the intensity of the other categories of harmful insects was registered as being weak and average, very rarely on the small areas has been registered as being powerful or very powerful.

5. The prevention and control measures realized inside the 3 forest districts are mostly chemical and mechanical, the chemical ones having the highest rate. Unfortunately the biological measures are missing the reason could be their higher cost.

6. The obtained results lead to a better knowledge of the present pests in the forest nurseries from the North-East of Moldavia and are the beginning of an ample research that will be made in the next three years on these pests and on the methods of fighting against them.

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RESEARCH ON HARMFUL ENTOMOFAUNA AND USEFUL ENTOMOFAUNA IN SOME APPLE ORCHARDS

CERCETĂRI CU PRIVIRE LA ENTOMOFAUNA DĂUNĂTOARE ŞI UTILĂ DIN UNELE PLANTAŢII POMICOLE DE MĂR

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Abstract: *Research has been conducted in the SA Loturi Service SRL Vaslui, Vaslui county during October 2008 - September 2009. For this was made direct field observations, were also regularly collected samples (branches, shoots, leaves) and insects were collected using different methods, shaken, or using soil traps type Barber. Following these investigations were reported as harmful species, the following species: San Jose Scale (Quadraspidiotus permiciosus Comst.), worm apples ((Laspeyresia pomonella L.), saw wasp with the apples (Haplocampa testidinea Drury), Wodlly apple aphid (Eriosoma lanigerum Hsm.), Cherry bark tortrix moth (Enarmonia formosana Scop.) etc. Useful species insect are particulary order Hymenoptera (families Braconidae, Ichneumonidae, Chalcididae etc.), of the order Coleoptera (Coccinelidae families, Carabidae), Neuroptera (Chrysopidae family) etc.*

Key words: soil traps, Coleoptera, *Quadraspidiotus permiciosus, Cydia pomonella* L, apple orchards.

Rezumat: *Research has been conducted in the SA Loturi Service SRL Vaslui, Vaslui county during October 2008 - September 2009. For this was made direct field observations, were also regularly collected samples (branches, shoots, leaves) and insects were collected using different methods, shaken, or using traps type Barber.Following these investigations were reported as harmful species, the following species: San Jose Scale (Quadraspidiotus permiciosus Comst.), worm apples ((Laspeyresia pomonella L.), saw wasp with the apples (Haplocampa testidinea Drury), Wodlly apple aphid (Eriosoma lanigerum Hsm.), Cherry bark tortrix moth (Enarmonia formosana Scop.) etc.. Useful species insect are particulary order Hymenoptera (families Braconidae, Ichneumonidae, Chalcididae etc..), of the order Coleoptera (Coccinelidae families, Carabidae), Neuroptera (Chrysopidae family) etc..*

Cuvinte cheie: capcane de sol, Coleoptera**,** *Quadraspidiotus permiciosus, Cydia pomonella* L, livezi de măr

INTRODUCTION

Apple culture is the best known and widespread in temperate climates, and apples tops both in terms of production volume, the quality - and request their food outlets.

Apple important fruit species worldwide, has an extremely large number of plant and animal organisms effects, which cause harm. Percher (Way, 1988 cit. Talmaciu M., 2007) has compiled a list of 80 diseases caused by viruses, mycoplasma, bacteria, fungi, plus 64 species of insects and mites, eight species of nematodes and at least two species of rodents.

Therefore, knowledge of pests and pathogens that attack apple and prevention and control measures are of particular importance for obtaining high yields and good quality.

MATERIAL AND METHOD

The research was carried out in SA Loturi Service SRL Vaslui, Vaslui County during October 2008 - September 2009. For comments that were made directly in the field were also regularly collected samples (branches, shoots, leaves) and insects were collected using different methods, by slip off, or type using Barber soil traps.

Following these investigations were reported as a pest, the following species: *Quadraspidiotus permiciosus* Comst., *Cydia pomonella* L., *Haplocampa testudinea* Drury., *Eriosoma lanigerum* L.., *Enarmonia formosana* Scop. etc. (Chatened du Gaetan, 1990; Panin I., 1951; Reitter E., 1908; Rogojanu V., Perju T., 1979).

Insect species are particularly useful order *Hymenoptera* (*families Braconidae, Ichneumonidae, Chalcididae* etc.), the order *Coleoptera* (*Coccinelidae* families, *Carabidae), Neuroptera* (*Chrysopidae* family) etc. it was also useful fauna followed by apple orchards, with periodically shaking down branches to the crown of trees and wildlife with soil traps for the air timber (Talmaciu M., 2006; Varvara M., 1981).

RESULTS AND DISCUSSIONS

In 2009, the apple orchards of the Company taken as observations were identified as most important following harmful species (table 1) tested *Quadraspidiotus perniciosus* Comst., *Eriosoma lanigerum, Sciaphobus squalidus* Gyll., *Aphis pomi, Cydia pomonella*, *Panonychus ulmi, Hoplocampa testudinea* etc.

He was also collected beetles fauna of apple orchards epigee of the Society for using this type of soil Barber traps. After determining the species of beetles collected indicates that it belongs to a number of 32, totaling 353 specimens from all 6 harvesting.

The most commonly collected species were: *Pseudoophonus pubescens, Harpalus distinguendus, Dermestes laniarius* Illig., *Harpalus tardus* and *Harpalus calceatus.*

They easily collected at 3, 4 or 5 from 6 harvest. It also notes that most commonly collected species, also had the highest number of such examples: *Harpalus tardus*, which was collected from 4 of the 6 collection it was a number of 88 specimens of species, *Harpalus calceatus* followed, with a total of 66 specimens, *Dermestes laniarius* which had 53 specimens and *Harpalus distinguendus* Duft., species with a total of 46 specimens. A total of 21 species have between one and three copies.

Table 1

Structure pest of apple plantations belonging to SC Lots Service Ltd. in 2009

No.	Scientific name of species	Common name	Order / Family	Time attack event	Observations
1	*Quadraspidiotus perniciosus*	San jose scale	Homoptera/ Diaspididae	From May to September	Occasionally, particularly in older plantations. Treatment was performed at the end of rest
2	*Eriosoma lanigerum*	Wooly apple aphid	Homoptera/ Eriosomatidae	From April to October	With greater frequency during the summer. Treatment was performed at the end of rest
3	*Sciaphobus squalidus*	Weewil buds	Coleoptera/ Curculionidae	Mid-March, the first decade of April	Varieties that have disbuding later, the attack was more powerful treatment is performed
4	*Aphis pomi*	Apple aphid	Homoptera/ Aphididae	Late April-mid September	The attack was quite frequently without significantly influence the quantity and quality production
5	*Anthonomus pomorum*	Apple Blossom Weevil	Coleoptera/ Curculionidae	Late April-early May	The attack was sporadic and did not require application of any treatment
6	*Hoplocampa testudinea*	European apple sawfly	Hymenoptera/ Tenthredinidae	The first half of May	Sporadic attack not necessary to apply a special treatment.
7	*Panonychus ulmi*	Red spider mite	Acari/ Tetranychidae	From May to September	Attack particularly intense in July and August
8	*Lithocolletis blancardella*	Apple blotch leafminer	Lepidoptera/ Tortricidae	From May to September	Sporadic attack, treatments performed to control other pests have taken this species
9.	*Adoxophyes reticulana*	Apple peel tortricid	Lepidoptera/ Tortricidae	From May to September	Occasionally attack 1-2% fruit contested
10.	*Cydia pomonella*	Codling moth	Lepidoptera/ Tortricidae	From June until Octomber months, a strong attack in producing real July-August	The attack was stronger in the second generation. Treatments performed in 10% reduced attack contested fruit
11	*Hyphantria cunea*	Fall Webworm (larva)	Lepidoptera/ Arctiidae	From July to September	Special treatment was made in late August
12	*Euproctis chrysorrhoea, Aporia crataegi, Hyponomeuta malinella, Operophthera brumata*	Brown-tail, Black Veined White, Apple Ermine Moth, Winter Moth	Lepidoptera	From May to September	Defoliator attack these species has been kept under control by carrying out treatment against other pests.

Table 2

Structure entomofauna collected at soil traps on the farm of SC Loturi Service Ltd. in 2009

No.	Species name	Harvest date and number of copies						Total examples
		1 19.05	2 8.06	3 3.07	4 17.07	5 20.08	6 9.09	
1	*Cantharis fusca*	3	-	-	-	-	-	3
2	*Epicometis hirta*	5	3	-	-	-	-	8
3	*Harpalus calceatus*	28	34	4	-	-	-	66
4	*Pseudoophonus pubescens*	1	9	6	1	-	-	17
5	*Calathus fuscipes*	6	1	-	-	-	-	7
6	*Harpalus distinguendus*	37	6	1	1	1	-	46
7	*Harpalus tardus*	58	28	1	1	-	-	88
8	*Amara familiaris*	1	-	-	1	-	-	2
9	*Dermestes laniarius Illig.*	21	25	4	3	-	-	53
10	*Omias rotundatus F.*	4	3	-	-	-	-	7
11	*Colon viennense Hrbst.*	3	-	-	-	-	-	3
12	*Haltica oleracea L.*	2	-	-	-	-	-	2
13	*Apion apricans*	2	-	-	-	-	1	3
14	*Cantharis pagana Rosenhauer*	1	-	-	-	-	-	1
15	*Curculio nucum L.*	-	1	1	-	-	-	2
16	*Pterostichus vulgaris L.*	2	-	-	-	-	-	2
17	*Harpalus aeneus F.*	-	12	-	-	-	-	12
18	*Otiorrhynchus raucus Fabr.*	-	2	3	-	2	1	8
19	*Anisodactylus signatus Panz.*	-	3	-	-	-	-	3
20	*Calathus melanocephalus L.*	-	1	-	-	-	-	1
21	*Amara aenea Djean.*	-	3	-	-	-	-	3
22	*Necrobia violacea L.*	-	1	-	-	-	-	1
23	*Amara ovata F.*	-	1	-	-	-	-	1
24	*Agriotes obscurus L.*	-	-	1	-	-	-	1
25	*Coccinella 7 punctata*	-	-	3	1	-	-	4
26	*Dermestes haermoxidalis*	-	-	1	-	-	-	1
27	*Pseudoophonus griseus*	-	-	2	-	1	-	3
28	*Carabus violaceus L.*	-	-	1	-	-	-	1
29	*Phyllotreta atra F.*	-	-	1	-	-	-	1
30	*Pterstichus cylindricus Hrbst.*	-	-	1	-	-	-	1
31	*Pentodon idiota Hrbst.*	-	-	-	1	-	-	1
32	*Octocemnus glabriculus*	-	-	-	-	1	-	1
TOTAL		174	135	29	8	5	2	353

He was also collected by shaking entomofauna the trees crown. Following its determination, it appears that it belongs to a number of six insect orders, namely: *Homoptera, Hymenoptera, Coleoptera, Thysanoptera, Diptera, Heteroptera* and *Lepidoptera*. Order with most specimens collected were the

order *Homoptera* (32 copies), followed by the order *Coleoptera* (20 copies), *Hymenoptera* (17 copies). The majority of these species of parasitic *Hymenoptera* collected species belonging to several families: *Braconidae, Chalcididae, Pteromalidae, Scelionidae, Proctotrupidae*, etc.

Table 3

Taxonomic structure and abundance entomofauna collected by sliping offin apple orchards

No.	Name order	No.total of copies	Family	No of species and copies	Species name	No of exempl/ species /family
1	Homoptera	32	Lecaniidae	1/5	*Parthenolecanium corni*	5
			Aphididae	1/22	*Aphis pomi*	22
			Cicadelidae	2/5	-	5
2	Hymenoptera	17	Braconidae	1/1	-	17
			Pteromalidae	1/5	-	
			Chalcididae	1/1	-	
			Encyrtidae	1/1	-	
			Proctotrupidae	1/1	-	
			Scelionidae	1/4	-	
			Formicidae	1/1	-	
			Eulophidae	1/2	-	
			Eurytomidae	1/1	-	
3	Coleoptera	20	Coccinellidae	1/18	*Stethorus punctillum*	18
			Curculionidae	1/1	*Apion viciae*	1
			Chrysomelidae	1/1	*Longitarsus apicalis*	1
4	Thysanoptera	6	-	2/6	-	6
5	Diptera	7	-	2/7	-	7
6	Heteroptera	7	-	2/7	-	7
7	Lepidoptera	2	-	1/2	-	2
TOTAL		91	-	22	-	91

CONCLUSIONS

1. Species reported as important pests in apple orchards of the Agricultural Society ,,Loturi Service" Ltd. were tested *Quadraspidiotus perniciosus* Comst., *Cydia pomonella* L., *Hoplocampa testudinea*, *Aphis pomi.*

2. In society, have been applied in apple orchards against pathogens and pests a total of 10 treatments.

3. Soil fauna collected belongs to a number of 32 species, the most abundant species with a: *Harpalus tardus, Harpalus distinguendus, Dermestes laniarius* and *Harpalus calceatus.*

4. Fauna collected from tree crown belongs to a number of six orders of insects are prevalent orders *Homoptera, Coleoptera* and *Hymenoptera*.

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STUDY OF THE INFLUENCE OF AQUEOUS EXTRACTS FROM *ASCLEPIAS SYRIACA* ON THE DEVELOPMENT OF SPECIES OF *RHODOTORULA SP.*

STUDIUL INFLUENTEI EXTRACTELOR APOASE DIN *ASCLEPIAS SYRIACA* ASUPRA DEZVOLTARII UNOR SPECII DE *RHODOTORULA SP.*

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Abstract. *The paper presents results obtained in the cultivation of two different strains of Rhodotorula spp. in a medium containing an aqueous extract of different concentrations in dry matter and polyphenolic compounds separated from Asclepias syriaca. The extracts were characterized in terms of content of polyphenols and sugars using various analytical techniques. Development of yeasts was monitorized by determining the amount of wet biomass during the experiment for nine days. After recovery of biomass, culture broth was characterized by total polyphenols concentration by the Folin-Ciocalteu method and pH evolution. The results obtained have shown the consumption of polyphenols by yeast, which influenced the growth in the biomass of the two different strains compared with the control.*

Key words: *Asclepias syriaca*, *Rhodotorula* spp., wet biomass.

Rezumat: *În lucrare sunt prezentate rezultate obţinute în procesul de cultivare a două tulpini diferite de Rhodotorula într-un mediu ce conţine un extract apos de diferite concentraţii în substanţă uscată şi compuşi polifenolici separat din Asclepias syriaca. Extractele au fost caracterizate din punct de vedere al conţinutului de polifenoli şi al zaharurilor folosind diferite tehnici analitice. Dezvoltarea drojdiilor a fost monitorizată prin determinarea cantităţii de biomasă umedă în cursul desfăşurării experimentului timp de nouă zile. După recuperarea biomasei, în lichidul de cultură s-au urmărit concentraţia în polifenoli totali prin metoda Folin-Ciocâlteu şi evoluţia pH-ului. Rezultatele obţinute au evidenţiat un consum al polifenolilor de către drojdii, consum care a influenţat creşterea în biomasă a celor doua tulpini diferite comparativ cu martorul.*

Cuvinte cheie: *Asclepias syriaca, Rhodotorula* sp., biomasa umeda

INTRODUCTION

Asclepias syriaca is a plant native of North America, with large, opposite, elliptical leaves, which contains a large amount of latex toxic to animals. The plant is also called the bees flower, being cultivated as ornamental and melliferous plants; in the wild it grows in the Ostrovul of Moldova Veche (http://www.eukarya.ro/enciclopedie/). The plant has been much studied because of many types of chemical compounds and each possesses its large number of uses. Initially the plant was investigated as a source of rubber, but small amounts of *cis*-

isoprene polymers with low molecular weight justify its application only as a component of chewing gum.

Along with rubber, latex extracted from the plant contains a resinous component, their ratio depending on the morphological and old plant parts (rubber / resin: first year: 0.2-0.7/8.2, year II: 0.2/0.7, year III: 0/16.3) (Rusan v. et al., 1984).

Asclepias syriaca plant is little demanding with respect to ground and exposure, easily multiplies and can be cultivated in our country on soils with normal chemical composition. Although, *Asclepias syriaca* possesses a high potential of chemicals the literature signals only sporadic, isolated and unidirectional (Corlateanu E. et al., 1982) separation and use.

As following extraction with hot water, we can extract inorganic salts, oligosaccharides, sugars and polyphenols (Chow P. et al., 2008), which can be used successfully as a carbon source in fermentative processes. Polyphenols include several classes of compounds like: phenols, phenolic acids, flavonoids, anthocyanins, and more complex structures such as tannins and lignins. Polyphenols are secondary metabolites normally produced by plants or in response to stress conditions, such as infections, the action of UV radiation doses and other factors. The recovery of compunds with nutritive and antioxidant potential of plant biomass is an economic problem, relevant to food and pharmaceutical industry. Currently there is little information regarding the use of polyphenolic compounds in fermentation yeasts. However, some research shows that there are species of yeasts that have the potential to fragment the polyphenolic compounds and to use as a carbon source (Dănăilă M. et al., 2007). In other cases oxidized polyphenols may have inhibitory effect on the growth and development of certain microbial strains. The mechanism of polyphenols toxicity can be explained by inhibiting hydrolytic enzymes, or other transport mechanisms such as blocking the protein, non-specific interactions with carbohydrates, etc. (Popa V.I. et al., 2007). In this context, the purpose of this study is to determine the influence of aqueous extracts of *Asclepias syriaca* on the growth and development of two strains of yeast *Rhodotorula* sp. compared, along with how polyphenols compunds of culture medium are consumed.

MATERIAL AND METHOD

Two strains of yeast *Rhodotorula sp*. denoted by R1 and R2 which were selected by Biotechnology Applied in Food Industry – Integrated Center for Research and Education – Bioaliment, "Dunarea de Jos" University, Galati were used. The preculture was done on culture medium with the following composition: 10 g/L glucose, 5g/L peptone, 3 g/L malt extract, 3 g/L yeast extract. The experiment was conducted on platform thermostatic mixers for 48h at 27ºC and 120 rpm. The cells were recovered by centrifugation at 5000 rpm for 15 minutes, washed twice with distilled water and inoculated on culture medium containing the following mineral and organic chemical composition: 15 g/L glucose, 2.5 g/L yeast extract, 3 g/L sodium acetate, 1 g/L $(NH_4)_2SO_4$, 1 g/L KH_2PO_4, 0.1 g/L $CaCl_2$, 0.25 g/L $MgSO_4 \cdot 7H_2O$, 0015 g/L $ZnSO_4$, 0015 g/L $CuSO_4 \cdot 5H_2O$. The culture medium was prepared in aqueous extract obtained from 0.5 and 5 g of *Asclepias syriaca* dry material, brought to 1L. The

culture medium was distributed in 250 mL Erlenmayer flasks with a volume of 100mL, after which inoculation took place. Determination of the number of inoculated cells was performed by reading optical density at 620 nm. An absorbency of 0.5 is equivalent to 10^7 cells in 1mL inoculum (Buzzini P., 2001). Each flask was inoculated with 4×10^7 CFU (CFU = colony forming unit).

Three cultures were perfomed, a reference culture that does not contain polyphenols extract, a culture containing polyphenolic extract from 0.5 g/L dry plant and a culture containing a polyphenol extract from 5 g/L dry plant. Each culture was developed for 9 days and at every 24 hours one sample was investigated. Cultures were coded as follows: R1 - culture on medium containing only recipe compunds, R1AS0.5 - culture on medium obtained with components of above the aqueous extract from 0.5 g/L dry plant brought to 1L, and R1AS5 - culture medium prepared using an aqueous extraction of 5 g/L dry plant material (Hainal A.R. et al., 2009), R2 - the culture medium that contains only ingredients of recipe, R2AS0 5 - culture on the medium containing in addition to the recipe extracts from 0.5 g/L dry plant material, and R2AS5 - culture on medium containing aqueous extracts of 5 g/L dry plant material with the basic components of the culture medium.

After every 24 hours, cells were recovered by centrifugation at 4000 rpm for 15 min and washed twice with distilled water. Wet cell mass was determined by weighing, and expressed in g/L culture medium, the pH was not regulated during culture, being determined after cells recovery by centrifugation. Also, the culture medium was characterized from the point of the concentration of total polyphenols by Folin-Ciocalteu method (Popa V.I. et al., 2007).

RESULTS AND DISCUSSIONS

Aqueous extracts were characterized and data are presented in table 1. As following tests carried out, we did identify simple and complex sugars.

Table 1

The characteristics of *Asclepias syriaca* aqueous extracts

Sample	Total polyphenol concentration, mg/L gallic acid	Content in dry substance, g/L extract	Content in organic matter, g/L extract	Ash content, g/L extract	Ash content on dry weight basis,%
AS 5	58.0	1.084	1.004	0.08	7.0
AS 0.5	6.2	0.1084	0.1004	0.0008	0.7

AS 5 - aqueous extract frrom 5 g dry plant material brought to 1L;
AS 0.5 - aqueous extract frrom 0.5 g dry plant material brought to 1L;

From table 1 we can notice a huge difference in terms of total polyphenol concentration; the difference will influence the behavior of two different strains of *Rhodotorula sp.* during the process. Thus, in the case of R1 strain (fig. 1) we may notice a positive influence on the growth of yeast when it is used extract from 5 g dry material, compared with the reference culture. When an extract from 0.5 g is used we distinguish an inhibition on the development of the micro-organism compared with the control culture, which characterizes a better efficiency of the cultivation process when a culture is carried out in the extract from 5 g of dried plant material. In terms of the two strains, the situation is different in the case of R2.

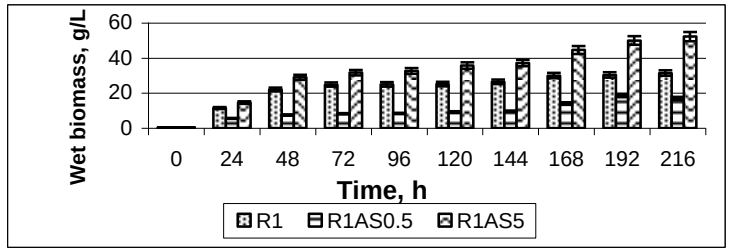


Fig. 1. Variation of amount of wet biomass depending on time cultivation for strain R1

One can also see the stimulating effect on the culture process when is using extracts from 5 g of plant material and the phenomenon of inhibition for media prepared with extract from 0.5 g plant material, compared with blank. This time, however, there is no a pronounced inhibition effect in comparison with reference culture (fig. 2).

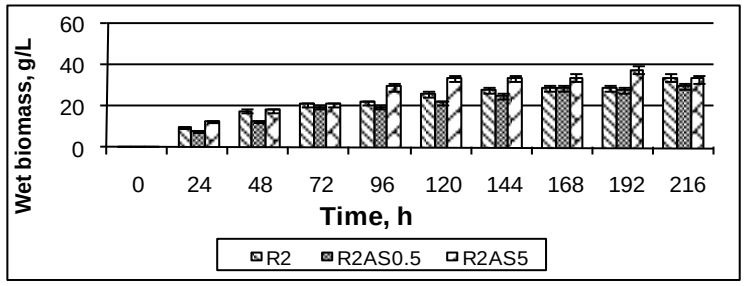


Fig. 2. Variation in the amount of wet biomass during the cultivation of strain R2

A comparison of the behavior of the two strains is more obvious in Figure 3, which could explain by different metabolic pathways of the studied micro-organisms.

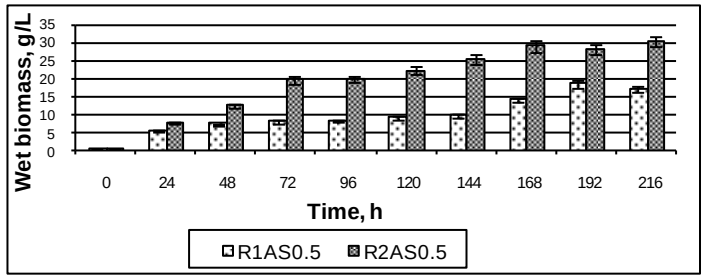


Fig. 3. Comparison of the biomass yield of the two strains grown on aqueous extract from 0.5 g/L dry plant material

In figure 4 we can see a comparison between the evolutions of the two strains of *Rhodotorula sp*., grown in medium containing 5 g extract of plant

material. In this case we can clearly observe a much better yield in biomass of strain R1 compared to that provided by R2 strain throughout the culture process.

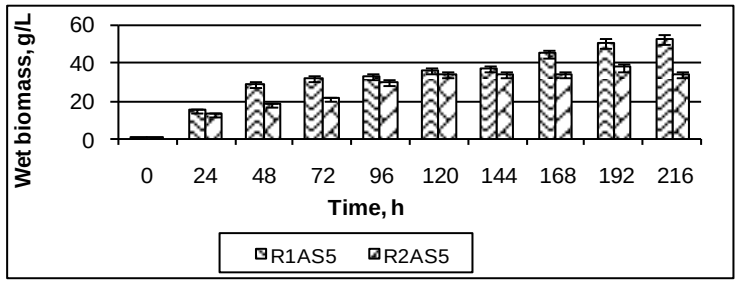
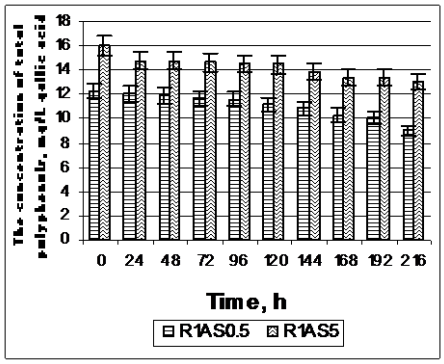
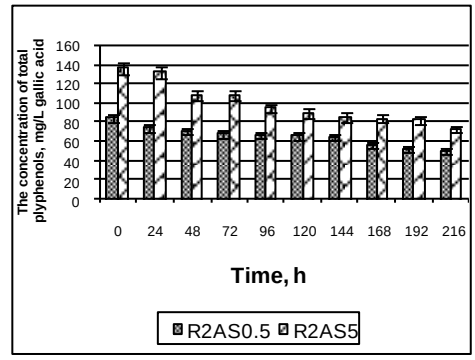


Fig. 4. Comparison of the biomass yield of the two strains grown on aqueous extract from 5 g/L dry plant material

The evolution of total concentration of polyphenolic compounds throughout the experiment can be followed in figure 5. The data obtained during the process show that the content in polyphenols is decreased because they are used by yeasts. The two strains are different from each other because the rate of consumption of polyphenols is slowly reduced in the case of strain R1 (fig.5 a) and decreases for the strain R2 within 48 hours to be progressively reduced by the end of the process.





a) **b)**

Fig. 5. Variation of total polyphenol concentration from culture medium:
a - strain R1; **b** - strain R1

Regarding the change of pH during the culture process it can say that: the value of this parameter decreases sharply, both for the reference culture and of that in the presence of the polyphenolic extract performed for a period of 72 hours, then jump to maintaining an upward trend until the end of the experiment (fig. 6).Decreased pH values by weak acid could be explained by the fact that the process of monosaccharides glycolysis acidic compounds are formed (acid-enzyme complex reaction-intermediate, 3-fosfogliceric acid, pyruvate).

Further increase of pH after 72 hours of experiments could be determined by the formation of different phosphorylated compounds in various stages of glycolysis, compounds that induce a weak basic character and alter the pH to values around 7.

Also, changes in pH could be determined by the acidic products which are intermediary compounds in the degradation and metabolism of polyphenols.

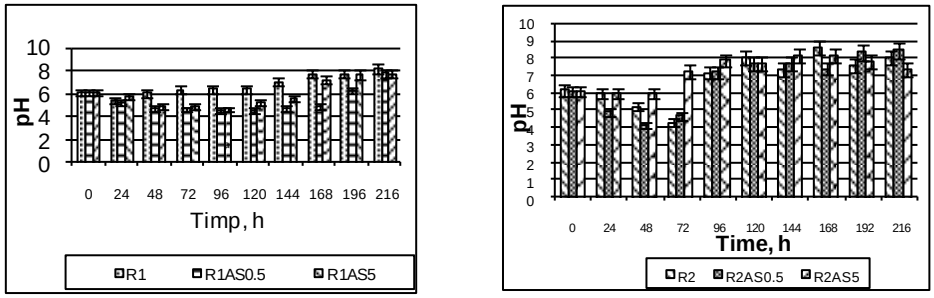


Fig. 6. Changes in pH during cultivation; A- strain R1; B- strain R1

CONCLUSIONS

1. Yeast strain *Rhodotorula sp.* denoted by R1 biosynthesizes biomass yields much better in a medium containing 5 g extract from dried plant material, in comparison with the reference culture. At lower concentrations, polyphenols exhibit a strong inhibitory effect. This occurs less pronounced when strain R2was cultivated. Polyphenolic compounds present in extracts are used as carbon source for the two different microorganisms and metabolic pathways are specific to each of them.

2. Therefore, aqueous extracts from *Asclepias syriaca* may be used in culture media compositions of the two yeast strains studied whose components may be metabolized as carbon sources. The metabolic pathways seem to be specific to the two organisms, aspect which will by later analyzed.

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SILVER FIR STANDS INFECTED BY MISTLETOE (*VISCUM ALBUM* SSP. *ABIETIS*) DYNAMICS IN THE CONTEXT OF CLIMATE CHANGE

DINAMICA ARBORETELOR DE BRAD CU ATACURI DE VÂSC (*VISCUM ALBUM* SSP. *ABIETIS*) ÎN CONTEXTUL SCHIMBARILOR CLIMATICE

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Abstract. *In the expected climatic change questions are being raised concerning the migration of the potential range of forest species and the consequences on silviculture. To answer these questions, information about climatic changes is required. In this paper the dynamics of mistletoe infected silver fir stands in the context of climate change is examined. Silver fir stands from the border of natural vegetation area are the most vulnerable on climate changes and here mistletoe infection is highest. To simulate the effects of climatic change the aridity indices (IA) were calculated for the following hypotheses: i) hypothesis 1: temperature increase and precipitation decrease, ii) hypothesis 2: temperature increase and precipitation increase.*

Key words: climatic change, aridity index, mistletoe, silver fir

Rezumat. *Ecosisteme perene cu ciclu lung de producţie, pădurile suportă continuu efectele variaţiilor sezoniere, anuale şi periodice ale parametrilor climatici Creşterea prognozată a temperaturii va determin, în anumite zone instalarea unor deficite de umiditate în sol în timpul sezonului de vegetaţie cu efecte negative asupra stării de sănătate a arborilor sau vor predispune arborii la boli şi dăunători. În lucrarea de faţă este examinată dinamica arboretelor cu brad afectate de vâsc în contextul schimbărilor climatice. Bradul de la marginea arealului natural de vegetaţie este cel mai vulnerabil la schimbările climatice si parazitismul vâscului este cel mai virulent. Pentru simularea schimbărilor climatice în arealul actual al bradului din Carpaţi s-au calculat indicii de ariditate (IA) anuali în diferite ipoteze de prognoză: i) ipoteza 1- creşte temperatura, scad precipitaţiile, ii) ipoteza 2 – creşte temperatura, cresc precipitaţiile.*

Cuvinte cheie: schimbări climatice, indice de ariditate, vâscul bradului, brad

INTRODUCTION

To underline the prognoses climate changes for the next decades the mean values of temperature and precipitation can be obtained from maps published in different studies or using a simulation model of a regional climate in different prognoses hypothesis. In hypothesis that B1 scenario is the most probable (*the B1 scenarios are characterized by: rapid economic growth, reductions in material intensity and the introduction of clean and resource efficient technologies, an emphasis on global solutions to economic, social and environmental stability)* for

Romania the climate prediction pointed out a mean temperature increase of 0.5 - 2^0 C and also quantitative and qualitative changes of precipitations. The winters will be warmer (with + 1-3^0C) and wet (by comparison with 1961-1990 period) and summers with low precipitations and higher temperatures (IPCC, 2001).

The most recent access_of the site www.peseta.jrc.es underline higher increases of the mean annual temperatures that have been anticipated till now (figure 1). The same site reveals moderate increments of the mean precipitation for the mountainous area and for the northern part of the country and significant decreases of precipitations (-15-20%) in Câmpia Română (figure 2).

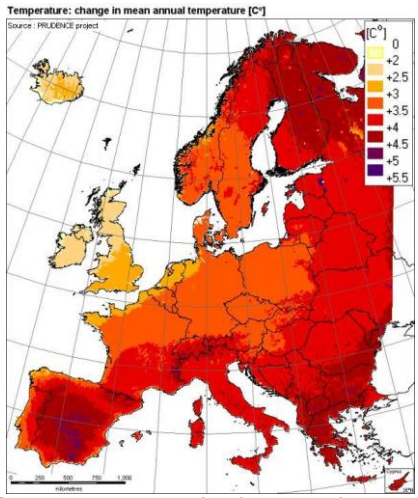

Fig.1 - Prognosed changes in mean annual temperature at the end of 21th century (2071-2100) related to mean values from 1961-1990 period (after www.peseta.jrc.es)

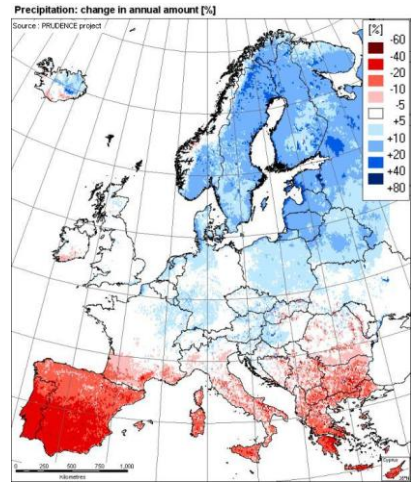

Fig. 2 - Prognosed changes in mean annual precipitation at the end of 21th century (2071-2100) related to mean values from 1961-1990 period

For the silver fir of Carpathians Mountains are prognosed increases of the mean annual temperatures with +2-3^0C in North and +3-3,5^0C in Curvure and Southern Carpathians. Concerning the precipitation the prognosed changes pointed out increases around 5% in North (+30-80 mm) and decreases around 10% (-50-100 mm) in South.

Plagnat (1950) showed in his studies that the distribution area of the silver fir is correlated with temperature and precipitation. The same author asserts that silver fir has optimal development in the areas with the aridity index above 40. After Perrin (1931), silver fir occurs in the areas with 50 and 60 aridity indices.

The aim of this paper is to analyze the dynamics of mistletoe infected silver fir stands in the context of climate change.

MATERIAL AND METHOD

To simulate the effects of climate changes in the present area of silver fir from Carpathians (figure 3) the aridity indices (IA) were calculated in different prognosis hypothesis.

Fig.3. Distribution of silver fir in Romania

IA=P/T+10, where:
P represents the mean annual precipitations,
T represents the mean annual temperatures.
The aridity indices calculus take into consideration the mean annual values of temperature and precipitation from the lower elevation boundary of silver fir ecosystems from Romania (Barbu and Barbu, 2005). The silver fir from the border of the natural area is the most vulnerable at climate changes and the mistletoe infection is the most virulent.

This very simple annual index, which does not take monthly variation in temperature and precipitation into account, only gives general information on the drought level at the considered sites. It simulates the climatic changes easily (Aussenac, 2001).

Table 1

Scenarios of temperature and precipitation evolution at the end of 21th century in silver fir stand from Carpathians Mountains

Hypothesis 1 increase temperature, decrease precipitation			**Hypothesis 2 increase temperature, decrease precipitation**		
Aridity index (IA)	**Prognosed temperatures (T^0C)**	**prognosed precipitations (P mm)**	**Aridity index (IA 0)**	**Prognosed temperatures (T^0C)**	**prognosed precipitations (P mm)**
IA 0	T	P	IA 1+50	T+1	P+50
IA 1	T+1	P	IA 3+50	T+3	P+50
IA 3	T+3	P	IA 3+100	T+3	P+100
IA 1-50	T+1	P-50			
IA 3-50	T+3	P-50			
IA 3-100	T+3	P-100			

IA 1 = P/T+11	**IA 1-100** = P-100/T+11	**IA 1+50** = P+50/T+11
IA 2 = P/T+12	**IA 2-50** = P-50/T+12	**IA 1+100** = P+100/T+11
IA 1-50 = P-50/T+11	**IA 2-100** = P-100/T+12	**IA 2+50** = P+50/T+12
		IA 2+100 = P+100/T+12

T and P represent the mean values of temperatures and precipitations in 1905-1961 period (after Atlasul Climatic al României, 1966).

RESULTS AND DISCUSSIONS

Figure 4 presents the values of aridity indices for the last century (1900-2000) for the piedmountains area of Obcinele Bucovinei (ecological region A2 – 621 meters a.s.l).

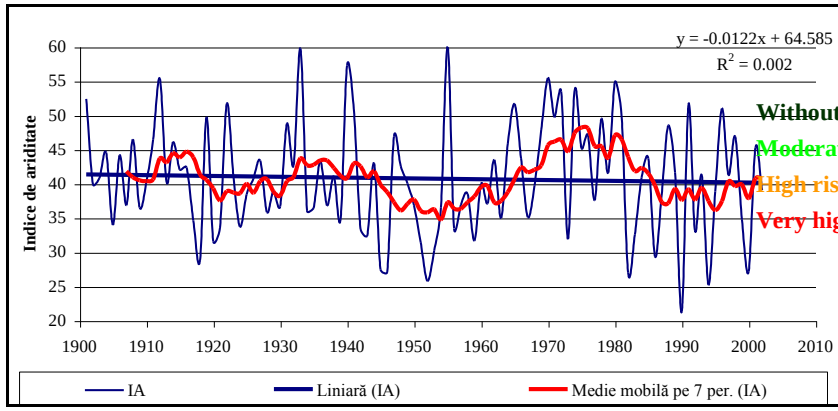

Fig. 4. Aridity index variation in 20th century in the ecologic subregion A2 – ecosystems with silver fir from Obcinele Bucovinei (621 m a.s.l.)

At the entire century, a variation tendency of aridity indices cannot be observed. The mean value of aridity index is around 40. Analyzing the moving average can be observed the alternation of periods with IA above and under 40 with a 40 years periodicity and amplitude of 10-15 units. Thus, in the last century there were registered three maximum values in 1905-1915, 1930-1940 and 1970-1980 and three minimum values in 1920-1930, 1945-1955 and 1985-1995. The periods with the aridity indices values under 35 can be associated with the period of maximal virulence of mistletoe.

On the bases of many observations in silver fir stands from the Eastern Carpathians we propose the following values of aridity indices (table 2) associated with risk classes on mistletoe infection.

Table 2

Risk classes on mistletoe infection related to aridity indices

Aridity index	Risk classes on mistletoe infection	Comments
50	very low	there is no risk for the reduction of the actual area of silver fir stands
45	moderate	moderate risk of the present area reduction
40	high	high risk of present area diminution
35	very high	very high risk of present area diminution

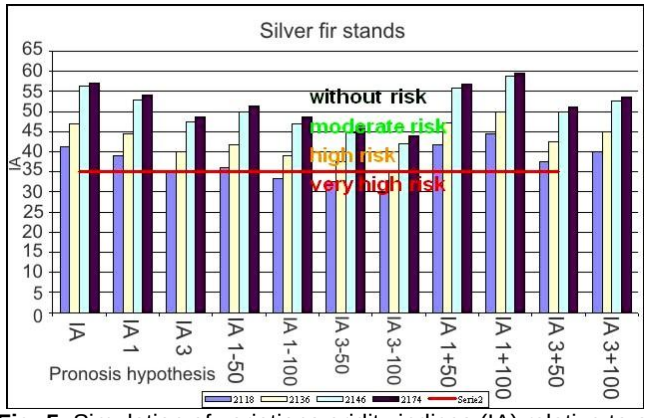

Fig. 5. Simulation of variations aridity indices (IA) relative to an increase in mean temperature and a reduction or increase in annual rainfall at the end of 21th century in silver fir stands

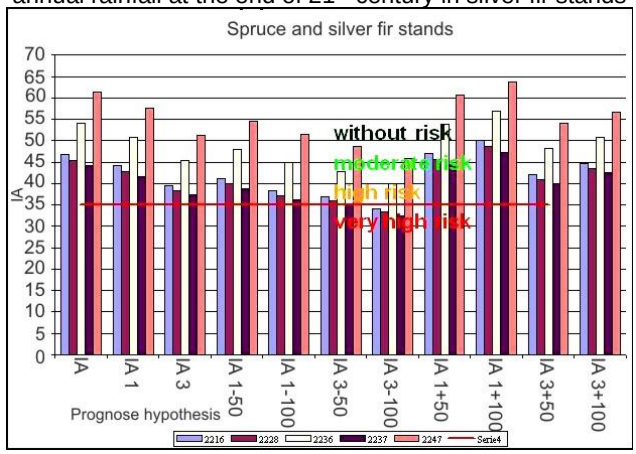

Fig. 6. Simulation of variations aridity indices (IA) relative to an increase in mean temperature and a reduction or increase in annual rainfall at the end of 21th century in spruce and silver fir stands

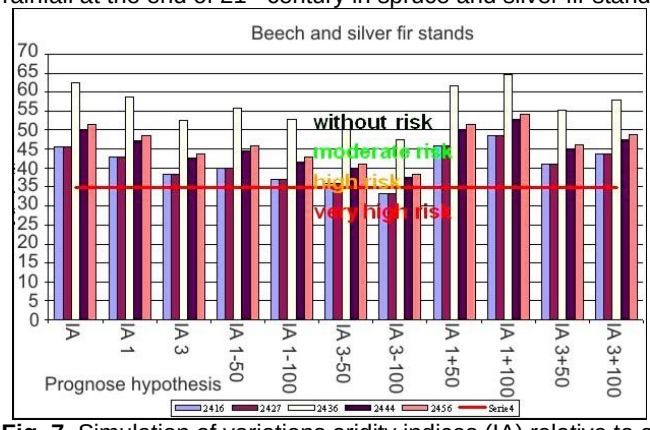

Fig. 7. Simulation of variations aridity indices (IA) relative to an increase in mean temperature and a reduction or increase in annual rainfall at the end of 21th century in beech and silver fir stands

In figures 5-7 there are presented the aridity indices simulation from different prognosis hypothesis for silver fir stands from Romania.

The main silver fir ecosystems in which the prognoses climate changes for the end of 21th century will amplify the infection with mistletoe of silver fir trees older than 80 years were synthesized on risk classes and forest formation (table 3). The actual areas of silver fir stands will diminish in the detriment of some competitive or with a wide ecological area species.

Table 3

Risk classes on mistletoe infection for silver fir ecosystems in different climate change hypothesis at the end of 21th century

Risk class	Stand		
	Silver fir stands	Spruce and silver fir stands	Beech and silver fir stands
Very high	2118*)	2237, 2228, 2216	2416, 2427
High	2136	2236	2444
Moderate	2146	2247	2456

Note: *) – represents the stand code

CONCLUSIONS

On the basis of the simulation results it seems that a possible temperatures increase without the increase of precipitation can generate a high risk of mistletoe infection in silver fir stands.

In the hypothesis of increases temperature and decreases precipitation the value of aridity index falls under 35 and the mistletoe infection risk is very high.

For aridity indices values above 50 there is no risk for mistletoe infection.

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PREVENTIONS AND CONTROL OF MAJOR PATHOGENS IN APPLE

PREVENIREA ŞI COMBATEREA PATOGENILOR LA MĂR

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Abstract. *In the period 2008-2009, the SCDP Iasi were carried out research on chemical control of major pathogens encountered in apple species. In developing complexes considered in determining the effective of fungicides by applying treatement and identify oneself with some appropriate periods of the fenology stages. Were used:Zato 0,01%, Dithane 0,2%, Clarinet 0,1%, Rubigan 0,04%, Antracol 0,15%, Flint plus 0,1% and Shafit F72 0,2%*
Key words: fungicides, pathogens, efficacy

Rezumat*. În perioada 2008-2009, la SCDP Iaşi s-au efectuat cercetări cu privire la combaterea chimică a principalilor agenţi patogeni întâlniţi la specia măr. În elaborarea complexelor de combatere s-a avut în vedere determinarea eficacităţii fungicidelor în funcţie de momentul aplicării tratamentelor şi încadrării acestora în anumite perioade corespunzătoare fenofazelor de vegetaţie. S-au folosit: Zato 0,01%, Dithane 0,2%, Clarinet 0,1%, Rubigan 0,04%, Antracol 0,15%, Flint plus 0,1% şi Shavit F 72 0,2%.*
Cuvinte cheie: fenofază, fungicide, patogeni, eficacitate

INTRODUCTION

The main pathogens causing significant damage to the species are apple scab (*Venturia inaqualis*) and powdery mildew disease (*Podosphaera leucotricha*). If scab disease occurs on leaves, flowers and fruit, by the appearance of brown spots and to powdery mildew disease, the attack is hereby acknowledged a white gray felt covering leaves, shoots, flowers and fruits (Cârdei E., 1997, Cârdei E., 1986).

Thus, chemical control remains a basic measure in integrated control of pathogens and for maximum efficiency, protection treatment should be carried out in close accordance with the development of bio-pathogens and phenological phases (Cârdei E., 1995, Ştirbu M., Aguriţa Manolache, 2000).

MATERIAL AND METHOD

In 2008-2009, the SCDP Iasi have conducted research on testing of fungicides to control scab and powdery mildew.

The research was conducted in varieties: Golden, Jonagold and Starkrimson which were applied to two control schemes:

- V1 – Zato (0,15kg/ha) + Dithane (2,5 kg/ha); Clarinet (2l/ha) şi Rubigan (0,8 l/ha);

- V2 – Zato (0,15 kg/ha) + Antracol (3 kg/ha); Flint plus (1,9 kg/ha) şi Shavit F 72 (3,0 kg/ha)

Phytosanitary treatments were carried out to the warning and were in number three, applied in different phases of vegetation. The first treatment was performed in

phase button pink, petals shed early in the second and third treatment was applied in about 10 days since previous, when applying treatments having an important role in determining the effectiveness of fungicides. Pathogen evolution is influenced by climatic conditions (table 1).

Table 1

Evolution of temperature and precipitation in the period from march to september ofyears 2008 and 2009

Month	Average temperature°C		Maximum temperature°C		Rainfall (precipitations)		Days with precipitation	
	2008	2009	2008	2009	2008	2009	2008	2009
March	7,3	3,7	22,4	19,5	43,4	18,8	11	14
April	11,4	12,1	23,5	25,8	124,0	1,2	14	4
May	15,9	16,0	29,0	31,8	94,4	36,6	12	12
June	20,6	20,2	32,2	34,1	87,8	68,6	9	11
July	21,4	22,4	32,2	37,5	164,2	35,6	13	8
August	22,2	21,1	35,7	36,7	66,0	30,8	3	5
September	14,1	17,3	32,5	33,1	48,6	10,2	6	4
Total					628,4	201,8		

As can be seen from the table, average monthly temperatures, starting from April were 11.7°C in 2008, reaching 12.1°C in 2009. It is known that primary scab infections occur at temperatures above 5°C of powdery mildew disease and the temperature 18-22°C. Moreover, the maximum temperature was 35,7°C in 2008 and 37,5°C in 2009, thus creating conditions conducive to the development of pathogens. Regarding rainfall, the greatest amount recorded in 2008, by 628.4 mm. But, in addition to significant rainfall is the number of days with precipitation favoring pathogen attack. For example, in 2008, the number of rainy days was 14 in April, 12 in May, 9 in June and 13 in July which favored scab attack.

RESULTS AND DISCUSSIONS

Experimental results on the effectiveness of fungicides against pathogens are presented in table 2.

Thus, in 2008-2009, two pathogen attack (*Venturia inaqualis* and *Podosphaera leucotricha*), recorded in untreated control variant, after flowering, shows that were good conditions for scab and powdery mildew disease. For example, in 2008, the frequency of scab on leaves was 64.7% and 55.0% on fruits, and in 2009, the attack was lower: 42.5% on leaves, 24.7% on fruits. To these values, the variant treated, frequency of scab and powdery mildew was reduced. In 2008, the variety most affected by scab was Starkrimson, where values have been 7.4% on leaves and 4.3% on fruit, and variety for powdery mildew on leaves Golden with a frequency of 4.3% and 3.6% on fruit.

Table 2

Efficacy of fungicides tested in apple plantations – SCDP IASI

Used products	Variety	Scab F %				Powdery mildew disease F%			
		2008		2009		2008		2009	
		Leaves	Fruits	Leaves	Fruits	Leaves	Shoots	Leaves	Shoots
V1 T1- Zato+Dithane T2- Clarinet T3 -Rubigan	Golden	6,2	4,0	4,8	2,8	4,3	3,6	2,4	1,6
	Jonagold	5,0	3,2	3,1	2,3	2,0	1,4	1,2	1,4
	Starkrimson	7,4	4,3	5,0	3,1	-	-	-	-
	Untreated control - Jonagold	64,7	55,0	42,5	27,4	43,4	33,7	31,4	24,7
V2 T1- Zato+Antracol T2-Flint plus T3-Shavit F72	Golden	4,1	3,5	1,0	0,8	4,1	2,9	1,1	0,9
	Jonagold	3,6	2,9	1,2	0,7	1,8	0,9	1,4	1,0
	Starkrimson	5,0	3,4	1,4	0,8	-	-	-	-
	Untreated control - Jonagold	64,7	55,0	42,5	27,4	43,4	33,7	31,4	24,7

Also can be seen from table, that fungicides Zato + Antracol, Flint plus and Shavit F 72, were more effective recording a lower attack of 0.8% scab on fruit in 2009, compared to the version Zato + Dithane, Clarinet and Rubigan, scab attack on fruits in the same year was 2.8%. Close values were also applied to powdery mildew.

Analyzing the behavior of the same pathogen, differentiated the two years of experience, is found in 2008 were most favorable for the development of pathogens and the attack was more intense compared to 2009.

For example, the variety Jonagold, variant Zato+Dithane, Clarinet and Rubigan, the frequency of scab on leaves was 3,2% in 2008 from 2.3% in 2009.

CONCLUSIONS

1. Climatic conditions in 2008 – 2009 were conducive to the development of pathogens *Venturia inaqualis* and *Podosphaera leucotricha*.

2. In year 2008, scab and powdery mildew disease attack was more intense than in 2009, proving that by the frequency of pathogens.

3. The best results in combating scab and powdery mildew were obtained in products: Zato 0,01%, Antracol 0,15%, Flint plus 0,1% and Shavit F 72 0,2%

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PHYTOSANITARY CONTROL OF APPLE TREE - QUALITY AND ECONOMIC EFICIENCY

FITOPROTECŢIA MĂRULUI - CALITATE ŞI EFICIENŢĂ ECONOMICĂ

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Abstract. *Works to prevent and control pathogens and pests of fruit trees is an important sequence in fruit growing technology. Altought the means of control have multiplied in recent times the chemical processes it is more responsibility. The quantity and quality of fruit such apple culture and economic efficiency are highly dependent on plant protection products in plant protection programs. In the years 2007-2009 at SCDP Iasi have used new products, with new principles of action based on apple pests, with new active substances, witch were placed in sound programs afforded very good results.*
Key words: pesticides, control, frequency, intensity

Rezumat. *Lucrările de prevenire şi combatere a patogenilor şi dăunătorilor pomilor fructiferi reprezintă o secvenţă importantă în tehnologia pomicolă. Deşi mijloacele de combatere s-au diversificat în ultimul timp – procedeului chimic îi revine cea mai mare responsabilitate. Cantitatea şi calitatea fructelor precum şi eficienţa economică a culturii mărului sunt dependente în foarte mare măsură de produsele de protecţia plantelor din cadrul programelor fitosanitare. În anii 2007 – 2009 la SCDP Iaşi s-au utilizat produse noi, cu principii noi de acţiune asupra dăunătorilor mărului, pe bază de noi substanţe active, care introduse în programe judicioase au dat rezultate foarte bune.*
Cuvinte cheie: pesticide, combatere, frecvenţă., intensitate

INTRODUCTION

Works to prevent and combat pathogens and pests of fruit trees is an important sequence in fruit growing technology. Although combating have diversified more recently chemical process bears the greatest responsibility. Fruit quality and quantity and efficiency of the apple crop is heavily dependent on plant protection products in protection programs. In the years 2007-2009 at SCDP Iasi new products were used with new principles of action on the apple pest, based on new active substances, which were introduced in protection programs judicious view to obtaining as the product ad. Similar studies have been undertaken both in our unity and the country alike (Beşleagă Ramona ş.a, 2009; Cârdei E.,1995; Cârdei E.,2007; Istrate M., ş.a,2006; Petre Gh**.,** 2006.).

MATERIAL AND METHODS

Experiments on control apple pests and pathogens were conducted in 2007-2009 in two apple varieties: Idared and Jonagold. Trees have been grafted on MM 106 and were planted in 2001, led palmetto arm as oblique support systems. Soil

between rows of trees was grassy plant material is mechanically chopped 2-3 times per summer and left as mulch, row of trees and soil was worked with wheel mechanical stylus. Fertilization was achieved with foliar fertilizer only version Fertifol five interventions by 4 l / ha.

Climatic conditions were monitored period showed the presence of higher levels to normal, in terms of temperature. Thus, it appears that the highest monthly average temperatures were recorded in 2007, when maximum temperatures in may-august were 36,5°C-40,0°C. The other two years as both average and maximum temperatures were higher than the multi, but lower than those of 2007 (table 1).

Table1

Climate data 2007-2009

Months	Average temperature			Maximum temperature			Precipitations		
	2007	2008	2009	2007	2008	2009	2007	2008	2009
III	8,1	7,3	3,7	21,6	22,4	19,5	26,2	43,4	18,8
IV	11,0	11,4	12,1	24,7	23,5	25,8	29,6	124,0	1,2
V	19,6	15,9	16,0	38,8	29,0	31,8	33,4	94,4	36,6
VI	23,1	20,6	20,2	36,5	32,2	34,1	22,0	87,8	68,6
VII	25,2	21,4	22,4	40,0	32,2	37,5	45,0	164,2	35,6
VIII	22,5	22,2	21,1	37,1	35,7	36,7	112,0	66,0	30,8
IX	16,0	14,1	17,3	26,7	32,5	33,1	87,8	48,6	10,2
Total							356,0	628,4	201,8

In terms of rainfall in 2008 was the richest there were 628,4 l/m in march-september period, compared to only 201,8 liters per square meter in 2009 and 356,0 liters per square meter in 2007 the same period. In april 2008 fell to 124,0 l/m, number of rainy days is 14, in 94.4 l/m in 12 days in june and 87,8 l/m in 9 days. Apple pathogens in these climatic conditions, especially brown staining of leaves of apple (*Venturia inaqualis*) had the most favorable opportunities for development. Apple pests found more favorable conditions in 2007 and 2009.

To prevent and combat pests and pathogens to reduce or eliminate damage in 2007-2009 fitoasanitare treatments have been applied on the basis of previously established programs and in which they were introduced the latest and most effective plant protection products. For example, treatment program in 2009 to two apple varieties was following (table 2).

Products used are generally known as having good efficacy, but of all the notes the following: Flint Plus 64 WG, and Proteus Maccani OD 110. Plus Flint 64 WG is a fungicide with preventive action and a complex activity and multi-mezosistemică siti conferred by the two active ingredients: trifloxystrobin and captan 60% 4%. Waxy layer is strongly absorbed by the leaves and thus resistant to rain and has the ability to redistribute the leaf surface through evapotranspiration processes and translaminară activity.

Table 2

Schedule for phytosanitary treatments applied in 2009 at SCDP Iasi

Nr. crt.	Phase	Fought against pathogens and pests	Plant Protection Products	Dose / ha L, kg
1	mouse ears	San Jose Scale, peel fruit moth, eggs of mites , eggs of aphids, flowers ladybug, bark disease	Champion + Oleocarbetox S	4,5+ 15,0
2	pink button	scab, powdery mildew disease, scale woolly, mites, peel fruit moth	Zato + Antracol + Reldan + Decis 25 WG	0,15 3,0 1,5 0,06
3	start shaking petals	scab,powder mildew disease , monilioze, mined, defoliator, wasp apples , aphi ds, mites	Flit plus+ Decis Mega 50 EW	1,9 0,24
4	fruit nut	worm apples T1G1, aphids, mined, scab, powder mildew disease	Shavit F 72+ Calypso 480 SC	3,0 0,4
5	in the previous 12 days	worm apples T2G1, defoliator, mined, scab, powder mildew disease	Clarinet+ Decis 25 WG	2,0 0,06
6	fruit ø de 2-2,5 cm	same pathogens and pests and peel fruit moth	Captan 80 + Sulf muiabil + Decis 25 WG	3,0 6,0 0,06
7	fruit ø 3,0 cm	San Jose Scale T1G1, peel fruit moth, defoliator, aphids,mites, scab, powder mildew disease	Systhane plus Reldan+ Nissorun	0,4 3,0 0,6
8	in the previous 12 days	San Jose ScaleT2G1, worm applesT1G2	Maccani + Proteus OD 110	2,0 0,8
9	in the previous 10 days	Worm applesT2G2, peel fruit moth, minator, scab, powder mildew disease, etc	Captan 80+ Sulf muiabil+ Decis 25 WG	3,0 6,0 0,06
10	almost normal size fruit	San Jose G2, mites, vworm apples, moniliozã, deposit diseaseetc	Folicur Solo + Calypso 480 SC + Seizer	

Maccani is a fungicide which constituted two active ingredients: pyraclostrobin ditianon 4% and 12% strobilurinelor first part of the group and mode of action is inhibition of mitochondrial respiration and the second having a multi-site inhibition dtermină spores. The active substance remains on the surface of leaves with a solid deposit, will enter the leaf through translaminare properties and the local system. Release the active substance is gradually giving it a long action.

Proteus OD 110 is a systemic and contact insecticide with a broad spectrum of activity on many pests including apple's. Has two active ingredients, including a "thiacloprid" and another group cloronicotinele "Deltamethrin pirectroizilor group. Thiacloprid penetrate the plant relatively quickly (after about an hour), deltamethrin remains on the surface, both components act by contact and ingestion of fruit pests that bite and vegetative parts of plants. Proteus combines the action of long-term systemic shock action. Making art - oil dispersion (Oil dispersy) gives the product a grip and superior to others formulations penetrate plant.

During the growing season have made observations and measurements on: the attack of pathogens and pests, weather data, the effectiveness of plant protection products, the quantity and quality of fruit, expenditure on applied technology.

RESULTS AND DISCUSSIONS

In the three years of study of the evolution of apple pests and pathogens were found on them were very favorable conditions in 2007 and 2008 to pathogens and pests in 2007 and 2009.

Frequency of scab attack on the untreated control was very high on both leaves and fruit, so in 2007 there was 63,5% in value of 42,4% on leaves and fruit, and in 2008 to 72,5% on leaves and 54,6% (table 3 and 4).

Table 3

Effectiveness in combating phytosanitary treatments to apple scab

Specification	Apple scab							
	2007				2008			
	Leaf		Fruits		Leaf		Fruits	
	F%	I%	F%	I%	F%	I%	F%	I%
Idared	9,4	10,5	7,4	10,0	10,3	15,0	8,7	15,3
Jonagold	11,3	10,7	8,1	10,0	14,4	15,6	10,5	20,4
Jonagolg Mn	63,5	25,0	42,4	25,7	72,5	25,0	54,6	35,7

Table 4

Effectiveness of phytosanitary treatments to combat powdery mildew on apple

Specification	Apple powdery mildew disease							
	2007				2008			
	Leaf		Shoots		Leaf		Shoots	
	F%	I%	F%	I%	F%	I%	F%	I%
Idared	11,7	10,0	6,5	10,0	13,3	12,4	8,9	15,4
Jonagold	8,9	10,0	5,2	10,0	10,2	10,0	7,8	15,0
Jonagolg Mn	45,8	25,0	31,4	25,0	57,9	34,7	42,3	40,5

High values were also applied to apple powdery mildew. These high frequencies in particular highlights the effectiveness of plant protection products used in the treatment program. Ionagold variety was more sensitive to scab than Idared variety, which in turn was more sensitive to powdery mildew disease. Both scab and powdery mildew disease were present in treated plots but the frequency and intensity of significant value not significant damage occurred. Scab and

powdery mildew frequency values were at least 8-11 times lower. Situation in 2007 and 2009 leads us to believe that no pesticides can best ensure a perfect protection.

Regarding pests were monitored only three were considered the most dangerous stage: worm apples, peel fruit moth and San Jose Scale (table 5).

Table 5

Effectiveness of phytosanitary treatments in apple pest

Specificare	% attacked fruits San Jose		% attacked fruits de *Cydia*		% attacked fruits de *Adoxophyes*	
	2007	***2009***	***2007***	***2009***	***2007***	***2009***
Idared	0,1	0,2	3,9	4,5	*2,5*	2,6
Jonagold	0,2	0,2	*4,2*	4,7	*2,5*	2,8
Jonagolg Mn	36,5	40,2	*71,4*	75,0	*39,9*	46,7

Their degree of risk, the percentage of affected fruit (36,5-40,2% - San Jose, 71,4-75,0% - the worm apples-*Cydia pomonella* and from 39,9 to 46,7% - the shell moth apples- *Adoxophyes reticulana*) is a testimony of what might happen in a corresponding untreated plantation. Although insecticides used are efficacy and performance, however, contested the test plots or fruit found in different percentages (eg 3,9-4,7% 2,5-2,8% from worm to moth and apple peel). Potential hazards that may cause these insects are largely due to changing weather favorability for the purposes of development. Even in these particularly difficult conditions, the program specialist protective treatment applied in 2007-2009 was more than satisfactory by both the health of trees and the production obtained – 30917,7 kg/ha and quality.

In terms of quantity and quality of output and expenditure was found that they were different in the three years of study, but in all the years of production- and quality assured expenses and a profit. For example present technical and economic data obtained per hectare in 2009:

- Production of apples per hectare: 30,917.7 kg, of which:
  - Storage: 20336,7 kg – 65,7%;
  - Industry: 10581,0 kg – 34,3%;
- Costs of production per hectare: 9934,7 lei, of which:
  - Expenses related to salaries +: 5098,3 RON – 51,2%
  - Costs of pesticides: 2966,5 RON – 29,9%
  - Cost of fuel: 580,7 RON – 5,8%
  - Other expenses: 1296,6 RON – 13,1%
- Cost price/kg: 0,32 Euro/kg
  - Price of apples from storage recovery: 0,75 Euro/kg
  - Price of apples recovery industry: 0,09 euro / kg + 0,16 euro/kg subsidies – 0,25 Euro / kg;
  - Storage expenses: 0,25 Euro/kg;
- Income/ha: 17897,8 lions that:
  - 15252,5 lions turning apples stored

- 2645,3 lei apple industry recovery

- total cost/ha: RON 15018,9
- Profit/ha: 2878,9 RON

In a precarious economy, uncertain at that time believe that the apple crop profitable.

CONCLUSIONS

1. Weather conditions were very favorable for pathogen development in 2007 and 2008 and for pests;

2. Scab attack frequency was 63,5 – 72,5% on leaves and fruit from 42,4 – 54,6% in the untreated control and from 9,4 – 14,4% on leaves and fruit from 7,4 – 10,5% in plots treated;

3. Were the most dangerous pests in San Jose Scale (36,5 t- 40,2% contested fruit) apple worm (71,4 – 75,0%) and fruit shell moth (39,9 – 46,7%) - insecticides used had a special performance (3,9% -4,7% in Cydia pomonella, from 2,5 – 2,8% in Adoxophyes reticulana)

4. Average yield was 309,7 kg / ha, 20336 kg for storage; profit for 2878 was euro / ha;

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EFFECT OF CHROMIUM ACCUMULATION ON SEEDLINGS AND PHOTOSYNTHETIC PIGMENTS IN BEAN SEADS (*PHASEOLUS VULGARIS L.*)

EFECTUL ACUMULĂRII IONULUI DE CROM ÎN GERMENII DE FASOLE (*PHASEOLUS VULGARIS* L.) ŞI INFLUENŢA SA ASUPRA ACTIVITĂŢII ENZIMATICE ŞI A CANTITĂŢII DE CLOROFILĂ

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Abstract. *During the germination process the seeds are affected by the external and internal factors, which can have a profound change on the outcome. External factors include those that affect the germination environment, while internal factors can be related to the "history" of the individual seed. One of these external factors is chrome and may lead abnormality or death of the embryo. The goal of this trial is to identify the biochemical and physiological plants reaction to the excess of Cr^{3+}. It was evaluated the germination energy and faculty of the bean seeds under the influence of different Cr^{3+} solution concentration. The analysis methods was orientated to determinate the enzymatic activities and the chlorophyll quantity. The study of Cr^{3+} effects under the metabolic process associated seeds germination and post – germination phases , is completed by the monitoring of enzymatic activities involved in the mobilisation of the seeds' food reserves and determination of the chlorophyll quantity involved in photosynthesis process. The results were compared to relieve the interaction between doses – plant reaction, and the elements that are different or common under toxicity effect, compared by the blank test (control – distillate water).*

Key-words: seed germination, *Phaseolus vulgaris*, Cr^{3+}, chlorophyll, enzymatic activity,

Rezumat. *Premisa investigaţiei are la baza ipoteza conform căreia creşterea plantelor este controlată de anumite substanţe endogene, care nu acţionează separat, ci se condiţionează reciproc, creşterea şi dezvoltarea reprezentând rezultanta echilibrului dinamic dintre aceste substanţe. Unul dintre aceşti factori este ionul metalic trivalent Cr^{3+} care poate induce apariţia de germeni anormali sau chiar moartea embrionului. Scopul investigaţiei constă în identificarea răspunsurilor biochimice şi fiziologice ale plantelor la excesul de metale grele, în speţă Cr^{3+}. A fost evaluată energia şi facultatea germinativă a semintelor de Phaseolus vulgaris, sub influenta unor soluţii de concentraţii diferite de crom, împreună cu determinarea activităţi enzimatice şi a cantităţii de clorofilă. Procesele metabolice asociate germinaţiei şi fazei post-germinative sunt estimate prin monitorizarea activităţii unor enzime şi a cantităţii de clorofilă. Rezultatele obţinute au fost comparate pentru a releva*

existenţa unei relaţii doză-răspuns, identificând elementele comune şi particularităţile care le diferenţiază sub aspectul toxicităţii, cât şi rezultatele obţinute în condiţii martor.

Cuvinte cheie: germinaţia seminţelor, *Phaseolus vulgaris*, Cr^{3+}, clorofila, activitate enzimatică

INTRODUCTION

Heavy metals like Zn, Fe, Cu, Mn are essential for plant growth and important constituents of many enzymes of metabolic importance. Other metals like Pb, Cd, As, Se, Cr and Al are biologically non – essential and toxic above certain threshold levels. Chromium is toxic to plants and does not play any role in plant metabolism. Accumulation of chromium by plants can reduce growth, induce chlorosis in young leaves, reduce pigment content, alterate enzymatic function, damage root cells and cause ultra structural modifications of the chloroplast and cell membrane. (Ho, 1990). Chromium toxicity can reduce seed germination and radicle growth in plants. Growth inhibition in plants can be due to inhibition of cell division by inducing chromosomal aberrations. However, in many plants an increase in DNA content has been observed under chromium and the amount of DNA increased with the increase in concentration of chromium. During seed germination, hydrolysis of proteins and starch takes place, providing amino acids and sugars. (Butnariu, 2005, 2007). Under chromium treatment, a decrease in both α and β – amylase has been reported, which is one of the important factors for germination inhibition in many plants in view of the impaired supply of sugar to developing embryo axes. At very low concentrations of chromium, however, an increase in amylase activity has been reported. Chromium exposure at the micromolar range can lead to severe phytotoxic symptoms in plant cells. (Chandra, 1992). Chromium often accumulates in aquatic life, adding to the danger of eating fish that may have been exposed to high levels of chromium. (Barcelo, 1985). Tannery effluent is a major source of aquatic chromium pollution with high BOD, COD and total dissolved solids. It occurs in several oxidation states ranging from Cr^{2+}, Cr^{3+} to Cr^{6+}. However, Cr^{6+} is the most toxic form and mutagenic because of its high solubility, ability to penetrate the cell membranes and strong oxidizing ability. (Rai, 1992). Oxidative stress is caused either by inducing oxygen free radical production or by decreasing enzymatic and nonenzymatic antioxidants. Reactive oxygen species (ROS) reacts very rapidly with DNA, lipid and proteins causing cellular damage. The toxic effect of chromium has amply been documented both in the laboratory and under natural conditions in aquatic plants. (Krupa, 1993, Apha, 2005). Thus there is a great need to assess toxic potential of chromium in *Phaseolus vulgaris* plants under such conditions. Wetland plant treatment is the best choice for treatment of wastewater because of the low maintenance cost and simplicity of operation. (Chandra, 1992). Recently, many plants including water hyacinth have become important in pollution treatment systems and used successfully to remove chromium. *Phaseolus vulgaris* seedlings' grown in different chromium concentrations (25, 50 to 100 ppm) showed appreciable amounts of the same

accumulated in their tissues, maximum being in roots. (Butnariu, 2008) Higher amounts of chromium accumulated in plant tissues result significant inhibition in chlorophyll, protein contents and nitrate reductase activity in test plant. Sensitivity of nitrate reductase activity in the presence of both nitrate and ammoniac nitrogen could be used as a bioassay index for toxicity assessment against supraoptimal concentrations of chromium. (Barcelo, 1985).

MATERIAL AND METHOD

SR 1634/ 1999 – Seeds for sowing Determination of germination. *ISTA Handbook on Seedling Evaluation 3rd edition*. The seeds were placed in a pleated accordion-like paper strip. (PP). Completed strips were kept in boxes within a germination cabinet at 25^0 C and 70 % rH. *SR EN ISO 16634 – 1:2009* ver. eng. Determination of total nitrogen by combustion principle Dumas and calculating the content of crude protein. Sampling and preparing samples for analysis was conducted in accordance with *AOAC 920.180*. Samples were prepared for quantification using the system of mineralization for mineralization rapidly several samples of organic and mineral for further investigation by Meto spectrophotometric, Turbidity or titrimetrice. (*SR EN 13804:2003*). Sample mineralized not require distillation intermediate was prepared for analysis of colorimetric direct protein. The mineralization can be used to determine heavy metals, the total phosphorus and total Kjeldahl nitrogen, for hard evidence and for samples liquid. The metals were extracted from samples as 2.0 g of sample was mineralized in the environment of organic mixture of acetone and petroleum ether (5:1 v/v) in a mineralized Digesdhal, System mineralization Digesdahl / Digesdahl ® Digestion Apparatus. (*SR EN 14083:2003*). The filtrate was brought to 50 ml with distilled water and this mixture was determined metals. (*SR EN 13805:2003*.) pH – has been determined, pH – meter Model InoLab – pH 740, according to *STAS 8619 / 3 / 90* pH – meters. Determination electrometry of pH – the solution aqueous approved by the ASRO. *Extraction of Soluble Sugars from Sample*: Two grams of the milled sample was extracted for 30 min with 10ml of 80% ethanol at 60^0C using a magnetic stirrer. The extract was filtered through a filter paper and the ethanol evaporated in a water bath at a temperature of 80^0C to give a final volume of 2 ml. One gram of each standard (reference) sugar (raffinose, sucrose, glucose and galactose) was dissolved in 100 ml of distilled water to make a 1% solution. *Quantitative Analysis*: Then, 0.1 ml of 5% phenol was added to each dissolved sugar followed by rapid addition of 0.5 ml concentrated tetraoxosulphate (vi) acid (H_2SO_4). Each tube containing the sugar – reagent mixture was then placed in a water bath to cool for 20 min. The absorbance of the cooled mixture was read at 490 nm using the spectrophophotometer, and the corresponding concentration was extrapolated from the standard calibration curve prepared from each reference sugar. Chlorophyll a, b, total and carotenoid were determinative spectrofotometeric by using the method with molibdovanadat UV – VIS spectrophotometer *T60U, PG Instruments Limited, UV WIN ® version 5,05*.

RESULTS AND DISCUSSIONS

Seeds of bean (*Phaseolus vulgaris L.*) were germinated by soaking in $Cr_2(SO_4)_3$ solution. The abnormal seedlings resulted after 9 day of germination shows that chromium determinate many damage to the embryo such as: stunted root, missing primary root, curled hypocotyl, short hypocotyl, hypocotyl forming

a spiral and constricted, and many other defective terminals bud (figure 1), and the germination was reduced until a half compared with the control.

The relationships among chromium excess treatment, germination rate, dry weight, sugar contents, and enzymes activities in cotyledon were investigated. Higher amounts of chromium accumulated in plant tissues result significant inhibition in chlorophyll, protein contents and nitrate reductase activity in test plant. Sensitivity of nitrate reductase activity in the presence of both nitrate and ammonical nitrogen could be used as a bioassay index for toxicity assessment against supraoptimal concentrations of chromium.

25 ppm Cr^{3+} concentrations 50 ppm Cr^{3+} concentrations 100 ppm Cr^{3+} concentrations

Fig. 1. Normal and abnormal seedlins of *Phaseolus vulgaris*

A strong positive correlation was found between chromium content in effluents and plant roots ($r^2 = 1.002$) and leaves ($r^2 = 0.997$). A similar trend was also found under laboratory condition (100 and 25 mg/g) in roots ($r^2 = 1.002$) and leaves ($r^2 = 1.003$).

Table 1

Physico – chemical characteristics of *Phaseolus vulgaris* seedlings'

Parameters	Cr solutions concentrations		
	25	50	100
Colour	*Greyish green*	*Light gray green*	*Light gray*
pH	*7.8±0.62*	*7.9±0.63*	*6.8±1.24*
Dissolved oxygen (DO) mg/ l	*0.21±0.07*	*3.29±0.10*	*4.90±1.14*
Biochemical oxygen (BOD) mg/ l	*1349±6.01*	*370±3.62*	*482±0.013*
Chemical oxygen (COD) mg/ l	*3791±18.48*	*1074±7.13*	*934.0±1.89*
Total solids mg/ l	*3892±9.74*	*3754±8.04*	*3423.0±1.32*
Total dissolved solids (TDS) mg/ l	*3420±6.25*	*3315±7.59*	*2305±0.012*
Total suspended solids (TSS) mg/ l	*472±3.79*	*439±2.34*	*398±1.2±2.344*

Mean ± SE (n=3)

Heavy metal stress provoked a diminution in germination rate and biomass mobilization, as compared with the control.

Table 2

Effect of chromium on protein and sugar (mg/g fresh wt.) and nitrate reductase activity (μmol NO_2 /g fresh wt.) in *Phaseolus vulgaris* seedlings' at different concentrations

Cr^{3+}	Protein (mg/g fresh wt.)	Sugar (mg/g fresh wt.)	NR activity (μmol NO_2 /g fresh wt.)
Control	*91.56±0.86*	*2.00±1.14*	*84.232.00*
25 ppm	*85.74±1.1**	*8.00±0.019*	*69.17±0.62**
50 ppm	*78.86±1.1**	*16.00±0.007*	*39.51±0.19**
100 ppm	*64.27±0.87**	*22.00±0.029*	*25.21±0.13**

All values are mean of triplicates ± S.D. * = Significance ($p < 0.01$) compared to control

A drastic disorder in soluble sugars export, especially glucose and fructose liberation, was also imposed after exposure to excess chromium. This restricted the starch and sucrose breakdown in reserve tissue, as evidenced by the inhibition in the activities of α – amylase and invertase isoenzymes (soluble acid, soluble neutral, cell wall – bound acid). Chlorophyll a, b and total chlorophyll content increased at low concentration (25 and 100 ppm). However, there was significant decrease ($p < 0.01$) at high concentration (100 ppm).

Table 3

Effect of different concentration of chromium on photosynthetic pigments (mg/g fresh wt.) in *Phaseolus vulgaris* seedlings' at different concentrations

Concentration	Chlorophyll a	Chlorophyll b	Total chlorophyll	Carotenoid
Control	*1.27±0.09*	*0.44±0.06*	*1.80±0.08*	*0.34±0.08*
25 ppm	*1.36±0.08*	*0.19±0.05**	*1.51±0.06**	*0.55±0.05**
50 ppm	*1.07±0.05**	*0.15±0.05**	*1.39±0.04**	*0.61±0.09**
100 ppm	*0.77±0.05**	*0.13±0.04**	*0.87±0.06**	*0.70±0.08**

All values are mean of triplicates ± S.D. * = Significance ($p < 0.01$) compared to control

Maximum reduction was observed at 100 ppm. Similarly, a concentration dependent reduction in chlorophyll content over control was also observed in the leaves of *Phaseolus vulgaris* seedlings'.

However, carotenoid content showed dose dependent relationship. It increased significantly ($p < 0.01$) with increase in concentration of chromium in the medium. Heavy metal accumulation in vascular plant is known to produce significant physiological and biochemical responses. A decrease in chlorophyll content may either be due to inhibition of chlorophyll synthesis or its destruction or replacement of Mg ions.

An increase in carotenoid content was observed in chromium treated plants of *Phaseolus vulgaris*. Increased carotenoid concentration for the protection from free radical formation is a common response to xenobiotics.

CONCLUSIONS

Contamination by chromium (Cr) is widespread in agricultural soils and industrial sites. This heavy metal represents a risk to human health.

In order to gain fundamental insights into the nature of the adaptation to chromium excess, the characterisation of physiological indices, including responses of photosynthetic gas exchange and chlorophyll a fluorescence along with changes in mineral nutrient contents and water status were studied in *Phaseolus vulgaris* seedlings'. Increased concentrations of chromium Cr (VI) in solution were applied.

The growth of *Phaseolus vulgaris* seedlings' is decreased by chromium and the leaves have lost their pigments. Chromium accumulation was greater in roots than in leaves. The physiological parameters were severely reduced by this heavy metal. Chromium induced resulted in a modification of mineral content in roots and leaves, especially for Ca, Mg and Fe.

The chromium stress decreased CO_2 assimilation rates mainly due to stomatal closure, which reduced water loss by transpiration without decreasing the cellular available CO_2. The fluorescence parameters associated with photosystem II (PSII) activity and the photochemical activity are modified by chromium. Non – radiative energy dissipation mechanisms were triggered during stress since non – photochemical quenching was increased and efficiency of excitation capture by open centers was reduced.

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THE APPLE RATIONAL PROTECTION AGAINST THE KEY PEST AND DISEASES

PROTECŢIA RAŢIONALĂ A MĂRULUI ÎMPOTRIVA BOLILOR ŞI DĂUNĂTORILOR CHEIE

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Abstract: *Within the apple orchard from the Didactical Station Banu Mătăcine, the key pathogen that require chemical treatments ensuring also the control of the secondary pathogens are: Venturia inaequqlis, Podosphaera leucotricha, Monilinia fructigena, and the pests that produce the highest damages and attack with the highest frequency are: Quadraspidiotus perniciosus, Cydia pomonella, Anthonomus pomorum, Aphis pomi, Panonychus ulmi, Bryobia rubrioculus, Phyllonorychter blancardella, Leucoptera scitella, Hyphantria cunea, Eryosoma lanigerum. The chemical treatments were applied taking into account complexation and alternating pesticides to reduce consumption, which have been associated with eliminating sources of infection by agrophytotechnical methods (soil - plant) nutrition.*

Key words: apple, pathogen agents, pests

Rezumat. *În plantaţia de măr a Staţiunii Didactice a Universităţii din Craiova patogenii cheie împotriva cărora se aplică tratamente care asigură şi combaterea patogenilor secundari sunt în ordinea importanţei lor economice: Venturia inaequqlis, Podosphaera leucotricha, Monilinia fructigena, iar dăunătorii animali care atacă cu frecvenţa cea mai mare sunt: Quadraspidiotus perniciosus, Cydia pomonella, Anthonomus pomorum, Aphis pomi, Panonychus ulmi, Bryobia rubrioculus, Phyllonorychter blancardella, Leucoptera scitella, Hyphantria cunea, Eryosoma lanigerum. Tratamentele chimice au fost aplicate avându-se în vedere complexarea şi alternarea pesticidelor, pentru reducerea consumului, care s-au asociat cu eliminarea surselor de infecţie prin lucrări agrofitotehnice (sol – plantă*

Cuvinte cheie: măr, agenţi patogeni, dăunători

INTRODUCTION

In the apple orchards the main diseases with economically importance are: apple scab, powdery mildew of apple and brown rot of pome and stone fruits. The pests that produce the highest damages and attack with the highest frequency are: *Quadraspidiotus perniciosus, Cydia pomonella, Anthonomus pomorum, Aphis pomi, Panonychus ulmi, Bryobia rubrioculus, Phyllonorychter blancardella, Leucoptera scitella, Hyphantria cunea. Eryosoma lanigerum* (Gh., Lefter, N., Minoiu 1990). Due to the difficult problems of prevent and control the diseases and pests in the Craiova conditions there has been made studies regarding the biology and ecology of the main phytopathogens and pests in order to rationing the treatments applied in the apple orchard.

MATERIAL AND METHOD

The phytopathogens agents and pests biology has been followed during the vegetation period as well in the vegetation repose on the Jonathan variety, considered to be a sensitive variety. The presence of the pests in the orchards, the populations' weight, the appearance moment has been established using the pheromones traps as well through observation in the orchard (Mitrea, I., et al. 1999).

The research regarding the pests' biology there has been made in natural conditions as well in lab conditions using development cages (Mitrea, I., et al. 1999).

The chemical treatments have been applied at advertising in order to control the key pathogens and pests. The determinations regarding the fungicides efficiency has been made at middle of June for primary infections and middle of September for secondary infections.

The calculus for the treatments efficiency has been made on Abbott formula.

For the treatments warning for the damaging microlepidoptera from the apple orchards there has been used establishing the flight curve using the pheromones traps ATRAPOM, ATRABLANC, ATRASCIT, ATRAMAL (Hertug, Maria, 1981).

The insecticides efficiency has been established using the Henderson-Tilton formula.

E% = (1 -)Ta/tb) x (mb/Ma) x 100

Ta = The number of individuals in the treated variant, after the treatment applying;

tb = The number of individuals in the treated variant, before the treatment applying;

Ma = The number of individuals in the control variant, after the treatment applying;

mb = The number of individuals in the control variant, after the treatment applying;

The efficiency observation has been made periodically between May and September, during the tree years of experience.

RESULTS AND DISCUSSIONS

The apple is the prevalent specie in the Banu Maracine Didactical Station. The Diseases produced by the mycological pathogens *Venturia inaequalis*, *Podosphaera leucotricha*, *Monilinia fructigena* are key diseases the produce high yield losses, imposing a great number of treatments (table 1).

Table 1

The key phytopathogen agents from the apple orchard of D. S. Banu Mărăcine

Disease	Phytopathogen agent	Number treatments	GA % 2007 – 2009			
			Leaves	Flowers	Shoots	Fruits
Apple scab	*Venturia inaequalis*	8 – 12	52,53	16,8	20,4	14,2
Apple powdery mildew	*Podosphaera leucotricha*	8 – 10	50,24	15,1	40,6	-
Brown rot of pome and stone fruits	*Monilinia fructigena*	4	-	-	-	20,8

As it can be observed from the table, during 2007 – 2009 there has been recorded medium degree values of the attack degree for the 3 pathogens key, values that has been oscillated function the attacked organ, which has impose 8 – 12 treatments post floral for apple scab and apple powdery mildew and 4 treatments for Brown rot of pome and stone fruits.

In 2007 there were recorded before 1 August 10 primary and secondary infections (two mild, five middle and three high), in 2008, the amount of precipitation favored the multiplying of the fungus. There were recorded 18 infections (4 mild, 7 middle and 7 high), of which eight occurred during the intensive growth of shoots and fruits. In 2009 there were recorded 18 infections (six mild, six middle and 5 high). Of these, nine occurred after the petals fallen and as a consequence from May to June has been recorded an intense pace of attacks.

Due to the climatic conditions of the years 2009 - 2007 were required application of 8-10 treatments to control the powdery mildew:

2007: 15, 23, 31 May; 10, 17, 25 June; 5, 17, 28 July; 8 August

2008: 3, 14, 22 May; 6, 16 June; 1, 4, 30 July; 14 August

2009: 13, 23 May; 3, 10, 20 June; 5, 20, 31 July.

Another disease frequently noticed during the 3 years of study has been Brown rot of pome and stone fruits produced by the *Monilinia fructigena* fungus.

Because the pathogens' chemical control still constitute the base of the integrated control (N., Minoiu, A., Maxim, 1996), in this paper we are presenting the biological efficiency of 7 fungicides with complex action, used for controling *Venturia* and *Oidium*, which has been tested on the Jonathan variety and can be used in the apple integrated complex control (table 2).

In the climatic conditions during 2007-2009, in the Didactical Station Banu Maracine were noted as having a good action to prevent and control the two key apple diseases (apple scab and apple powdery mildew) the products: Shavit 71.5 F – 0.2%, Folicur 250 EW – 0.05% and Bavistin 50 WP – 0.07%.

Table 2

The biological efficiency of some fungicides use to prevent and control the apple scab and apple powdery mildew at the Didactical Station Banu Maracine (2007-2009)

Product	Pathogen agent							
	Venturia inaequalis				Podosphaera leucotricha			
	Leaves		Fruits		Leaves		Shoots	
	GA %	E %	GA %	E %	GA %	E %	GA %	E %
Rubigan 12 EC	3,5	93,3	0,05	99,6	2,7	94,6	2,5	93,8
Euparen M	3,8	92,7	0,08	99,4	3,0	94,0	3,2	92,1
Folicur 250 EW	2,3	95,6	0,02	99,8	1,9	96,2	2,2	94,5
Topsin M 70	3,4	93,5	0,09	99,3	3,6	92,8	2,9	92,8
Bavistin 50 WP	2,8	94,6	0,06	99,5	3,3	93,4	3,1	92,3
Shavit F71,5	1,9	96,9	0,02	99,8	2,2	95,6	1,8	95,5
Score 250 EC	2,8	94,6	0,04	99,7	3,0	94,0	2,8	93,1
Martor netratat	52,53	-	14,2	-	50,24	-	40,6	-

Regarding the pests from the Oltenia central area apple orchards there has been recorded a high number of damaging species, with an attack frequency that has been ranged between 2–30 %, (table 3), fact that has determined to made some observations and determinations regarding the pests' biology and ecology as well establishing the right moment for applying the phyto-sanitary treatments, in order to establish the efficiency of some phyto-pharmaceutical products used for controlling these pests.

Table 3

The harmful entomofauna from the apple orchards

Class	Species	The attack degree (%)	The attack frequency (%)
Insecta	*Aphis pomi* De Geer	12,9	16
	Dysaphis devecta Walker	25,7	30
	Eriosoma lanigerum Hausm	2,3	3
	Quadraspidiotus perniciosus Comst	2,8	4
	Hoplocampa testudinea Klug	3,1	6
	Anthonomus pomorum L.	3,6	7
	Cydia pomonella L.	7,2	11
	Phyllonorycter blancardella F.	5,6	10
	Leucoptera scitella Zell.	3,4	6
	Stigmella malella St.	1,5	2
Acarina	*Pannonichus ulmi* Koch	2,5	4
	Bryobia rubrioculus Scheut	2,2	3

From the 12 species encountered in the apple orchards from the Oltenia central area, only four (*Aphis pomi* De Geer, *Dysaphis devecta* Walker, *Cydia pomonella* L. and *Phyllonorycter blancardella* F) has present a high frequency and degree attack, determining us to follow these species from the biological, ecological and control point of view.

In order to control *Aphis pomi* De Geer and *Dysaphys devecta* Walker , there has been used 11 insecticides with different chemical base. The insecticides' biological efficiency present values ranged between 93.5 % and 99.52 % at 72 hours from the treatments' apply (table 4).

The highest biological efficiency over 98 % has been recorded for the insecticides: Novadin 40 EC, dose 0.1% (98.72%), Supersect 10 EC, dose 0.03% (99.40%), Calypso 480 SC, dose 0.02% (99.12%) and Chesse 25WP dose 0.10% (99.52%).

The lowest values of the biological efficiency has been recorded for the products: Decis 2.5 EC, dose 0.03% (93.5%), Karate 25 CE, dose 0.01% (95.82%) and Diazol 50 EW, dose 0.2% (95.85%).

The natural mortality recorded at the control variant, has been of 1.50 % at 72 hours.

The chemical interventions it's necessary immediately after the leaves from the top of the shoots are infested in a proportion of 5 %.

Table 4

The efficiency of some phytosanitary products use to control the apple aphids (*Aphis pomi* De Geer and *Dysaphys devecta* Walker)

Product	Active substance	Dose*(%)	Efficiency (%)***
Control variant	-	-	1,50**
Diazol 50EW	Diozinon	0,2	95,85
Calypso 480 SC	Tiacloprid	0,02	99,12
Chesse 25 WP	Pimetrozin	0,10	99,52
Novadin 40 EC	Dimetoat	0,1	98,72
Cipertrin 10 EC	Alfacipermetrin	0,015	97,50
Decis 2,5 EC	Deltametrin	0,03	93,50
Fastac 10 CE	Alfacipermetrin	.....	96,12
Karate 2,5 EC	Lambdacihalotrin	0,01	95,82
Supersect 10 EC	Cipermetrin	0,03	99,42
Zolone 25 WP	Fasalan	0,25	96,93
Pirimor 25 WG	Pirimicarb	0,1	96,32

* - volume of solution = 1500 l/ha

** - natural mortality

***calculated using the Hederson – Tilton formula.

The next pest with economical importance for this area has been *Cydia pomonella* L. which has present an attack frequency of 11 %, the climatic conditions favorising the develop of two generations/year. The efficiency of some insecticides used in controlling the apple codling moth has been ranged between 90.12 % for the Karate 2.5 EC and 92.61% for Cascade 5 EC, reducing the pest biological reserve that was initially high (table 5).

Table 5

The efficiency of some insecticide use to control the apple codling moth, under a strong infestation conditions

Product	Active substance	Dose (%)	The attack degree (%)	Efficiency (%)
Karate 2,5 EC	Lambda cihalotrin	0,01	9,6	90,12
Cascade 5EC	Flufenoxuron	0,05	8,2	92,62
Sinoratox 35 CE	Dimetuat	0,15	8,6	91,72
Martor netratat	-	-	45,7	-

The forth pest with economical importance for the apple orchards from the Oltenia central area has been *Phyllonorycter blancardella*, with an attack frequency of 10 %, developing 3 generations/year. The treatments efficiency has been: 93.8% for Nomolt 15 SC, 94.7% for Cascade 5 EC and 93.8% for Rimon 10 EC (table 6). The products Decis 2.5 EC and Karate 2.5 EC, has recorded efficiency over 85 % being one of the products recommended for controlling the spotted tentiform leafminer. The organic-phosphoric products recording lowest efficiency made these to occupy a secondary role in the treatments against the spotted tentiform leafminer.

Table 6

The efficiency of some insecticides used to control the spotted tentiform leafminer

Product	Dose (%)	Active substance	The attack degree (%)	Total mines	Efficiency (%)
Sinoratox	0,1	Dimetoat	5,3	23	86,7
Ecalux 25 CE	0,1	Quinalfos	9,3	17	85,4
Reldan 40 CE	0,1	Clorpirifosmetil	8,5	25	84,3
Decis 2,5 CE	0,05	Deltametrin	7,8	13	85,2
Karate 2,5 EC	0,02	Lambdacihalotrin	3,7	8	85,1
Talstar 10 EC	0,03	Bifentrin	6,9	11	88,6
Cascade 5 EC	0,05	Flufenaxuron	3,1	5	95,2
Nomolt 15 SC	0,025	Teflubezuron	3,4	6	94,3
Rimon 10 EC	0,06	Navaluron	2,9	8	93,8
Control variant	-	-	46,5	197	-

CONCLUSIONS

1. In order to prevent ant control the key pathogens from the apple orchards it's necessary to take care of the phytopathogens agent biological features, the climatic conditions, the varieties sensitivity and the efficiency of the fungicides products.

2. In the apple scab control and apple powdery mildew from the 7 tested fungicides there has been noticed through a high efficiency the following products: Shavit 71.5 F – 0.2%, Folicur 250 EW – 0.05% and Bavistin 50 WP – 0.07%.

3. The best results in controlling the pest from the apple orchards has been recorded with the products: Cascade 5 EC dose 0.05 %, Novadin 40 EC dose 0.1 %, Calypso 480 SC dose 0.02 % and Chesse 25 WP dose 0.10 %.

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HISTOLOGICAL CHANGES INDUCED BY THE ACTION OF THE INSECTICIDE RELDAN 40EC IN *RANA RIDIBUNDA*

MODIFICĂRI HISTOLOGICE INDUSE DE ACȚIUNEA INSECTICIDULUI RELDAN 40EC LA *RANA RIDIBUNDA*

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Abstract. *The main purpose of this work is to study the histological changes induced by the action of the insecticide Reldan 40EC (chlorpyrifos-methil) on Rana ridibunda. Reldan 40EC is one of the most widely used organophosphorus insecticides in agriculture with its attendant adverse health outcomes. The animals used in the experiment were divided in four experimental lots: two lots of control individuals (first lot was kept at 4-6ºC and the second lot at 22-24ºC) and two experimental lots in which the animals were treated with 0.01 ml/g body weight Reldan 40EC and kept at 4-6ºC, respectively at 22-24ºC. The toxic was administrated with intraperitoneal shots (one shot every two days, in a scheme of three weeks). At the end of the experiment we observe histological changes in skin.*

Key words: stratified epithelium, mucous gland, chlorpyrifos-methil, *Rana ridibunda*

Rezumat. *Scopul acestei lucrări este acela de a urmări modificările histologice induse de acțiunea insecticidului Reldan 40EC la broasca de lac (Rana ridibunda). Reldan 40EC este unul dintre cele mai utilizate insecticide organofosforice în agricultură cu efecte negative asupra sănătății omului şi animalelor. Animalele utilizate au fost împărțite în 4 loturi: 2 loturi martor (unul în care animalele au fost ținute la o temperatură de 4-6ºC şi al 2-lea în care animalele au fost ținute la o temperatură de 22-24ºC) şi 2 loturi de experiență în care animalele au fost tratate cu 0.01ml/g greutate corporală Reldan şi ținute la 4-6ºC, respective 22-24ºC. Toxicul a fost administrat prin injecții intraperitoneale (câte o injecție la 2 zile timp de 3 săptămâni). La sfârşitul tratamentului s-au constatat modificări histologice la nivelul tegumentului.*

Cuvinte cheie: epiteliu statificat, glande mucoase, clorpirifos-metil, *Rana ridibunda*

INTRODUCTION

Dramatic declines in amphibian populations have been described all over the world since the 1980s. Pesticides are applied throughout the world often with unintended consequences on ecological communities. In some regions, pesticides are associated with declining amphibians, but we have a poor understanding of the underlying mechanisms (Relya, 2006).

The evidence that the sensitivity to environmental threats is higher in amphibians than in mammals has been generally linked to the observation that

amphibians are characterized by a rather permeable skin (Boone and Bridges, 2003, Rowe et al., 2003). Some researchers have focused attention on the study of the antioxidant defense mechanisms of mammal skin after exposure to oxidative stressors, including chemical pollutants and ionizing, ultraviolet, and UV irradiation (Kohen, 1999).

Frogs are more vulnerable than other vertebrates to environmental contaminants because frog eggs are not protected by semiimpervious shells and frog skin is water permeable (Duellman and Trueb 1986). Amphibian skin is highly permeable because it is physiologically involved in gas, water, and electrolyte exchange with the environment (Quaranta et al., 2009).

Several studies have suggested that in frogs, epidermal principal cells are mainly involved in active transport, whereas MRCs (flask-shaped mitochondria-rich cells) are specialized in proton and bicarbonate secretion (Lindeman and Voûte l976; Fox, 1986; Ehrenfeld and Klein 1997). Numerous investigations on frog skin have focused mainly on morphologic and ion-transport changes under both, natural and experimental conditions (Barni et al. 1987; De Piceis Polver et al. 1988; Vanatta and Frazier 1989; Malvin and Hlastala 1989) and in relation to environmental contamination as well (Ferrari and Salibian 1999; Suwalsky et al. 2000, 2001, 2004). Johnson et al. (2000) have undertaken studies to date on the detoxifying and antioxidant responses of the amphibian epidermis to counteract effects of contaminants.

The aim of this study was to assess the several of histological alterations observed in skin frogs who were intoxicated with Reldan 40EC in a dose of 0.01 ml/g body weight.

MATERIAL AND METHOD

In all the variants, frogs (*Rana ridibunda*) of both sexes captured from the bordering lakes of Pitesti (Romania) were used. Animals were kept unfed in freshwater aquaria for 5 days and the water was changed daily to avoid the accumulation of toxic substances.

After adaptation in the lab, the frogs were separated in lots, which were used separately for the following experiments: two lots of control individuals, containing animals kept in laboratory at 4-6^{o}C, respectively at 22-24ºC with no treatment, in running water which was changed everyday, (1) one lot containing animals which were subjected to treatment with Reldan 40EC in a dose of 0.01 ml/g of body weight and kept at 4-6ºC, (2) a second lot containing animals which were subjected to treatment with Reldan 40EC in a dose of 0.01 ml/g of body weight and kept at 22-24ºC. The toxic was administered by intraperitoneal shots, one shot every two days, in a scheme of 3 weeks. The administered dosage of insecticide was not lethal as none of the subjects died through the experiment.

The animals were killed at the end of the treatment by decapitation, under chloroform anesthesia, and fragment of ventral skin were quickly removed. The pieces were fixed in 8% formalin for poikilotherms and further processed for paraffin wax-embedding using routine protocols. Consecutive 5 µm-thick sections were cut using a rotary microtome (Slee Maintz Cut 5062) and a series of sections were stained with H&E, Sirius red for collagen (Juncueira et al. 1979).

The toxic substance used was the insecticide commercialized under the

generic name „Reldan 40EC" which has as an active substance chloropyrifos-methyl. Reldan 40EC is an organophosphorous pesticide that is currently registered, or has tolerances pending, for crops and livestock, ornamental plants, turf, household pests, and mosquito control. The most obvious threat to the aquatic environment is its use as a mosquito larvicide's; fish and aquatic invertebrates can also be affected through runoff due to certain terrestrial uses (Cebrián, 1992).

RESULTS AND DISCUSSIONS

The stratified epidermis of adult anurans consists of several layers: germinative (or basal), spinous (or spinosum), granulous (or granulosum), and hornified (or corneum), all consisting of principal cells or keratinocytes showing a peculiar morphologic aspect depending on the layers (Fox 1986; Lindeman and Voûte 1976).

Compared with amniotes, anuran epidermis shows some structural differences; in particular, it exhibits a relatively thin hornified surface composed of one or two layers of flattened cells that retain their nuclei (Alibardi, 2003). Based on these structural traits, frogs can use the epidermis for respiratory gas (mainly carbon dioxide) and ion exchange. In fact, being exposed to both, air and pond water, the skin of the frog represents one of the principal organs for body-fluid homeostasis (Fenoglio et al., 2006).

At light microscopy, frog epidermis that were treated with Reldan 40EC in a dose of 0.01ml/g body weight and kept at 4-6ºC was found to consist of four layers of cells with a superficial flat layer of hornified cells showing picnotic nuclei (fig.1).

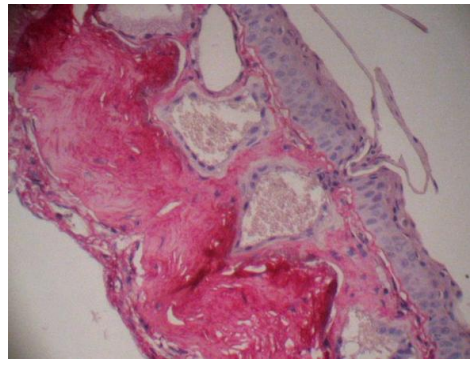

Fig.1. Skin of Rana ridibunda treated with Reldan 40EC in a dose of 0.01ml/g body weight and kept at 4-6ºC. HE and Sirius red. 10X

Epidermis displayed a tendency to become thicker. In addition, the presence of some pale keratinocytes was noticed in the subcorneal layer. Cells in the deeper layers (basal to granulous) displayed more abundant cytoplasm and spheroid or oval nuclei. A thin interstice was present between the external horny layer and the epidermal layer just below (fig.2).

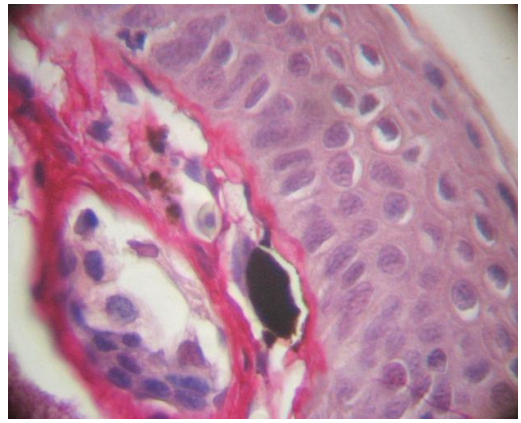

Fig.2. Skin of Rana ridibunda treated with Reldan 40EC in a dose of 0.01ml/g body weight and kept at 4-6ºC. HE and Sirius red. 40X

The skin presented a high number of hypertrophied acinose glands. In parallel, we registered an intense secretion of the mucous (fig. 3).

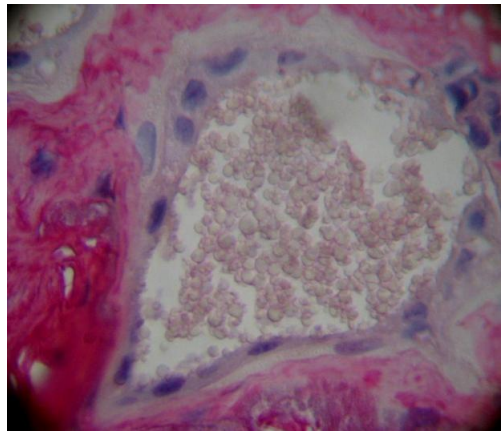

Fig.3. Secretor cells in mucous glands. HE and Sirius red. 40X

In the skin sections of frogs that were treated with Reldan 40EC in a dose of 0.01ml/g body weight and kept at 22-24ºC was found to consist more layers of cells and less keratinized superficial cells in the epidermis (fig.4, 5). We concluded that the highly stratified epidermis was directly linked to the insecticide action (Păunescu et al., 2008, 2009). The skin presents a more pronounced hypertrophy of the dorsal and ventral mucous glands.

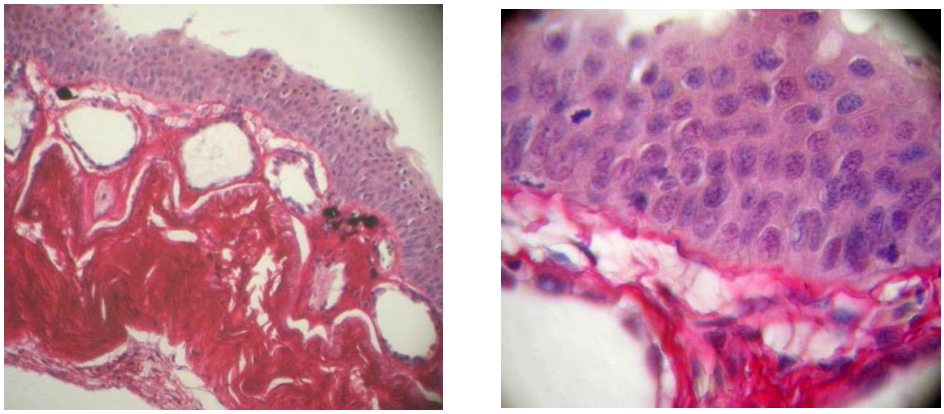

Fig.4. Skin of Rana ridibunda treated with Reldan 40EC in a dose of 0.01mlțg body weight and kept at 22-24ºC. HE and Sirius red. 10X, 40X

CONCLUSIONS

Generally, in the skin sections of frogs, no degenerative alterations were detected but remarkable morphologic modifications were detected. However, the epidermis become more thickness in animal treated with Reldan 40EC in a dose of 0.01ml/g body weight and kept at 4-6ºC. At 22-24ºC, Reldan 40EC in a dose of 0.01ml/g body weight determines a highly stratified epidermis with less keratinized superficial cells. In both variants skin presented a high number of hypertrophied mucous glands and an intense secretion of mucous.

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THE CHANGES OF SOME PHYSIOLOGICAL PARAMETERS IN PRUSSIAN CARP UNDER THE ACTION OF THE CHAMPION 50 WP FUNGICIDE

MODIFICAREA UNOR PARAMETRI FIZIOLOGICI LA CARAS SUB ACŢIUNEA FUNGICIDULUI CHAMPION 50 WP

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Abstract. *Champion WP (copper hidroxide) is a fixed copper fungicide widely used for control of fungal and bacterial pathogens. The Cchampion WP product is toxic to fish and aquatic organisms (96-hour LC_{50} Bluegill: 180 mg/l, 96-hour LC_{50} Rainbow trout: 0.023 mg/l and 48-hour EC_{50} Daphnia: 0.065 mg/l). This study was carried out to analyze the effects of sublethal and lethal concentrations – from 0.003 to 3 mg/l - of Champion fungicide on some physiological parameters (oxygen consumption, breathing frequency, number of erythrocytes) of the prussian carp (Carassius auratus gibelio Bloch). The acute and subacute toxicity of Champion fungicide was evaluated in glass aquaria under semi- static conditions. The Champion 50 WP product, under the concentrations of 0.003 mg/l water, produces, after two weeks of exposure a significant increase of prussian carp energethic methabolism; under the concentration of 0.3 and 3 mg /l water, the fungicide produces, after one week of imersion, a significant decrease of the fish oxygen consumption. The fungicide has changed the respiratory rhythm of prussian carps in all investigated concentrations after seven days of exposure. The number of erythrocytes has significantly decrease after 14 days of immersion at fungicide concentrations of 0.3 mg Champion /l water. The acute test (96 hours) records mortality in all variants.*

Key words: Champion WP, prussian carp, oxygen consumption, breathing frequency, number of erythrocytes

Rezumat. *Champion WP (hidroxid de cupru) este un fungicid pe bază de cupru utilizat pentru controlul ciupercilor şi bacteriilor patogene. Produsul comercial Champion WP este toxic pentru peşti şi alte organisme acvatice (LC_{50} 96 ore Lepomis macrochirs: 180 mg/l, LC_{50} 96 ore Oncorhynchus mykiss: 0.023 mg/l EC_{50} 48 ore Daphnia magna: 0.065 mg/l). Această lucrare a fost realizată pentru a studia efectele concentraţiilor subletale şi letale de fungicid Champion – de la 0.003 la 3 mg/l asupra unor parametri fiziologici (consum de oxigen, frecvenţa mişcărilor respiratorii, număr de eritrocite) la caras (Carassius auratus gibelio Bloch). Toxicitatea acută şi subacută a fungicidului Champion a fost testată în condiţii semistatice, în acvarii de sticlă.* Produsul *Champion 50 WP, în concentraţia de 0.003 mg/l apă, produce, după două săptămâni de expunere, o creştere semnificativă a metabolismului energetic al caraşilor; în concentraţii de la 0.3 la 3 mg/l apă ,fungicidul produce, după o săptămână de imersie, o scădere semnificativă a consumului de oxigen al peştilor. Fungicidul a modificat ritmul respirator la caras în toate*

concentraţiile investigate, după şapte zile de la expunere. Numărul de eritrocite a scăzut semnificativ după 14 zile de imersie în fungicid la concentraţia de 0.3 mg Champion/l apă. În testul acut (96 ore) s-a înregistrat mortalitate în toate concentraţiile studiate.

Cuvinte cheie: Champion WP, caras, consum de oxigen, frecvenţa respiratorie, număr de eritrocite

INTRODUCTION

The inorganic pesticides were the most important of the early pesticides and they are still used today, primarily for the control of plant diseases and as wood preservatives. Champion WP (copper hidroxide) is a fixed copper fungicide widely used for control of fungal and bacterial pathogens.

Copper speciation is directly affected by water pH, and the free cupric ion concentration is higher in water with low pH, while a copper hydroxide complex prevails in water with high pH (Payle et al., 1992; Tao et al., 2001; Pimentel, 1971). Copper is highly toxic in aquatic environments and has effects in fish, invertebrates, and amphibians, with all three groups equally sensitive to chronic toxicity (U.S. EPA 1993; Horne and Dunson 1995).

This study was carried out to analyze the effects of sublethal and lethal concentrations – from 0.01 to 2.4 mg/l - of Champion fungicide on some physiological parameters (oxygen consumption, breathing frequency, number of erythrocytes) of the prussian carp (*Carassius auratus gibelio* Bloch). The acute and subacute toxicity of Champion fungicide was evaluated in glass aquaria under semi-static conditions.

MATERIAL AND METHOD

Determinations were made between January and April 2009 on prussian carp samples (*Carassius auratus gibelio* Bloch), captured from the surrounding rivers of Piteşti. Animals were acclimatized for 2 weeks before the completion of experiments in aquariums with a capacity of 100 l and 50 l (Picoş and Năstăsescu, 1988), under conditions of natural photoperiodism, a period in which they were fed once a day (*ad libitum*), at around 10 am. After acclimatization in the laboratory, the fish were separated in six lots of 10 fish (average weight 10.089, 9.3, 7.36, 9.45 and 9.75 g) subjected to Champion 50 WP fungicide at a temperature of 16-18°C in concentrations of 0.003, 0.03, 0.3 and 3 mg/l water (variants I-IV) and the control lot (variant V).

The fungicide concentrations were determined by preliminary tests of survival. The introduction of fish in solutions was done after their mixing and aeration for 5 minutes. The water temperature was 16-80°C, the "immersion" solution was changed every 24 hours, and aeration of water was continuous; the fish were not fed during experiments to avoid further intervention of this factor (Picoş and Năstăsescu, 1988). The testing method was systematic with refreshing solution at 24 hours after the calculations of the day, in aquariums of 100 l (50 l, respectively) for each experimental lot.

There have been made determinations of oxygen consumption and frequency of respiratory movements at intervals of 24, 48, 72, 96, 168 and 336 hours on all samples of these lots (depending on survival). After two weeks of exposure to the

fungicide, samples of variant I (0.003 mg fungicide) and V (the control lot) were sacrificed to achieve intakes of blood necessary to hematological calculations (number of erythrocytes).

Determination of oxygen consumption was done by means of the oximetre and Winkler method and erythrocytes were counted with Thoma chamber, using a small amount of blood from the caudal artery on the optic microscope (Picoş and Năstăsescu, 1988; Şerban et al, 1993).

The statistical interpretation of the results was performed with ANOVA (LSD) test.

RESULTS AND DISCUSSIONS

The figure 1 shows the average frequency of the respiratory movements of prussian carps exposed to the action of Champion fungicide at temperatures of 16-18ºC (0.003, 0.03, 0.3 and 3 mg/).

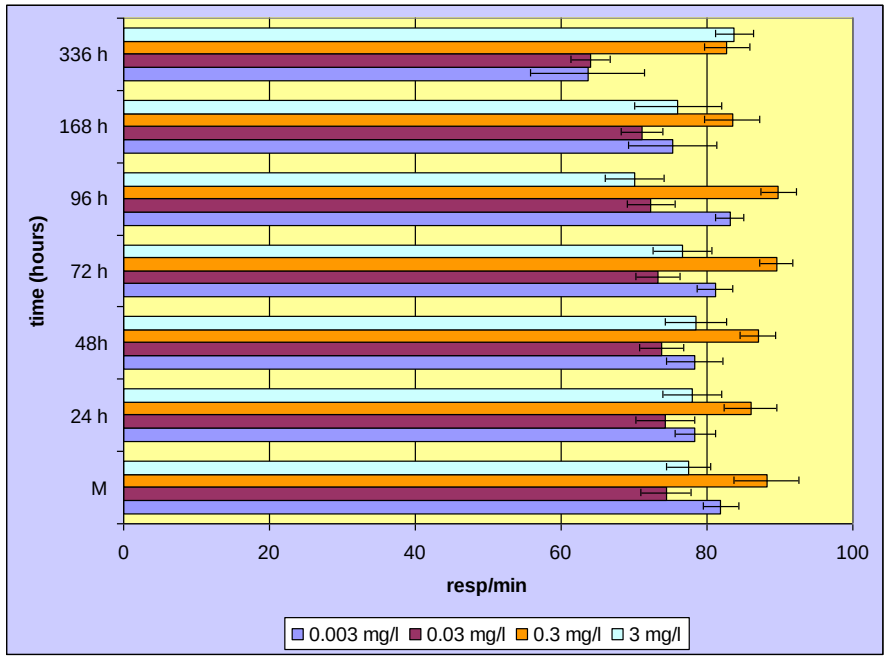

Fig.1. The influence of Champion fungicide upon breathing frequency on prussian carp

In all studied concentration, the Champion modified the values of breathing frequency; for the concentrations of 3 mg/l water, the fungicide effect, after two weeks of exposure, is stimulating (significantly difference for $p<0,05$).

At the concentration of 0.003 and 0.03 mg Champion/l water, effect of breathing frequency has been inhibiting. The values recorded at the end of the experiments with fungicide, except variant III, were significantly difference comparing to the control values (established before the immersion).

In all experimental variants have been applied have only been observed three stages of the sympthomatologicycal scheme described by Schäperclaus for the intoxicated fish (Năstăsescu, 1986; Picoş and Năstăsescu, 1988).

Common symptoms of initial acute toxicity are apparent fish hypoxia, disoriented (ataxic) at the surface, and mucus-producing effects.

Changes in oxygen consumption of prussian carps exposed to the fungicide Champion in different concentrations are shown in figure 2.

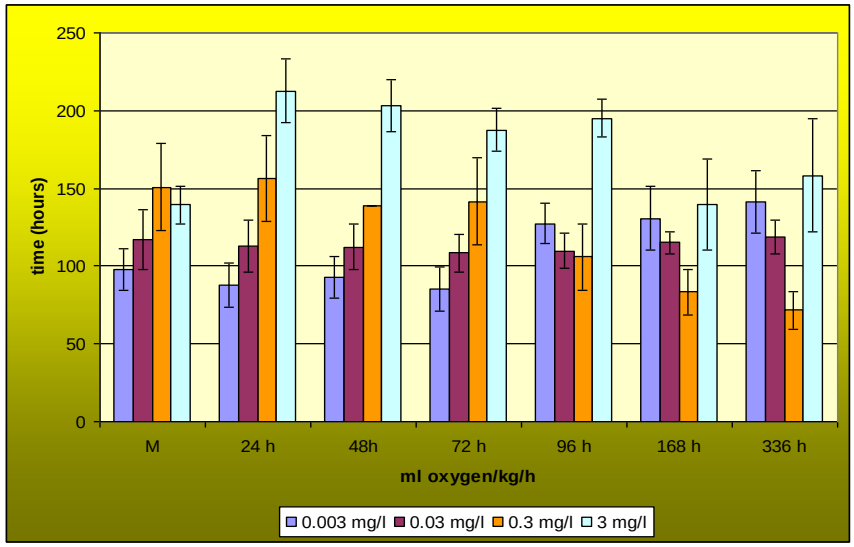

Fig.2. The influence of the Champion fungicide upon oxygen consumption on prussian carp

The oxygen consumption was found to be significantly influenced by the concentration of the used fungicide. Thus, as shown in figure 2, at a concentration of 0.003 and 3 mg fungicide/l water, this index increase (significantly differences for $p<0,05$) after four days of immersion (acute test); the respiratory metabolism diminished to 70.15% of the control value.

The values of the physiological index recorded after two weeks of exposure to Champion fungicide at a concentration of 0.003 and 3mg/l water are 144% and 113 % of the values recorded prior to fish exposure to toxicity. Decreased oxygen consumption under the action of some pesticides (Dithane M 45, Reldan, and Tilt) has also been noticed by Marinescu (Marinescu et al., 2004) and Ponepal (Ponepal et al., 2009).

Figure3 show the changes in the average values of erythrocytes after two weeks of exposure to Champion in a concentration of 0,003 mg/l water.

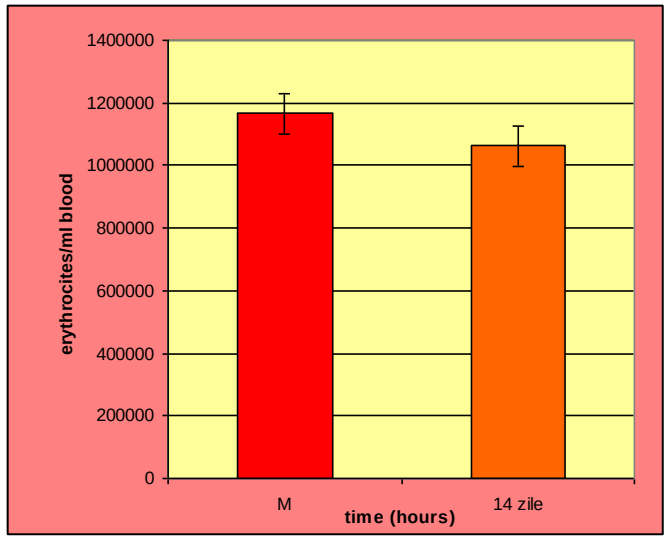

Fig. 3. The influence of Champion fungicide upon number of erythrocytes on prussian carp

The number of erythrocytes in the fish individuals subjected for 14 days to immersion into water with 0.003 mg/l of Champion was also affected. After 14 days of exposure to fungicide we found out a significant decrease in the number of erythrocytes (91.2 % of the control value). Similarly results were obtained in carp by Hughes et al (1995) after a brief exposure to Methadathion.

The decrease in RBC after 7 days exposure to some pesticides in fish was observed by Dhembare and Pondha (2000), Ponepal et al. (2009).

Table 1 shows the survival times on prussian carps during the 14 days of experiments.

Table 1

Lethal effect of the fungicide Champion on prussian carp

Experimental variants	Champion (mg/l water)	The number of living specimens					
		Immersion time (hours)					
		24	48	72	96	168	336
I	*0.003*	*10*	*10*	*10*	*9*	*9*	*9*
II	*0.03*	*10*	*10*	*10*	*9*	*8*	*8*
III	*0.3*	*10*	*10*	*10*	*9*	*8*	*7*
IV	*3*	*10*	*10*	*9*	*8*	*6*	*4*
V	*Control lot (0.00)*	*10*	*10*	*10*	*10*	*10*	*9*

The acute test (96 hours) records mortality in all fish variants, excepting control lot, but none of the variants record absolute mortality only in variant IV (3 mg Champion/l water).

CONCLUSIONS

With all concentrations (0.003, 0.03 and 0.3 mg/l water), excepting those of 3 mg Champion/l water, the fungicide caused a slowdown in Prussian carp breathing (shallow breaths) after two weeks of exposure. The fungicide Champion, under the concentrations of 0.003 and 3 mg/l water, had, after 96 hours of exposure, a stimulatory effect on oxygen consumption for the prussian carp. The fungicide had an stimulatory effect on the energy metabolism of prussian carps after two weeks of at concentration of 0.003 mg/l water. After 14 days of exposure to Champion (0,003 mg/l water at 16-18 ºC we found out a significant decrease in the number of erythrocytes of prussian carp.

In all variants we records fish mortality (at 10 to 60% after two weeks of exposure).

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SOME ASPECTS ON THE FAUNA FROM THE RAPE CULTURES FROM THE S.E. PART OF TRANSYLVANIA

UNELE ASPECTE PRIVIND FAUNA DIN CULTURILE DE RAPIŢĂ DIN S.E. TRANSILVANIEI

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Abstract. *Collection of material was made with fillet of entomological rape crops in the agricultural society of the town Rotbav, Brasov County and the "spontaneous rape" of the surrounding areas. The culture of rape in the company were made two sweeping the vegetation "June on 3.06.2008 and 9.06.2008, while the spontaneous rape, were made a number of 4" cosiri, all in June, the following dates: 3.06.2008, 9.06. 2008, 17.06.2008 and 22.06.2008. The material thus collected was then cleaned of plant debris and then was kept for a period of time in an alcohol solution of about 20% concentration. The determination of material collected from the two variants was found that pest species are mainly the order Coleoptera, more common species being: Phyllotreta atra, Phyllotreta nemorum and Meligethes aeneus. Numerical density /m², fauna useful, harmful and overall had different values depending on the variant and the time of collection. Thus, the fauna in varianta useful "rapeseed cultivation" was worth 8.99% and the "spontaneous rape" of 7.53%.*

Key words: harmful entomophauna and useful entomophauna, rape

Rezumat. *Colectarea materialului s-a făcut cu ajutorul fileului entomologic din culturile de rapiţă din cadrul unei societăţi agricole din localitatea Rotbav, judeţul Braşov cât şi din "rapiţa spontană" din împrejurimile acestei zone. În culturile de rapiţă din cadrul Societăţii comerciale, au fost efectuate două „cosiri", în luna iunie, la data de 3.06.2008 şi 9.06.2008, în timp ce la rapiţa spontană, au fost făcute un număr de 4 „cosiri", tot în luna iunie, la următoarele date: 3.06.2008; 9.06.2008; 17.06.2008 şi 22.06.2008. Materialul astfel colectat a fost apoi curăţat de resturile vegetale apoi a fost păstrat o perioadă de timp într-o soluţie de alcool cca 20% concentraţie. În urma determinării materialului colectat la cele două variante s-a constatat că speciile dăunătoare aparţin cu precădere ordinului Coleoptera, mai frecvente fiind speciile: Phyllotreta atra, Phyllotreta nemorum şi Meligethes aeneus. Densitatea numerică/m², a faunei utile, dăunătoare şi totale a avut valori diferite în funcţie de variantă dar şi de momentul colectării. Astfel, procentul de faună utilă la varianta „rapiţă cultivată" a avut valoarea de 8,99%, iar la „rapiţa spontană" de 7,53%.*

Cuvinte cheie: entomofaună dăunătoare şi entomofaună utilă, rapiţă

INTRODUCTION

In Romania, the total losses following the attack of the pathogen agents, pests and weeds reach annually 2.5-3 billion dollars, namely a few times more

than the sum necessary to purchase phytosanitary products, including the costs of works for the application of treatments.

As well as other cultures, the rape culture is attacked by a series of pests producing important damages.

The autumn rape culture occupies large surfaces, especially in the areas with lower temperatures where it replaces sunflower (Poland, Germany, England, the Scandinavian countries etc. (Arion, 1957; Balachowschi, Mesnil, 1935-1936, Knechtel, 1951; Manolache et al., 1946-1957, 1969). In our country, though having a long tradition and being cultivated since the first decades of the past century, this culture has registered in recent years a strong reversal so that at present the cultivated surfaces exceed sometimes 100,000 ha annually (Baicu, 1982, Panin, 1951; Bărbulescu et al., 1993, 2002; Boguleanu, 1980; Hulea et al. 1975; Rădulescu et al., 1973; Săvulescu et al., 1982; Sin, 2000; Şandru, 1996). Following the progress achieved in the improvement process by obtaining breeds whose oil content reaches 40% and the protein reaches 40% in the defatted groats with a low content of erucic acid, the rape has turned from an industrial-fodder plant into an important food plant. Both for its multiple industrial uses and numerous economic advantages, the rape is considered a valuable culture, easy to cultivate and trade but with some protection problems, especially related to pests (Manolache, Boguleanu, 1978; Paulian, Iliescu, 1973; Paulian et al., 1974; Perju et al., 1976; Popov, 2003).

MATERIAL AND METHOD

The observations were made in 2008 on some rape cultures from Brasov area, in Rotbav locality, in two variants:

- spontaneous rape (untreated);
- cultivated rape (treated).

The material was collected by means of the entomologic netting effectuating several "cuts", each time a sample being obtained from the insects collected on a surface of about 10 m^2.

We effectuated several harvests of the material, more precisely between 2 and 4 harvests as follows:

- for the variant "spontaneous rape" we effectuated 4 cuts on the following dates: 1st cut, on 03.06.2008; 2nd cut, on 09.06.2008;3rd cut, on 17.06.2008;4th cut, on 22.06.2008;

- for the variant "cultivated rape" (treated) we effectuated 2 cuts on the following dates:1st cut, on e 03.06.2008; 2nd cut, on 09.06.2008;

The material collected in this way was cleaned from the vegetal remains, and then it was put in an alcohol solution with 20% concentration where it was left for a certain period of time. For the establishing of the material we used different catalogues for determining breeds (Reitter, Bobârnac and Stănoiu, etc) or other materials: Romanian Hymenoptera guide, entomophagous insects and their use in the integrated protection of agricultural ecosystems; entomophagous insects and their use in the integrated protection of horticultural ecosystems. The material determined in this manner constituted the topic of this paper.

RESULTS AND DISCUSSIONS

After colleting and analyzing the data for the two variants "spontaneous rape" (untreated) and "cultivated rape" (treated) the situation is as follows:

a.For the variant spontaneous rape (untreated), the results of the 4 "cuts" were the following. The damaging fauna belongs to the following insect orders: *Coleoptera, Diptera, Homoptera* and *Lepidoptera*. From the 4 insect orders, the *Coleoptera* order has the largest number of exemplars belonging to 3 species: *Meligethes aeneus* F. with 200 exemplars, *Phyllotreta atra* with 110 exemplars and *Phyllotreta nemorum* with 30 exemplars. As for the useful fauna, it belongs to 3 orders. The *Hymenoptera* order comprises most of the exemplars of useful insects belonging to the families *Aphidiidae, Braconidae* and *Ichneumonidae*. From the *Diptera* order, the collected insects belong to the families *Tachynidae* and *Asilidae.* The density of the fauna collected in this "cut" was 37.2 exemplars/m^2 for the damaging fauna, 2.92 exemplars for the useful fauna and 40.1 exemplars /m^2 for total fauna.

The damaging fauna belongs to a number of 4 insect orders, among which predominant is *Coleoptera,* both as number of exemplars and as number of species. The *Coleoptera* species collected were: *Meligethes aeneus* F. with 50 exemplars, *Phyllotreta atra* with 6 exemplars, *Phyllotreta nemorum* with 3 exemplars and *Tanymecus palliatus* F., with a single exemplar. The other orders had a reduced number of exemplars.

The useful fauna, quite reduced, had only 6 exemplars belonging to *Diptera* order with two families: *Tachynidae* and *Asilidae.*

As for the density of damaging fauna as compared to the surface unit (m^2), it registered 17.1 exemplars for the damaging fauna, 0.6 exemplars for the useful fauna and 17.7 exemplars for the damaging and useful fauna.

The damaging species belong to 4 insect orders: *Coleoptera, Diptera, Heteroptera* and *Orthoptera.* From the 4 orders, the *Coleoptera* order had most of exemplars and species, more precisely: *Meligethes aeneus* with 30 exemplars, *Phyllotreta atra*, with 35 exemplars and *Phyllotreta nemorum* with 3 exemplars. The orders *Diptera, Heteroptera* and *Orthoptera* registered a reduced number of exemplars and species.

The useful fauna collected in this cut belongs to orders *Hymenoptera* and *Heteroptera*. The density of the fauna collected per surface unit (m^2), was 7.9 exemplars for the damaging fauna 1.0 exemplars, for the useful fauna and 8.9 exemplars for the total fauna collected.

b. For the variant cultivated rape (treated), the results of the 2 cuts were the follows:

- at the first cur effectuated on 3.06.2008 (table 2), we collected a number of 20 insect exemplars, 19 belonging to the damaging fauna and 1 exemplar belonging to the useful fauna, this representing 5% from the total fauna collected. The damaging fauna mainly belongs to *Coleoptera* order and one species, *Meligethes aeneus* F. with 19 exemplars. The useful fauna belongs to one order, *Neuroptera, Chryropa* type. The density of damaging fauna as compared to the

surface unit (m^2) registered 1.9 exemplars for the damaging fauna, 0.1 exemplars for the useful fauna and 2.0 exemplars for total fauna.

Table 1

Situation on the fauna collected from Rotbav area, the "spontaneous rape" (untreated)

No. crt.	Fauna type	Systematic classification		No. of exemplars	Total
		Order	Suborder/family/type/species		
03.06.2008					
1	Damaging	Coleoptera	*1.Meligethes aeneusF.* *2.Phyllotreta nemorumL.* *3.Phyllotreta atraF.*	200 110 30	372
		Diptera	*1.Anthomyidae* *2.Tipulidae*	9 6	
		Homoptera	*1.Aphidae*	12	
		Lepidoptera	*1.Tortricidae*	5	
2	Useful	Hymenoptera	*1.Aphydiidae* *2.Braconidae* *3.Ichneumonidae*	10 2 5	29
		Diptera	*1.Tachynidae* *2.Asilidae*	8 2	
		Heteroptera	*1.Miridae*	2	
% of useful fauna from total fauna				401	7.24
09.06.2008					
1	Damaging	Coleoptera	*1.Meligethes aeneus F.* *2.Phyllotreta nemorum L.* *3.Phyllotreta atra F.* *4.Tanymecus palliatus F.*	50 6 3 1	171
		Diptera	*1.Anthomyidae* *2.Tipulidae*	6 2	
		Thysanoptera	*1.Haplothrips spp.*	1	
		Orthoptera	*1.Acridiidae*	1	
		Heteroptera	*1.Pentatomidae*	1	
2	Useful	Diptera	*1.Tachynidae* *2.Asilidae*	5 1	6
% of useful fauna from total fauna				17.7	3.41
17.06.2008					
1	Damaging	Coleoptera	*1. Meligethes aeneus F.* *2. Phyllotreta atra F.* *3. Phyllotreta nemorum L.*	30 35 3	79
		Diptera	*1.Anthomyidae* *2.Tipulidae*	4 1	
		Heteroptera	*1.Miridae*	5	
		Orthoptera	*1.Acrididae*	1	
2	Useful	Hymenoptera	*1.Ichneumonidae* *2.Chalcididae* *3.Apidae*	2 2 3	10
		Heteroptera	*Pyrrhocoridae*	3	
% of useful fauna from total fauna				89	11.23
22.10.2008					
1	Damaging	Orthoptera	*1.Acridiidae*	1	2
		Diptera	*1.Anthomyidae*	1	
2	Useful	-	-	-	-

- in the second cut effectuated on 9.06.2008 (table 2), we collected a number of 69 insect exemplars, 62 belonging to the damaging fauna and 7 exemplars belonging to the useful fauna, this representing 10.14% from the total fauna collected. The damaging fauna mainly belongs to *Coleoptera* order with the following species: *Meligethes aeneus*, with 50 exemplars, *Oedemera flavipes* Fabr., with 3 exemplars, *Chrysomela violacea* Müll. and *Eusomus ovulum* Germ., with one exemplar each.

The useful fauna belongs to *Diptera* and *Hymenoptera* orders and the families *Anthomyidae, Tipulidae, Cecidomyidae, Ichneumonidae* and *Braconidae*, respectively. The density of damaging fauna as compared to the surface unit (m^2) was 6.2 exemplars, 0.7 exemplars for the useful fauna and 6.9 exemplars for the total fauna collected.

Table 2

Situation on the fauna collected from Rotbav area, the "cultivated rape" (treated)

No. crt.	Fauna type	Systematic classification		No. of exemplars	Total
		Order	Suborder/family/type/species		
03.06.2008					
1	Damaging	Coleoptera	*1.Meligethes aeneus F.*	18	19
		Heteroptera	*1.Miridae*	1	
2	Useful	Neuroptera	*1.Chryropidae*	1	1
% of useful fauna from total fauna				20	5,0
9.06.2008					
1	Damaging	Coleoptera	*1.Meligethes aeneusF.*	50	62
			2.Oedemera flavipes Fabr.	3	
			3.Chrysomela violacea Müll	1	
			4.Eusomus ovulum Germ.	1	
		Diptera	*1.Anthomyidae*	4	
			2.Tipulidae	1	
			3.Cecidomyidae	2	
2	Useful	Hymenoptera	*1.Ichneumonidae*	5	7
			2.Braconidae	2	
% of useful fauna from total fauna				69	10,14

Referring to the entomofauna collected for the two variants, "spontaneous rape" (untreated), and cultivated rape (treated), the situation is the following:

- for the spontaneous rape (untreated) (table 3), in the period of observations, we collected at the 4 cuts 624 exemplars of damaging insects and 47 exemplars of useful insects, representing 7.53 from the total fauna collected.

Table 3

Situation on the useful and damaging fauna collected from the spontaneous rape (untreated) cultures from Rotbav area in 2008

No. crt.	**Fauna nature**	**Collecting date**				**Total exemplars**
		3.06.2008	**9.06.2008**	**17.06.2008**	**22.10.2008**	
		Number of exemplars				
1	Damaging	372	171	79	2	624
2	Useful	29	6	12	-	47
% useful fauna from total fauna 7.53						671

The density of damaging fauna was 62.4 exemplars /m^2, of useful fauna was 4.7 exemplars /m^2 and of useful and damaging fauna was 67.1 exemplars /m^2.

For the cultivated rape (treated) (table 4), we collected 89 exemplars in total, 81 belonging to the damaging fauna and 8 exemplars belonging to the useful fauna, representing 8.99 from the total fauna collected.

The density of damaging fauna was 8.1 exemplars /m^2, of useful fauna was 0.8 exemplars /m^2 and of useful and damaging fauna was 8.9 exemplars /m^2.

Table 4

Situation on the useful and damaging fauna collected from the cultivated rape (treated) cultures from Rotbav area in 2008

No. crt.	Fauna nature	Collecting date		Total exemplars
		3.06.2008	9,06.2008	
		Number of exemplars		
1	Damaging	19	62	81
2	Useful	1	7	8
% useful fauna from total fauna 8.99				89

CONCLUSIONS

1. In 2008, from the rape cultures from locality Rotbav, we collected the damaging and useful entomofauna for two variants: V_1 – spontaneous rape (untreated); V_2 – cultivated rape (treated)

2. We made in the period of observations a number of 6 "cuts" to collect the material, as follows: 4 "cuts" for the variant "spontaneous rape" (untreated) on the dates: 3.06.2008; 9.06.2008; 17.06.2008 and 22.10.2008; 2 "cuts" for the variant "cultivated rape" (treated) on the following dates: 3.06.2008 and 9.06.2008.

3. For the spontaneous variant (untreated) we collected 624 damaging exemplars and 47 useful insect exemplars representing 7.53% from the total fauna collected, whereas for the cultivated variant (treated) we collected 81 damaging insect exemplars and 8 useful insects, representing 8.99% from the total fauna collected.

4. The damaging fauna from the rape cultures from locality Rotbav belongs to the *Coleoptera* order with the species *Meligethes aeneus*, *Phyllotreta atra* and *Phyllotreta nemorum*. We also collected some *Diptera* species damaging for plants belonging to the families *Anthomyidae* and *Agromyzidae*.

5. The useful fauna belongs to *Hymenoptera* order and the families *Braconidae* and *Ichneumonidae*.

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CONSIDERATION ON THE BENTHIC INVERTEBRATE FAUNA FROM THE LOTRU RIVER

CONSIDERAŢII ASUPRA FAUNEI DE NEVERTEBRATE BENTONICE A RÂULUI LOTRU

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Abstract. *The paper presents data reffering to the comparative structure of the benthic invertebrate fauna of the Lotru River in five sampling site. On the basis of relative abundancy, the dominancy of the invertebrate groups is highlighted. In particular, is analyzed the community structure of the mayflies larvae being presented the list of the taxa, ecological spectrum, relative abundance, frequency and other ecological characteristics of the mayflies fauna.*
Key words: benthic invertebrate fauna, Lotru River, mayflies

Rezumat. *Lucrarea prezintă date referitoare la structura faunei de nevertebrate bentonice a Râului Lotru în cinci staţii de cercetare. Sunt evidenţiate grupele dominante pe baza abundenţei relative din macrozoobentos. În mod particular este analizată structura comunităţilor de efemeroptere, fiind prezentată lista taxonilor, spectrul ecologic, abundenţa relativă, frecvenţa şi alte caracteristici ecologice ale faunei de efemeroptere din Râul Lotru.*
Cuvinte cheie: nevertebrate bentonice, Râul Lotru, efemeroptere

INTRODUCTION

Situated in the Meridional Carpathians, in Vâlcea county, the Lotru river has its springs in the Parâng mountains, with a length of 80 km, and flows into the Olt river, near the Brezoi village. The Lotru basin sprawls on a 1024 square kilometers area, being narrower at the end and wider in its middle part. A right tributary of the Olt river, the Lotru is a typical mountain river due to its medium altitude of the basin (1374 m) and its morphodynamic characteristics. It has a slope of 327m/km, and that is why the water has a high speed, showing the potential of some high hydraulic amount of energy (Ujvary, 1972).

The average annual debit of the Lotru river at Voineasa is of 6.55 m^3/s and at the Vidra Lake is of 15.6 m^3/s. In spring, when the snow in the higher basin is melting, the debit is of 46 m^3/s, sometimes reaching 58.3 m^3/s.

The hydroenergetic Lotru system is the most complex of its kind in Romania and is situated on the upper and middle course of the river, being formed of a chain of storage basins and hydroelectric power stations, the most important of which are: Obârşia Lotrului, Vidra, Lotru, Malaia and Brădişor

Through the research undertaken and presented in the current work we wanted to make an inventory of the important benthic invertebrate taxa from the Lotru river and to emphasize the dominant groups based on their relative abundance; the

identification of the mayfly species from the Lotru river; the determination of the water quality of the Lotru river taking into account the distribution of the mayfly species.

MATERIAL AND METHOD

In the period August 2008 – May 2009, zoobenthic samples were taken periodically in August, November and May. Five stations were established to take samples, in the area Obârşia Lotrului – Bradişor dam, specifically: Obârşia Lotrului, Upstream Vidra Dam, Downstream Vidra Dam, upstream HC Lotru and Bradişor.

On each sampling site, the benthos samples were taken using a Surber–sampler, which covered a surface of 0.16 m^2 (mesh-size: 200 μm). The stones were washed in the stream and brushed. The samples were preserved on the field in 8% formalin solution. The retained material was separated into groups by a Zeiss stereomicroscope in the Hydrobiology lab of the University of Pitesti and removed in ethanol 70%. European identifications keys were used (Elliott et al., 1988, Bauernfeind et al., 2001, Godeanu et al., 2002, Pescador et al., 2000).

RESULTS AND DISCUSSIONS

As far as the benthic invertebrate fauna is concerned, in the research period representatives from eight taxa groups were identified (fig. 1). The analysis of the resulted data reveals that the mayflies are the best represented in all the sample stations, followed by stoneflies. In the upstream stations the chironomids are dominant, especially in the samples taken in November, while the caddisflies are relatively constant in number.

In August, extremely high values for the numerical density (1128 ind./m^2, 681 respectively) and abundance (59,87%; 25,27% respectively) at the first two stations were registered, and they decreased gradually, from upstream - downstream in an inverse ratio with the midges; for the stoneflies, the distribution on stations upstream - downstream is variable, with high values at Obârşia Lotrului (312 ind./m^2) and upstream CH Lotru (252 ind./m^2), but extremely low in the other cases (minimum at Brădişor 15 ind./m^2).

The analysis of the benthic zoocenosis structure in November shows the clear dominance of the mayflies, followed by stoneflies for each station, the other groups being lowly represented. For the mayflies, the maximum number of individuals/ m^2 (728 ind./m^2) as well as the relative abundance (67,22%) are registered at Obârşia Lotrului, with a slow increase at Brădişor, but the values remain high, over 200 ind./m^2; for the stoneflies the distribution upstream-downstream is equal for all the five stations , with very close values - an average of 150 ind./m^2.

The structure of the benthic zoocenosis in May 2009 shows the general decreasing tendency of individuals/ m^2 from upstream downstream for the two groups – mayflies and stoneflies – with a slight improvement of the values at Downstream Vidra Dam, close to those at Obârşia Lotrului; we observed a surprising increase in the number of mayflies at the Brădişor station.

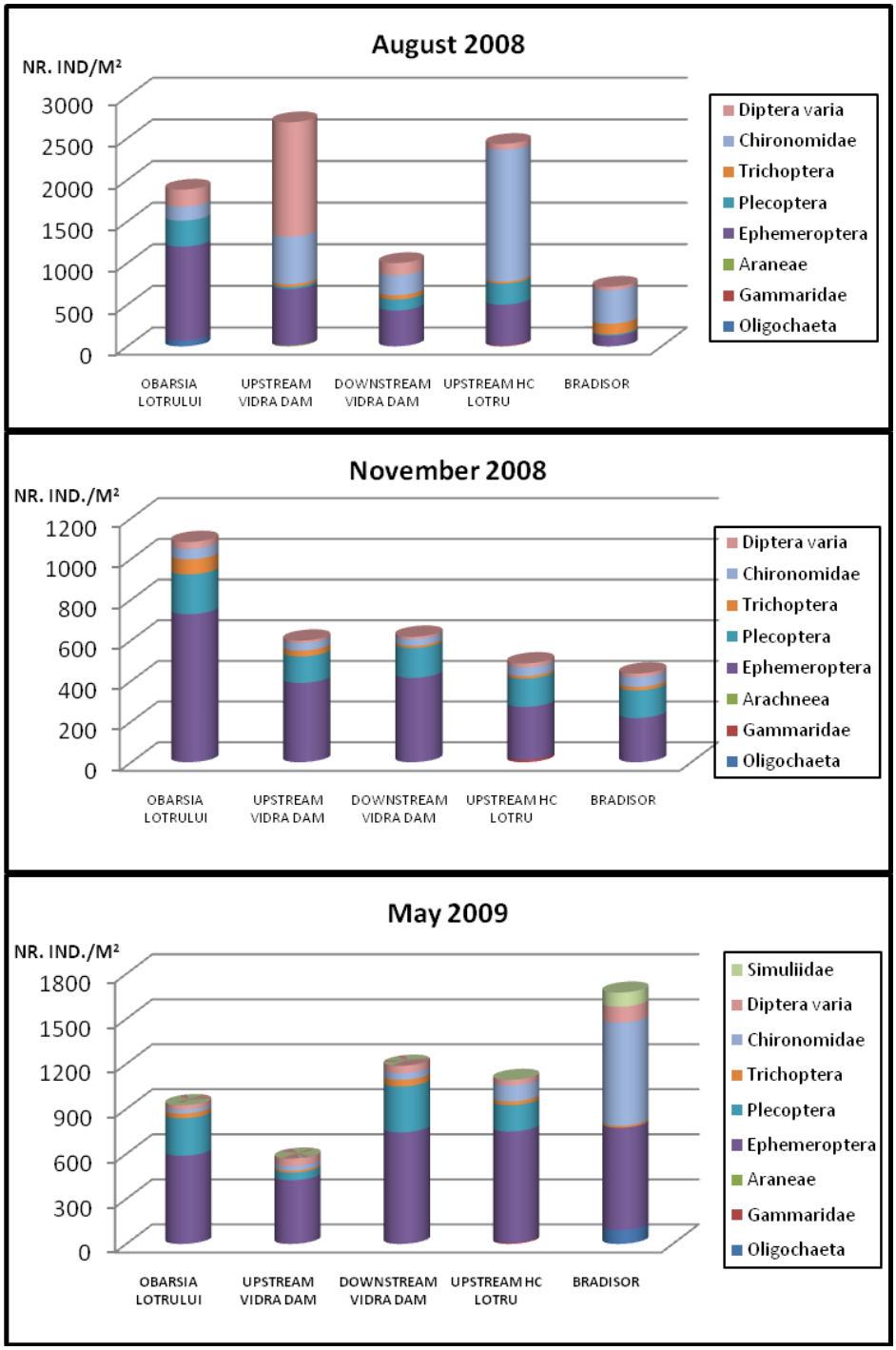

Fig. 1. The zoobenthical structure of the Lotru River

In the case of mayflies, in the samples taken we identified fourteen species from seven genera belonging to six families from all the three suborders. The monthly distribution of the mayfly species (fig. 2), reveals the following aspects:

In August 2008, eighteen species were identified, their number per station increasing progressively from Obârşia Lotrului (five species) to Upstream CH (ten species), and decreasing to six species at the Brădişor Station; the *Baëtis* genus is present at all the stations, with very high levels of density.

Baëtis alpinus reaches its maximum density at Obârşia Lotrului and Upstream Vidra Dam (767 ind./m^2, 235 ind./m^2 respectively) and it decreases gradually to values of 21 ind./ m^2 at the Upstream CH Lotru and disappears at Brădişor; *Baëtis rhodani* appears at Upstream Vidra station (146 ind./m^2) and its density increases gradually downstream up to 183 ind./m^2 at Brădişor; *Rhithrogena semicolorata* presents the highest values at the first upstream stations (354 ind./m^2, 155 ind./m^2 respectively), but it lacks at Brădişor; *Ephemerella ignita* is present at all the stations downstream of Vidra Dam, in low numerical density; the other species appear sporadically in reduced numbers.

In November 2008, it is observed that all the fourteen species are present. *Baëtis alpinus* is present at all the first three upstream stations, the highest numerical density being registered at Obârşia Lotrului (324 ind./m^2); the values decrease suddenly at Upstream Vidra Dam, Downstream Vidra Dam (24 ind./m^2). *Baëtis rhodani* appears at the Upstream Vidra station (63 ind./m^2) and the density increases progressively downstream up to 101 ind./m^2 at CH Lotru and then suddenly decreases to 24 ind./m^2 la Brădişor. For the *Rhithrogena* genus, there is a decreasing tendency from upstream downstream, the maximum numerical density being registered at Obârşia Lotrului (242 ind./m^2), the values decreasing gradually to 17 ind./m^2 at Brădişor; the *Ephemerella*, *Ephemera* and *Caenis* genera lack at the Obârşia Lotrului station, the maximum density being reached at Downstream Vidra Dam. The *Epeorus* and *Ecdyonurus* genera were identified at CH Lotru and Brădişor stations.

In May 2009, all the fourteen species were identified, their number / station increasing progressively, the maximum number of species (eight) being registered at Upstream CH; *Baëtis alpinus* has the highest density at Obârşia Lotrului and Upstream Vidra Dam (328, 235 ind./m^2, respectively), and then decreases gradually to 17 ind./ m^2 at the Brădişor station. *Baëtis rhodani* appears at the Upstream Vidra station (157 ind./m^2) and the density increases progressively downstream up to 324 ind./m^2 at Brădişor. *Rhithrogena semicolorata* registers the highest values at the Downstream Vidra Dam and CH Lotru. *Ephemerella ignita* is present at all the Upstream CH Lotru and Brădişor, in low numerical densities.

Taking into account the ecological spectrum (fig. 3) one can observe that at the upstream stations, the *Ecdyonuriidae* family is the best represented, with 57% at Obârşia Lotrului, a percentage that decreases progressively to 11% at Brădişor. The *Bäetidae* family is best represented at Brădişor, where they are dominant (45%). The other families represent less than 15% at all the stations.

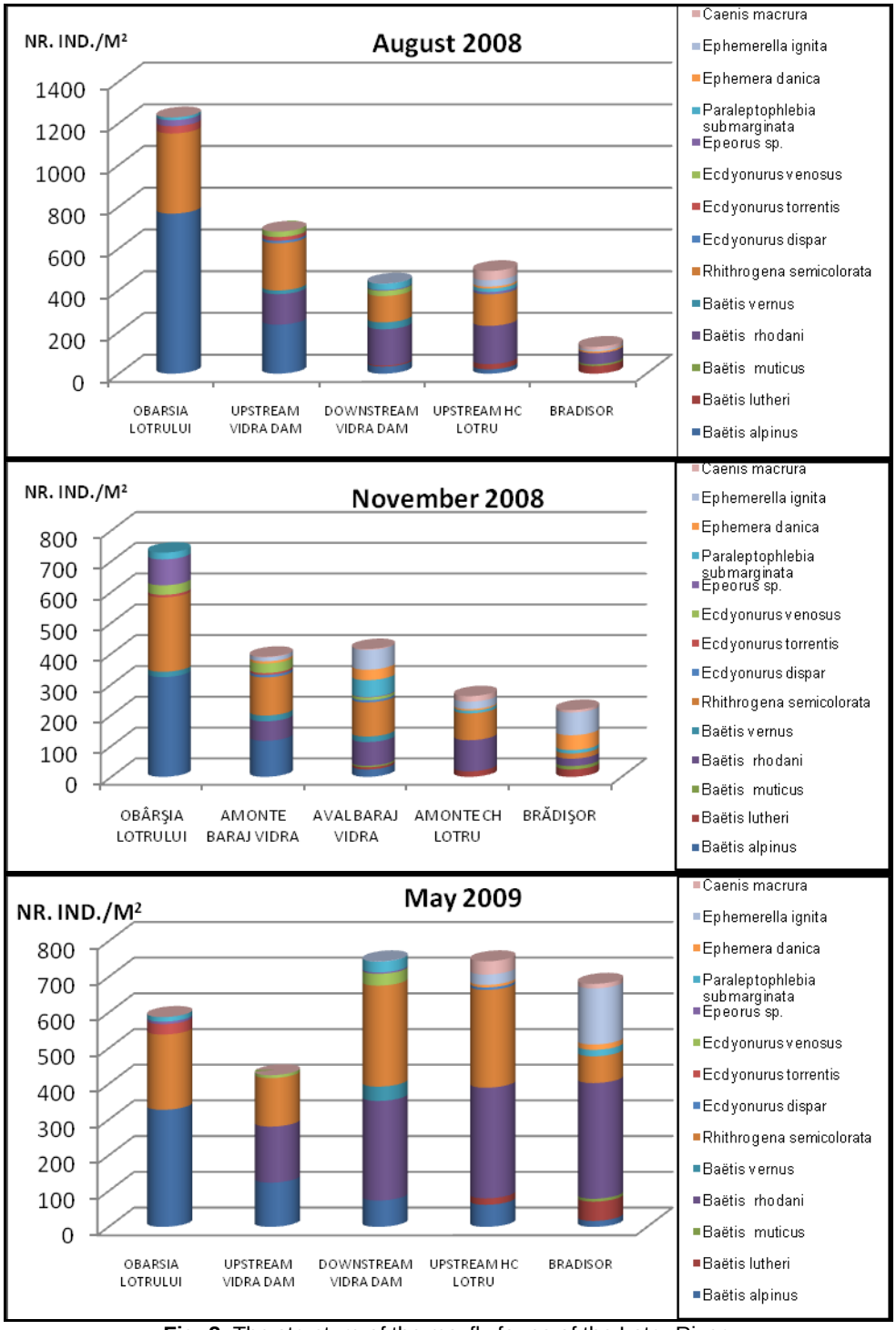

Fig. 2. The structure of the mayfly fauna of the Lotru River

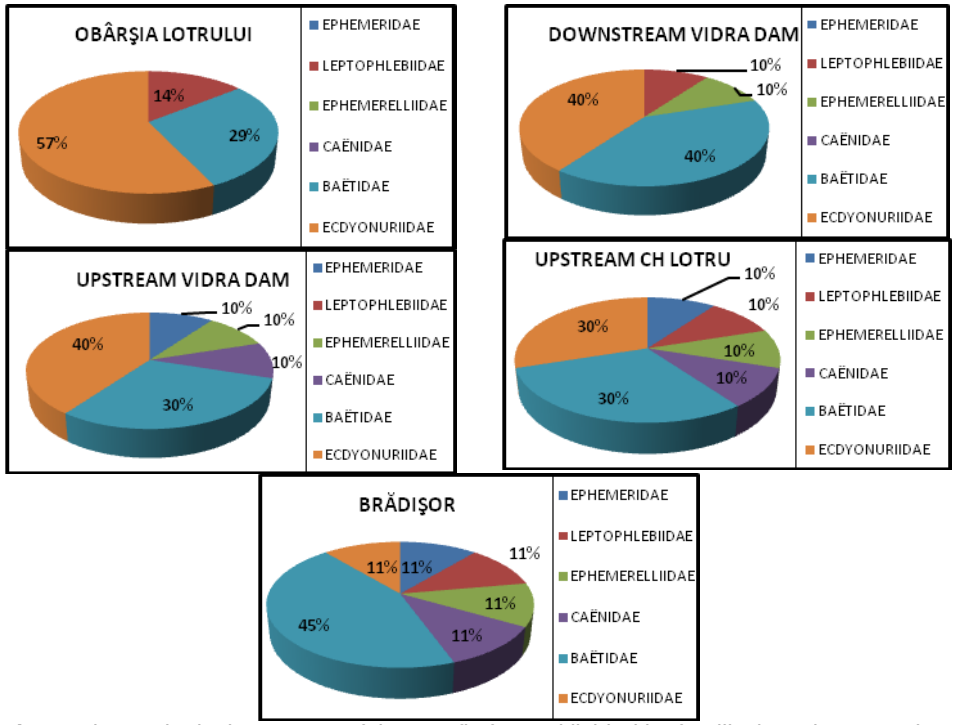

Fig. 3. The ecological spectrum of the mayfly fauna (divided by families) on the Lotru river

CONCLUSIONS

1. From the ecological zonation point of view, the presence of the identified species points at the idea that the river where the research was undertaken is part of the area where the erosion phenomenon is predominant, alternating with small areas of sedimentation;

2. From the quality of the water, the identified species are indicators of the waters from the oligosaprobe and β – mezosaprobe categories;

3. The hydrotechnical lay out did not significantly modify the structure of the benthic zoocenosis; it has been re-formed over the years.

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RESEARCH ON THE INFLUENCE OF AQUEOUS EXTRACTS FROM THE GRAPE SEEDS ON THE DEVELOPMENT OF SOME SPECIE OF *RHODOTORULA* SPP.

CERCETĂRI PRIVIND INFLUENȚA EXTRACTELOR APOASE DIN SÂMBURI DE STRUGURI ASUPRA DEZVOLTĂRII UNEI SPECII DE *RHODOTORULA* SP.

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Abstract. *This paper presents the results of research on the influence of aqueous extracts from the grape seeds on the development of strains of Rhodotorula spp. Extracts were obtained with different concentrations in dry matter and polyphenolic compounds, which were then characterized in terms of content of polyphenols and sugars by different analytical techniques. The cultures were monitored by determining every 24 hours the amount of wet biomass. After recovery of biomass, the culture broth was characterized during nine days of culture from the evolution of pH, and concentration of total polyphenols by Folin Ciocâlteu method every 24 hours. The results obtained reveal a differentiated consumption of polyphenolic compounds depending on their concentration in the culture medium, consumption which was reflected directly on the variation of the biomass amount compared to reference.*

Key words: grape seeds, *Rhodotorula* spp., wet biomass.

Rezumat: *În lucrare sunt prezentate rezultatele cercetărilor asupra influenței extractelor apoase din sâmburi de struguri asupra dezvoltării unei tulpini de Rhodotorula spp. S-au realizat extracte de diferite concentrații în substanță uscată şi compuşi polifenolici, care apoi au fost caracterizate din punct de vedere a conținutului de polifenoli şi a zaharurilor prin diferite tehnici analitice. Cultura a fost monitorizată prin determinarea la fiecare 24 de ore a cantității de biomasă umedă. După recuperarea biomasei, din mediul de cultură s-a determinat pH-ul pe parcursul celor nouă zile de cultură, şi concentrația de polifenoli totali prin metoda Folin-Ciocâlteu la fiecare 24 de ore. Rezultatele obținute evidențiază un consum diferențiat al compuşilor polifenolici funcție de concentrația acestora în mediul de cultură, consum care s-a reflectat direct asupra variației cantității de biomasă comparativ cu martorul.*

Cuvinte cheie: seminte de struguri, *Rhodotorula* sp., biomasa umeda

INTRODUCTION

The recovery of compounds with nutritive and antioxidant potential from plant biomass is an economic problem relevant to food and pharmaceutical industry. Currently there is little information regarding the use of polyphenolic compounds in fermentation yeasts. However, research

shows that yeasts have the potential to fragment the polyphenolic compounds and to use these as a carbon source (Dănăilă M. et al., 2007).

Polyphenols include several classes of compounds such as: phenols, phenolic acids, flavonoids, anthocyanins and more complex structures such as tannins and lignins. Polyphenols are secondary metabolites normally produced by plants or in response to stress conditions, e.g. due to infections, high doses of UV radiation action or other factors.

In other cases, oxidised polyphenols may have inhibitory effect on the growth and development of certain microbial strains. The mechanism for expression of polyphenol toxicity may be explained by inhibiting hydrolytic enzymes, or by other mechanisms such as blocking the protein transport, non-specific interactions with carbohydrates, etc.. By extraction with water the following chemical compounds can be extracted from plant material: carbohydrates, glycosides, tannins, proteins, alkaloids, salts (Chow P. Et al., 2008).

Dănăilă M. et al., 2007, tested for yeast *Rhodotorula glutinis 9.3* the influence of ethanol extract obtained from grape seeds. The authors introduced in the culture medium extract in different concentrations to study its influence on the development of biomass and carotenoids pigment biosynthesis. Research showed that the extract can be used as additional carbon source for the growth of these yeasts. Another property of *Rhodotorula* yeast species is to metabolize polysaccharides (Arroyo-Lopez F.N. et al., 2008).

The purpose of this study is to determine the influence of aqueous extracts from grape seeds on the growth and development of one strain of *Rhodotorula sp*., along with the consumption of polyphenols compounds of culture medium taking into account the existing literature data.

MATERIAL AND METHOD

We cultivated a yeast strain *Rhodotorula sp*., denoted by R2, which was selected by Biotechnology Applied in Food Industry – Integrated Center for Research and Education – Bioaliment, "Dunarea de Jos" University, Galati. The preculture was done in culture medium with the following composition: 10 g / L glucose, 5g / L peptone, 3 g / L malt extract, 3 g / L yeast extract. Fermentation was performed on a platform thermostatic mixers for 48h at 27 º C and 120 rpm. The cells were recovered by centrifugation at 5000 rpm, for 15 minutes, washed twice with distilled water and inoculated on culture medium with the following mineral and organic chemical composition: 15 g / L glucose, 2.5 g / L yeast extract, 3 g / L sodium acetate, 1 g / L $(NH_4)_2SO_4$, 1 g / L KH_2PO_4, 0.1 g / L $CaCl_2$, 0.25 g / L $MgSO_4 \cdot 7H_2O$, 0015 g / L $ZnSO_4$, 0015 g / L $CuSO_4 \cdot 5H_2O$.

In other variants, the culture medium was prepared in aqueous extract obtained from 0.5 and 5 g of seeds of red grape dry material (Merlot variety, harvest 2009), brought to 1L. The culture medium was distributed in 250 mL Erlenmayer falsks with a volume of 100mL, after which was inoculated. Determining the number of inoculated cells was performed by reading optical density at 620 nm. An absorbency of 0.5 is equivalent to 10^7 cells in 1mL inoculum (Buzzini P., 2001). Each flask was inoculated with 4 x 10^7 CFU (CFU = colony

forming unit), in part. The extract was obtained using 0.5 to 5 g air-dried plant material introduced in a 250 mL Erlenmeyer along with 125 mL of distilled water.

The Erlenmeyer is covered with a watch glass and heated on a water bath so that the temperature in the vessel is 85-90ºC. Allow at this temperature for 45 min shaking it from time to time. The material is decanted and the clear solution is filtered through a glass funnel fitted with filter paper. The operation is repeated 3-4 times until a colorless extract was obtained. All extracts were collected in a flask of 500mL and completed to the mark with distilled water.

Three cultures were performed in the following order: a control culture without polyphenol extract and two medium cultures containing polyphenolic extracts of 0.5 and 5 g of dry material. The cultures were noted as the following: R2- culture in which medium composition consists only of the components of the recipe, R2S0.5 - culture medium containing in addition to the basic recipe components and extracts of 0.5 g dry plant material, and R2S5 - culture performed in the presence of aqueous extract of 5 g of material with reference to the medium components.

Every 24 hours, cells were recovered by centrifugation at 4000 rpm for 15 min and washed twice with distilled water. Wet cell mass was determined by weighing, and expressed in g/L culture medium, the pH was not changed during cultivation of the yeast, being determined after recovery of cells through centrifugation. Also, in the culture medium the concentration of total polyphenols was determined by the Folin-Ciocalteu method (Liu X. et al., 2008).

RESULTS AND DISCUSSIONS

Aqueous extracts were characterized and the data obtained are presented in table 1. Naturally, solids and polyphenol concentrations are directly proportional to the amount of material subjected to extraction.

Table 1

Characteristics of extracts from grape seeds

Proba	Total polyphenol concentration, mg / L gallic acid	Content in dry substance, g / L extract	Content in organic matter, g / L extract	Ash content, g / L extract	Ash content on dry weight basis,%
VV 5	374.0	0.900	0.712	0.188	20.0
VV 0.5	19.2	0.087	0.0695	0.0179	1.9

VV 5 - aqueous extract frrom 5 g dry plant material brought to 1L;
VV 0.5 - aqueous extract frrom 0.5 g dry plant material brought to 1L;

The data presented in figure 1 show the effect of the two extracts of different concentrations on the biomass yield compared with the reference culture.

The extract obtained from 0.5 g material seems to have a stimulating effect on the growth and development of yeasts compared with the reference, for a period of up to 120 hours. After this period there is a slow decrease in biomass yield compared with the reference sample, which could be explained by the toxicity determined by metabolic products that may cause cell death and lysis. If we conducted the fermentation in extract from 5 g of grape seeds,

there was a sharp increase in the amount of biomass accumulated after 72 hours compared with the control, but it decreases after 168 hours.

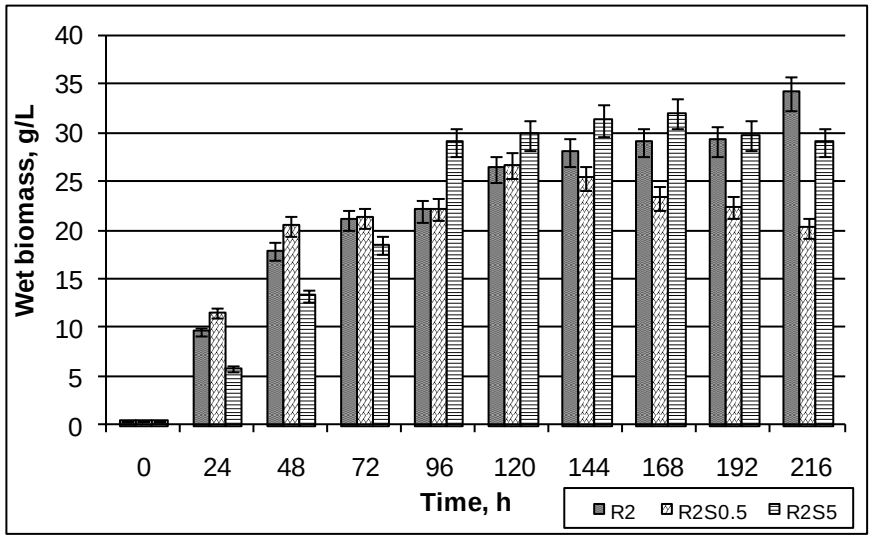

Fig. 1. Changes in the amount of wet biomass during the fermentation process

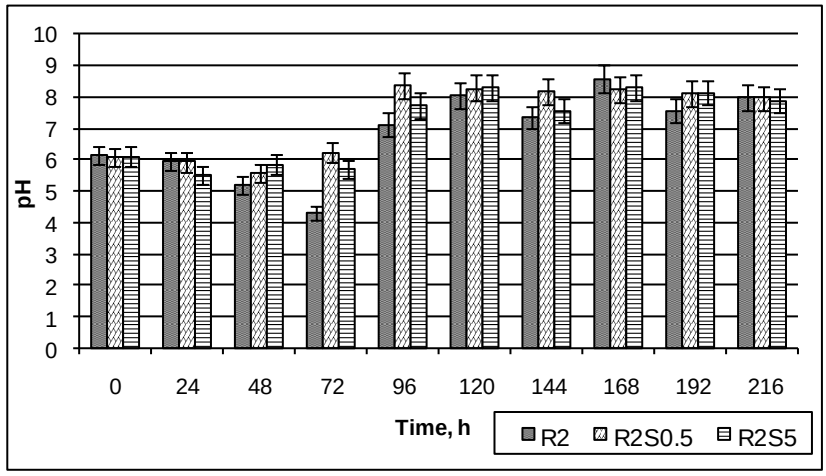

Fig. 2. The variation of pH during the fermentative process

In figure 2, we can follow the evolution of pH during fermentation. In this case the pH decrease is observed until 72 hours, reaching values up to 4. Subsequently, the pH jumps, remaining at values between 7 and 8 according to duration. The decreased of the pH could be explained by the

formation of acidic compounds in various stages of the glycolysis, and intermediate oxidation products for polyphenols, while increasing the duration to more than 96 hours may be due to the formation of phosphorylated compounds with a weak basic character.

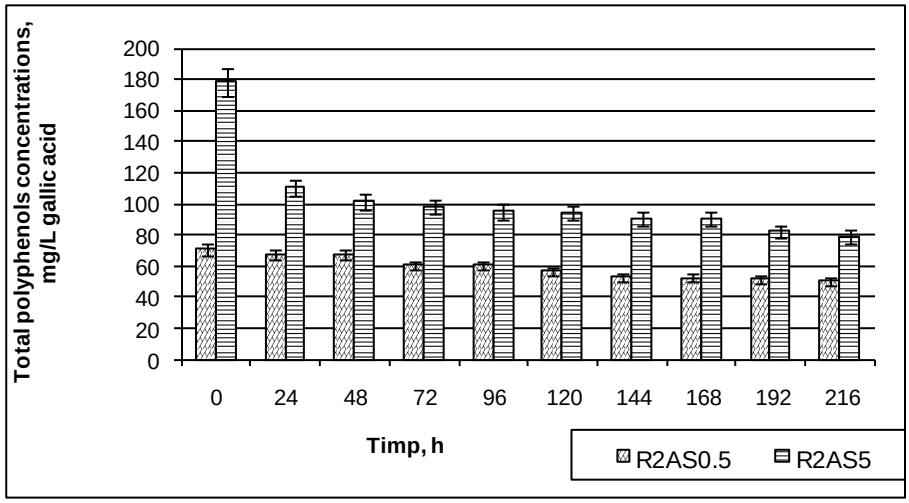

Fig. 3. Changes in total polyphenols concentration in culture medium during the experiment

In figure 3 one can observe a gradual decrease of the concentration of total polyphenols to the end of the process because of their possible metabolisation by yeasts. An interesting aspect is that, although the biomass yield started to decline, total polyphenol concentration continued to decrease and after 120 times respectively 168 hours for fermentation conducted in culture medium prepared in extract obtained from 5 g of material. This situation could be determined as following the action of oxidase enzymes released into the environment after cell lysis phenomena that may be involved in the degradation of polyphenols, aspect which will be further studied.

CONCLUSIONS

Using grape seed extracts containing polyphenols affect in a different way the developing *Rhodotorula* spp. from view point of yeld in biomass, which reached maximum values after 120 respectively 168 hours, depending on the concentration of polyphenols.

The data on changes in polyphenol content of the culture medium, highlights its low points during the process demonstrating that yeasts can consume additional aromatics compounds as carbon source.

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STUDIES REGARDING THE ANTIBACTERIAL ACTIVITY (CMI) OF VEGETAL EXTRACTS OBTAINED FROM GRAPE SEEDS AND MEMBRANES

STUDII PRIVIND ACTIVITATEA ANTIBACTERIANĂ (CMI) A EXTRACTELOR VEGETALE OBŢINUTE DIN SEMINŢE ŞI PIELIŢE DE STRUGURI

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Abstract. *At the Research Development Station for Viticulture and Wine Production of Iaşi, the antibacterial activity of four vegetal extracts with a total content of polyphenols between 26.7 and 37.7 g gallic acid/L and four vegetal preponderantly anthocyanin extracts with content between 511.8 and 2804.3 mg/L was studied. The total polyphenolic extracts obtained from grape seeds belonging to the Merlot, Băbească neagră and Fetească neagră varieties were the most active, their antibacterial (CMI) activity being obvious in concentrations of 3 – 4 mg/mL, in comparison to the Gram positive and Gram negative test strains. Nevertheless, the antibacterial (CMI) activity of the preponderantly anthocyanin extracts was different depending on the vine variety and on the used bacterial strain. The preponderantly anthocyanin extract obtained from the membranes of grapes belonging to the Fetească neagră variety stood out by inhibiting the development of test strains in the 3 mg/mL concentration.*

Key words: the vegetal extract, activity antibacterial, *Vitis vinifera*

Rezumat. *În cadrul Staţiunii de Cercetare Dezvoltare pentru Viticultură şi Vinificaţie Iaşi a fost studiată activitatea antibacteriană a patru extracte vegetale cu conţinut în polifenoli totali cuprins între 36,7 şi 37,7 g acid galic/L şi a patru extracte vegetale preponderent antocianice cu un conţinut între 511,8 şi 2804,3 mg/L. Extractele polifenolice totale obţinute din seminţele de struguri aparţinând soiurilor Merlot, Băbească neagră şi Fetească neagră au fost cele mai active, activitatea antibacteriană (CMI) manifestându-se la concentraţii de 3 – 4 mg/mL faţă de tulpinile test Gram pozitive şi Gram negative. Activitatea antibacteriană (CMI) a extractelor preponderent antocianice a fost însă diferită în funcţie de soiul de viţă de vie cât şi de tulpina bacteriană utilizată. S-a remarcat extractul preponderent antocianic obţinut din pieliţele boabelor de struguri aparţinând soiului Fetească neagră care a inhibat dezvoltarea tulpinilor test la concentraţia de 3 mg/mL.*

Cuvinte cheie: extracte vegetale, activitate antibacteriana, *Vitis vinifera*

INTRODUCTION

The use of plants as remedy in the treatment of various disorders dates back to ancient times. However, the discovery of antibiotics and their mass manufacture brought about their privileged use for the cure of diseases caused by microorganisms.

Therefore, in time, Gram-positive and Gram-negative bacterial resistance to a wide range of antibiotics appeared

For that reason, the studies conducted in specialty labs want to detect within plants and to promote new active principles with antibacterial effect.

In literature, there are many scientific works, whose subject was the study of polyphenols. These chemical substances isolated from various medicinal plants showed antibacterial activity in addition to their cytostatic features. We might name the papers of Hisanori A. and collaborators, 2001; Hidetdsh A. and collaborators, 2002; Chunxia W. and collaborators 2006; Mbata T.I. and collaborators, 2007; Doughari S.M. and collaborators, 2007, who obtained extracts from plants rich in hydroxicumarin, derivates of flavonoids, flavonols, flavonons, anthocyans, proanthocyanidin hydroxystilbene etc., with antibacterial activity against pathogenic strains isolated from various infectious processes.

More recently, studies lead to the development of synergic mixtures from polyphenolic compounds and antibiotics. From this perspective, interesting results were obtained by Zhi Qing H. and collaborators, 2001, 2002; Tiwari R.P., 2005; Esimone C.D., 2006. These synergic mixtures allowed the reduction of antibiotic doses administered for the treatment of diseases triggered by antibiotic-resistant microbial strains.

References related to the antibacterial activity of polyphenolic extracts obtained from grape seeds and skins are rather few and briefly presented. Therefore, our objective was to obtain total and mostly anthocyanic polyphenolic extracts from residue of winemaking process, namely grape seeds and skins, in order to test the antibacterial activity MIC (minimum inhibitory concentration)

MATERIAL AND METHOD

The extractions of total polyphenols from seeds and of anthocyans from the skin of *Vitis vinifera* were performed through Soxhlet continuous method, according to the ratio 1/10 vegetal solid material/ethylic alcohol. The concentrations of total polyphenols (g GAE/L) and of anthocyans (mg/L) were determined by Singleton – Rossi (1965) and Ribereau Gayon – Sonestreet (1965) methods. The amount of dry matter and ash was determined according to OIV methods.

In compliance with the regulations of NCCLS (National Committee for Clinical Laboratory Standards) for the determination of the active biological activity (MIC) of total polyphenolic extracts and of mainly anthocyanic extracts, we used the Mueller – Hinton dilution method in liquid medium in the presence of test bacterial strains: *Escherichia coli* ATCC 10536, *Pseudomonas aeruginosa* ATCC 15428*, Serratia marcesscen* şi *Staphylococcus aureus* ATCC 29737*.* Each test strain was inoculated in accordance with the McFarland 0,5 standard (Eucast 2003).

RESULTS AND DISCUSSIONS

The active substances of plants act on microorganisms in various ways. In relation to the polyphenolic compounds, the researchers Zq Hu and collaborators, 2002, Karou D. and collaborators 2005, Esimote and collaborators, 2006 and Akiyama H. and collaborators, 2001 have observed that flavonoids and tannins

modify the permeability of the cell wall, of the cytoplasmatic membrane, of microbial cells by directly fixing on the peptidoglycans. Thus, the substance exchange between the cell and the environment is diminished, ending up with the cell lysis.

Other actions of polyphenolic compounds lead to the disorder of biosynthesis processes of DNA and RNA nucleic acids, to the hindrance of some enzyme functions, interfering in the energy metabolism.

For highlighting the antibacterial activity (MIC) it is used either the diffusometric method (Kirby G.C., 1986; Bauer et. al, 1966) through an agarized medium in Petri dishes, or the dilution method in liquid media, the results being confirmed in an agarized medium (EUCAST, 2003).

The selection of the best method for determining the MIC value of an active principle depends on its physical-chemical features. Extracts rich in active compounds with big molecule should be studied in liquid media through the dilution method as they hardly diffuse in solid media.

Therefore the antibacterial activity (MIC) of total polyphenolic extracts and of anthocyanic ones, obtained from grape seeds, respectively skins belonging to the Cabernet Sauvignon, Merlot, Băbească neagră and Fetească neagră varieties, was studied by means of the Mueller – Hinton dilution method in liquid media.

A compulsory stage before the modeling of the experiment was the concentration of alcoholic vegetal extracts in a rotary evaporator for removing ethylic alcohol.

In table 1 we show the physical-chemical features of concentrated extracts obtained from grape seeds.

Table 1

Physical-chemical features of total polyphenolic extracts from seeds

Parameters	Unit of measure	Concentrated total polyphenolic extracts			
		Cabernet Sauvignon	Merlot	Băbească neagră	Fetească neagră
Total polyphenols	gallic acid g/L	36,7	37,7	36,6	37,5
Dry matter	mg/L	534,6	82,1	234,6	242,8
Ash	g/L	1,3	0,5	1,8	1,0
pH		5,5	5,6	5,5	5,5

By comparing the data shown in table 1 we observed that the values of total polyphenol concentrations of the four polyphenolic extracts are very similar, ranging between 36,6 and 37,7 gallic acid g/L. This similarity did not occur in the case of dry matter and ash, the values being entirely different.

The physical-chemical features of mainly anthocyanic extracts are shown in table 2. In the extracts studied, the concentration of anthocyans varied depending on the variety of *Vitis vinifera*, the highest concentration being found for Cabernet Sauvignon, namely 2804,3 mg/L, followed by the Merlot variety with 2000,8 mg/L.

Concentrated vegetal extracts comprise a wide range of polyphenolic

compounds, anthocyans but we determined only total polyphenols and anthocyans, therefore, we believe that an accurate assessment of MIC activity should take into account the total parameter represented by dry matter (mg/mL).

Table 2

Physical-chemical features of mainly anthocyanic extracts from grape skins

Parameters	Unit of measure	Concentrated mainly anthocyanic extracts			
		Cabernet Sauvignon	Merlot	Băbească neagră	Fetească neagră
Anthocyans	gallic acid g /L	2804,3	2000,8	511,8	1524,3
Dry matter	mg/L	119,3	145,6	71,9	53,4
Ash	g/L	0,56	0,58	0,50	0,78
pH		5,7	5,6	5,6	5,6

After repeating for three times the preliminary test to determine the concentration field, we saw that the antibacterial activity (MIC) could range between 1 – 20 mg/mL.

The results of tests for the antibacterial activity (MIC) of total polyphenolic extracts are shown in figure 1.

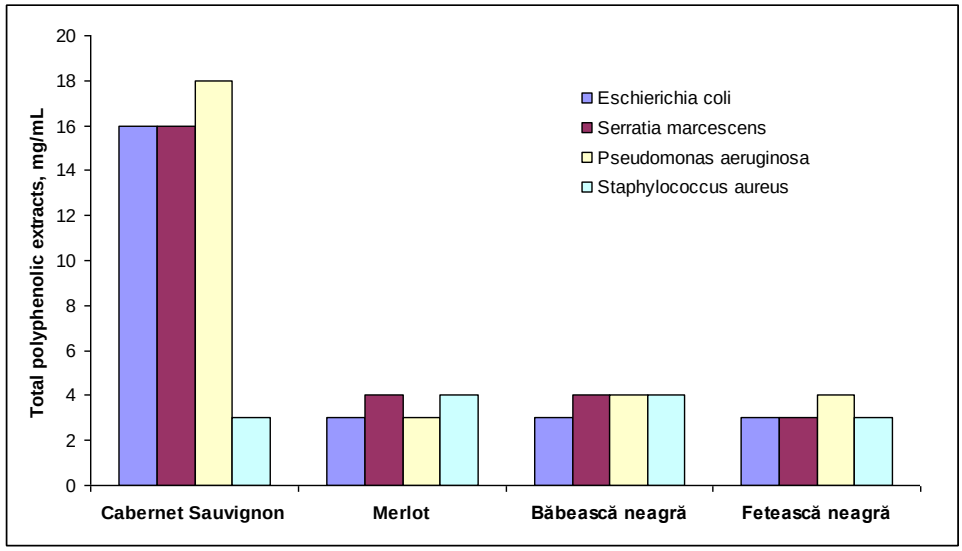

Fig. 1. Determining the biologically active activity (MIC) of total polyphenolic extracts from grape seeds

The graphical representation of data showed that the polyphenolic extract from grape seed of Cabernet Sauvignon variety inhibited the *Staphylococcus aureus* strain when the concentration was of 3 mg/mL. In contrast, in the presence of *Escherichia coli*, *Pseudomonas aeruginosa*, *Serratia marcesscen* test strains, the antibacterial activity is reduced and the values of MIC concentrations range between 16 – 18 mg/mL.

Total polyphenolic extracts obtained from seeds of Merlot, Băbească neagră and Fetească neagră varieties proved much more active. The antibacterial activity (MIC) against Gram-positive and Gram-negative strains occurred for concentrations of 3 and 4 mg/mL.

In figure 2 we present the results of tests on the antimicrobial activity (MIC) of mainly anthocyanic extracts.

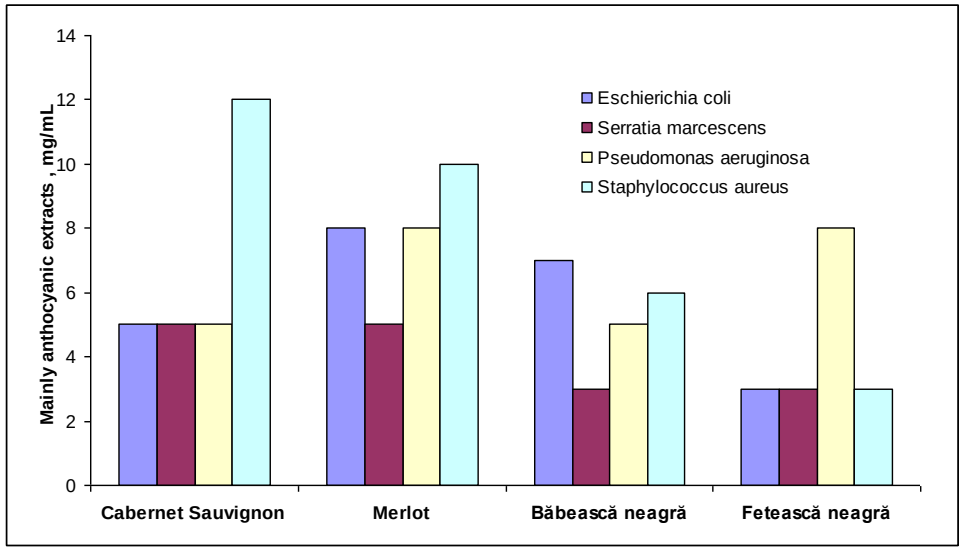

Fig. 2. Determining the biologically active activity (MIC) of mainly anthocyanic extracts from grape skins

The antibacterial activity (MIC) of anthocyanic extracts obtained from grape skins of Merlot and Băbească neagră varieties had an identical behavior in relation to Gram-positive and Gram-negative bacterial strains, small differences occurring in the case of concentrations (MIC). In the graphical representation of data, we saw that the mainly anthocyanic extract from grape skins of Fetească neagră variety inhibits the development of *Escherichia coli, Serratia marcesscen, Pseudomonas aeruginosa* bacterial strains when the concentration is 3 mg/mL and the *Staphylococcus aureus* strain for a concentration of 8 mg/mL.

A different behavior of the antibacterial activity (MIC) was noticed in the case of mainly anthocyanic extract from Cabernet Sauvignon variety. In figure 2 we see that the bacterial activity (MIC) against Gram-negative strains manifested when the concentration was of 5 mg/mL and against Gram-positive *Staphylococcus aureus* strain when it was of 12 mg/mL.

An overview of test data points out that polyphenolic extracts are more active in comparison with mainly anthocyanic ones. The demonstration of the antibacterial activity (MIC) of vegetal extracts of *Vitis vinifera* against Gram-positive and Gram-negative bacteria recommends this source for the preparation of new drugs with wide spectrum of actions.

CONCLUSIONS

1. The antibacterial activity (MIC) was tested „in vitro" using total polyphenolic extracts and mainly anthocyanic extracts;

2. The total polyphenolic extracts from seeds of Merlot, Băbească neagră and Fetească neagră varieties are the most active; the inhibition of test strains development occurred for concentrations of 3 and 4 mg/mL.

3. The best antibacterial activity (MIC) against *Escherichia coli, Serratia marcesscen, Pseudomonas aeruginosa* test strains was achieved by the mainly anthocyanic extracts from Fetească neagră grape skins with a concentration of 3 mg/mL and of 8 mg/mL against *Staphylococcus aureus* strain.

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L'AGRICULTURE BIOLOGIQUE: AU DELA D'UNE TECHNIQUE AGRICOLE UN MODE DE VIE MODERNE

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Je suis paysan en Agriculture Biologique dans la vallée de la Loire et je suis très honoré et impressionné de venir vous parler de nos pratiques. D'autant plus que depuis des dizaines d'années nous réclamons un accompagnement par la recherche qui a préféré plutôt consacrer d'énormes moyens au niveau de l'utilisation de la chimie en agriculture. Aussi je suis ravi de voir tous ces jeunes étudiants et chercheurs s'intéresser à nos problèmes et j'espère seulement qu'il n'est pas trop tard.

Ce symposium scientifique rassemble de nombreux spécialistes, chacun très compétents dans un domaine très précis donc très partiel. En tant que producteur agricole biologique, nous saluons vos travaux et nous vous remercions de nous avoir invités à y participer.

Nous voulons vous présenter l'Agriculture Biologique en tant qu'approche globale du vivant, de toutes ses interférences et de toute sa complexité.

Plus on évolue, plus la science considère les éléments du vivant de façon individualisée et la complexité de l'ensemble échappe aux spécialistes. Par exemple en génétique, nous pensons qu'il faut s'interroger sur cette évolution, qui fait qu'aujourd'hui, l'unité de référence est le gène voir la fonction du gène. Il semble indispensable de revenir à travailler sur la plante dans son ensemble. Il faut la considérer dans son comportement vis-à-vis de son écosystème et chercher à l'accompagner dans son adaptation à l'évolution de celui-ci en fonction des changements climatiques par exemple.

Nous avons fait la preuve par notre pratique et par nos résultats que nous produisons de la qualité avec des rendements satisfaisants et en respectant l'environnement.

Notre pratique n'est que l'application des bonnes règles de l'agronomie en utilisant toutes les connaissances disponible dans le domaine du vivant. Nous nous interrogeons sur le manque d'intérêt, par la communauté scientifique, pour certains domaines comme la microbiologie des sols, où les connaissances actuelles semblent bien limitées.

Nous nous interdisons l'utilisation des produits chimiques qui, finalement, créent plus de désordre qu'ils n'en solutionnent.

Nous avons en outre, la satisfaction de créer de l'emploi, de nous épanouir dans notre travail tout en dégageant notre revenu.

Notre expérience montre qu'il est possible, avec beaucoup de convictions, d'obtenir une production sans avoir une grande dépendance vis-à-vis d'intrants extérieurs. Ceci implique une recherche pour obtenir un équilibre dans sa ferme; l'objectif étant de travailler avec un sol vivant capable de nourrir de façon constante les plantes et les animaux.

Notre ferme de 15 ha en bio a trouvé cet équilibre en juxtaposant des productions de légumes et plants à côté de quelques animaux qui pâturent des prairies en été et permettent la production de fumier, en stabulation libre, l'hiver.

La prairie donne:

- de la vitalité au sol grâce au pâturage par les animaux (bouses, piétinement, salive…)
- l'enrichissement en azote grâce aux légumineuses (trèfle, lotier, luzerne….)
- une rupture dans le cycle de reproduction des parasites des espèces légumières.

Les cultures de légumes qui succèdent, profitent de ce sol reposé et enrichi, et en tire une nutrition adaptée aux besoins de chaque espèce. Cette alimentation équilibrée permet aux différents légumes d'avoir une bonne résistance à toutes les attaques parasitaires et permet de limiter les traitements qui sont essentiellement fait à partir de préparations à base de plantes, d'algues, … (PNPP préparations naturelles peu préoccupantes mais malheureusement qui ont encore les mêmes critères d'homologation que les produits phytosanitaires chimiques beaucoup plus toxiques).

Le compost base de la fertilité des sols: le fumier fait par les animaux en hiver est mélangé avec les autres déchets organiques de la ferme et de la maison. Il est composté en tas en été et en automne lui permettant une pré-transformation en humus. Cet humus est la chose la plus précieuse qu'il faut absolument préserver et développer dans un sol car il assure sa vitalité. Nous utilisons ce compost dans les parcelles qui ne sont pas pâturées (serres) et pour les cultures les plus exigeantes (concombre, aubergine, courgette….)

Un autre facteur de fertilité indispensable est le bon travail du sol. Tout labour profond est interdit de façon à préserver la couche superficielle qui est la plus fertile. IL est pratiqué du travail superficiel avec des disques, des outils à dents, des bineuses, le cultirateau pour la préparation des planches de semis et de plantation. Nous pratiquons le décompactage pour travailler le sol en profondeur sans le retourner.

Notre principale difficulté se trouve au niveau du désherbage. Nous pratiquons, avant l'implantation des cultures la technique des faux-semis, nous sommes vigilants pour bien positionner, dans la rotation, les cultures de légumes les plus concurrencées par les adventices (après luzerne ou prairie par exemple). Nous avons plusieurs bineuses qui, en plus du désherbage, assure l'aération du sol facteur de vitalité. Malgré tout le désherbage reste ce qui demande le plus de travail en maraîchage.

Nous avons mis en œuvre toutes ces techniques depuis 25 ans pour une production de toute la gamme des principaux légumes et depuis 10 ans nous avons développé une production de plants de fraisiers. Cette espèce à multiplication végétative est particulièrement délicate et la qualité des plants vendus est très surveillée afin que les plants ne transmettent pas les pathogènes (en particulier virus et champignons). Dans les pépinières conventionnelles la protection chimique est intense, un traitement obligatoire tous les 10 jours. La bio prouve qu'une qualité semblable peut être obtenue sans aucun traitement.

Par ailleurs le recours de plus en plus développé aux biotechnologies pour la création variétale et la production de semences pose un grave problème aux producteurs bio, d'ailleurs comme aux autres agriculteurs, qui deviennent dépendants de ces semences et surtout des firmes qui les commercialisent. Pour retrouver une autonomie dans cet approvisionnement en semences, nous développons un partenariat avec des chercheurs qui s'engagent dans un programme de sélection massale participative. Le chercheur sélectionneur accompagne le paysan ou le groupement de paysans pour l'amélioration variétale qui correspond à leur besoin en fonction de leur sol, de leur climat, de leur marché…..

CONCLUSIONS

L'analyse de la situation de nos sociétés modernes en crise et perturbées nous font penser qu'il faut recentrer les énergies sur des valeurs fondamentales et essentielles.

Le phénomène, généralisé à travers le monde, d'urbanisation trouve ses racines dans le fait que bien des paysans vivent très mal leurs conditions de vie et émigrent vers les villes ou vers l'étranger. Il est paradoxal de voir, dans les pays du sud, que ce sont les paysans qui souffrent le plus de malnutrition.

Nous avons donc un enjeu extrêmement important pour ces prochaines années. Il nous faut arriver à produire plus pour nourrir une population qui va atteindre 9 milliards d'hommes et cette augmentation

doit se faire dans le respect de l'environnement pour arriver à pérenniser ce niveau de production dans le temps.

Il nous faut donc envisager cette situation sous l'angle de la sécurité alimentaire et celle-ci doit être assurée localement compte tenu des coûts et des risques autour du transport.

Il apparait de plus en plus évident que l'Agriculture Biologique est en mesure de répondre à ces enjeux et cela a d'ailleurs été récemment confirmé par la FAO. Il faut simplement y croire, redonner un sens au statut de paysan, mobiliser les sociétés pour encourager l'installation des jeunes et les responsables politiques doivent être moteur dans ce processus.

Vous les jeunes étudiants, futurs ingénieurs et futurs techniciens autour de l'agriculture devront vous adapter en mettant en avant les notions d'autonomie des paysans, de respect de l'environnement, d'équité dans les échanges, d'enracinement des populations dans leur territoire.

L'agriculture intensive dans le cadre de la société de consommation n'a pas résolu les problèmes de malnutrition et a entrainé des flux migratoires importants.

L'agriculture biologique, par son lien fort au territoire, par son mode de production respectueux de l'environnement et de la nature, par la valeur et la qualité des produits obtenus peut contribuer à donner un intérêt aux populations à travailler et à vivre localement plutôt que de migrer en ville ou à l'étranger à la recherche d'un mieux vivre qui n'existe pas.

Contrairement à ce qui se dit, la bio n'est pas seulement une alimentation réservée aux plus riches et facilement exportable des pays où le coût de la main d'œuvre est faible vers les pays occidentaux. Elle est un mode de vie pour le producteur, pour le transformateur, pour le distributeur et pour le consommateur qui se soucient de santé et d'environnement.

YUAN MING YUAN - TRADITIONAL CHINESE GARDEN

YUAN MING YUAN – GRĂDINA TRADIȚIONALĂ CHINEZĂ

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Abstract. *Chinese traditional gardens are naturalistic style. Although they date back more than 4,000 years ago, it is only in the 13-th century when they were brought to Europe, in Marco Polo's writings. The European gardens noticed not clearly distinguished influences, with only one exception: the garden of the Old Summer Palace - Yuan Ming Yuan. Considered to be the eastern Versailles, Yuan Ming is almost one thousand years of alternating "greatness and decline". The Garden had a continuous development since the eleventh century, with a peak during the Qing dynasty, in the eighteenth century. Although the palace was spread over 350 hectares, having 150 sectors, most of Asian design, the biggest and the most impressive one was the European sector: a Renaissance garden with baroque elements, with 10 palaces European like- furnitured, including plants from Europe. Disaster came in autumn, 1680 when the English-French armies devastated, burnt and plundered everything in just three days, as a result of the emperor's refusal to trade tea and silk for opium. The Chinese people, 150 years after the disaster, decided not to restore or rehabilitate anything, opting for conservation - as a proof of humiliation of their culture. Efforts today are directed only towards regaining valuables from the museums of the world, or from private collections.*

Key words: chinese gardens, traditional gardens, Yuan Ming Yuan

Rezumat. *Grădinile tradiționale chinezești întruchipează ceea ce se consideră în arta peisageră, stilul liber peisager. Deși tradiția și dezvoltarea lor datează de mai bine de 4000 ani, abia în secolul XIII au pătruns în Europa, odată cu scrierile lui Marco Polo. În sens invers, cultura europeană nu a avut influențe vizibile, doar cu o singură excepție: Grădina Vechiului Palat de Vară – Yuan Ming Yuan. Considerat „Versailles-ul estic”, Yuan Ming Yuan are o istorie de aproape un mileniu ce poate fi cuprinsă în două cuvinte: „măreție și declin”. Grădina a evoluat începând din secolul XI, atingând apogeul în timpul dinastiei Qing –secolul XVIII. Deși ansamblul conținea 150 sectoare (350ha), majoritatea de inspirație asiatică, unul dintre ele, cel mai mare și cel mai opulent era sectorul european: o grădină renascentistă cu elemente baroce, având zece palate mobilate asemenea celor europene și elemente vegetale aduse tot din Europa. Dezastrul se produce în toamna anului 1680, când la refuzul împăratului de a primi în schimbul ceaiului și mătăsii, opium, armatele anglo-franceze devastează, jefuiesc și ard din temelii totul în trei zile. Chinezii, după 150 ani de la dezastru, au luat decizia de a nu reabilita sau restaura nimic, optând pentru conservare – ca mărturie a umilinței culturii unui popor. Eforturile de astăzi sunt direcționate doar pentru recuperarea pieselor de valoare aflate în marile muzee ale lumii sau care și-au pierdut urma în colecțiile private.*

Cuvinte cheie: grădini chinezești, grădini tradiționale**,** Yuan Ming Yuan

INTRODUCTION

A Chinese garden is the result of a perfect assembly between nature and man made constructions; a limited space which conveys the beauty of nature; an improvement brought to nature,which, at the same time, will evidentiate the efforts the constructor made for each little corner of it.

A traditional garden is a manual assembly of rock structures, little lakes with fish and all kinds of walls, pavillions, bridges or corridors, using flowers, grasses, little trees and trees, together with cosmic elements: the light of the moon, sun beams, sea breeze. All these intermingle in an artistic entity in which man and nature can coexist harmoniously.

MATERIAL AND METHOD

Yuan Ming Yuan is the main Chinese garden studied and it is at the basis of our research study. The number of architectual pieces or greenery did not help our investigation, as all Chinese traditional gardens use more or less the same elements, considered „compulsory". The secret, that is, the art in itself was rendered by the way all these were exposed, mixed together, or by the use of other effects as light and darkness, wind, sound, rain or fog. The mistery was revealed by the curving lines - inspired from the Chinese rice crops. These are lines which flow tridimesionally, either in rocks or in water, vegetation, or architectural pieces.

The research methods used included: *independent and systematic observation, case study, analysis, synthesis.*

RESULTS AND DISCUSSIONS

The study of the traditional Chinese gardens, of their evolution and development from ancient times , the search for the origins and influences, or the deciphering of symbols, expressions and execution methods are hard, time and effort consuming work.

Most times, a systematic description of a garden, led us nowhere. Words were too few and their connotations impossible to translate. They failed to convey the spiritual state the story of garden should have.

The traditional Chinese gardens embody the free lanscape architectural style. Although their tradition and development dates back more than 4 000 years, it is only in the thirteeenth century that they entered Europe, by Marco Polo's writings. The English were the first to embrace this style in the eighteenth century.

The European culture was not clearly influenced, with one exception only: the Garden of the Old Summer Imperial Palace - Yuan Ming Yuan. Considered to be the "eastern Versailles", Yuan Ming Yuan has a history which dates back a millenium and which can be described in two words: "greatness" and "decline" **(**Keswick Maggie, 2003**).**

The Garden of the Old Summer Imperial Palace - Yuanmingyuan is an unique project, originally designed (fig. 1).

Fig. 1. Yuan Ming Yuan – period before 1860, (www.chinatownology.com)

Built even since the Jin de East dynasty (1115-1234), it continued to expand continuously, during different historical periods of foreign dominations, and, during the Qing period it became the luxurious assembly of the imperial family.

Three big parks- **Yuanmingyuan** (westernly disposed), **Wanchunyuan** (southernly disposed) and **Changchunyuan** (easternly disposed), around Fuhai lake made up the garden, which, begun in the XII-th Century, will gain fame only in 1709, and will last for 150 years more, till 1860. The assembly was spread over 350 hectares, as the Forbidden Palace. **(**Chen G., 2007; Qiugxi L., 2001).

The whole complex is said to have been composed of 100 palaces, temples, pavilions, bridges and pagodas, enriched by natural gifts of Nature, as lakes, rocks, hills, steep slopes, caves or rivers. Known to have been one of the most impressive open air museums in the world, also named "Garden of Gardens", this was made up of over 150 scenes which contained a rare flora, brought from all remote corners of China.

Yuanmingyuan contained four dominant species with more than 80 varieties with flowers and special aspect: pine, bamboo, willow and lotus.

Buildings in Yuanmingyuan covered about 16 hectares of the total surface, expensive constructions made of rare materials, very carefully made. China gathered in there all its precious: jade sculptures, paintings, books, jewelry, extremely expensive porcelain. The buildings served as multifunctional places: from houses or government halls to relaxation and entertainment spots. Theatricality was added to natural picturesque environment. More than that, Yuanmingyuan was an imperial art museum wich contained rare books, treasures, cultural artifacts.

Yuanmingyuan assembly is not an ordinary garden. Constructors were brought from all China in order to create scenes of an amazing refinement. Also, European architectural influences can be noticed. Kanghsi Emperor called European missionaries, an important influence having the Jesuit Giuseppe Castiglione (1747-1759) who brought something from the Italian Renaisance. Palaces were build in baroque style and furnished like the ones in Europe.

The well known novelist Victor Hugo appreciated it as being *"a work of art which cannot ever be matched"*, and that *"all collections in French churches are fading when compared to this magnificent, splendid oriental museum"* (Keswick Maggie, 2003).

But, unfortunately, almost the whole assembly was destroyed in 1860, robbed and demolished in three days by the English-French forces which followed the order of Lord Elgin (fig. 2 and fig. 3). Forests were put on fire, dams were broken. In 1900 Yuanmingyuan was robbed again and artifacts were taken by the most important museums of the world or by private collectors.

Fig. 2. Yuan Ming Yuan – British and French troops (www.chinatownology.com)

Fig. 3. Yuan Ming Yuan – sometime after its destruction (www.chinatownology.com)

During the contemporary period the Chinese government funded and made big efforts to restore it (the deviation of one million cm of water to remake Fuhai lake, in 1984, efforts for regaining lost artifacts) (fig. 4 and fig. 5). But, the art of turning the Chinese paintings into a tridimensional landscape, as well as its construction and the old architectural techniques, proportions and topography were lost in time.

Where are the archaeological objects from Yuanmingyuan Park?

The French forces are known to have handed back more than ten thousands Chinese art objects to the Emperor after they had returned to their country.

Fig. 4. Yuan Ming Yuan – the ruins, today (www.gardenvisit.com)

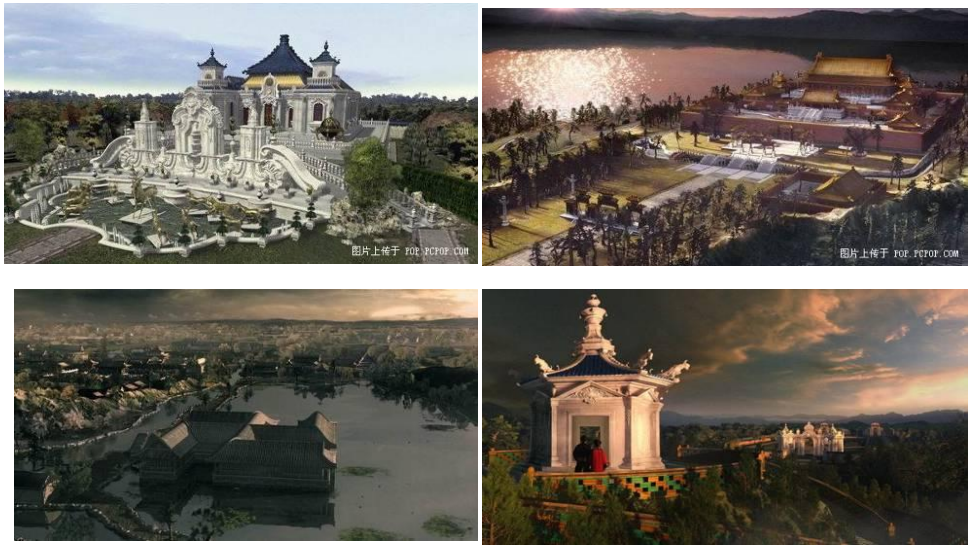

Fig. 5. Restoration collage
(http://gs.sysu.edu.cn/dkbbs/dispbbs.asp?boardID=4&ID=4101&page=1)

Thousands of art precious objects are exhibited in Great Britain museums. Among these, archaeological objects dating from Quin (221-206BC) and Han (206BC-220) dynasties, calligraphies and paintings belonging to Sui (581-618) and Tang (618-907) dynasties, as well as gold and jade objects from Ming (1368-1644) and Qing (1644-1911) dynasties.

In the French National Library we can find 80 art pieces, including the painting of the Yuanmingyuan Park landscapes, signed by the emperor.

Almost each important museum of the world has objects belonging to Yuan Ming Yuan. This also served as a clock. According to historical data, when the clock indicate the exactly time, one of the 12 statues used to drop water. At 12 o' clock, all statues dropped water simultaneously.

Fig. 6. Three bronze sculptures and a bowl – Christie's auction house (May 2000)
(http://taipei.tzuchi.org.tw/tzquart/2002sp/qp5.htm)

This clock was one of the most impressive and valuable constructions in Yuanmingyuan Park, because of the very ingenious design.

CONCLUSIONS

Traditional Chinese gardens are representative for the freestyle landscape.

Yuan Ming Yuan garden is one of the few Chinese gardens which bore the influence of the European gardens art, being considered a Renaissance garden with baroque elements.

The garden's decoration began in the XII-th century, during Jin de Est dynasty. The one millennium history of this amazing garden can be better described in two words:"ascent' and "decline".

Between 1860 and 1900 the whole assembly of the Old Imperial Palace Garden was destroyed and robbed, leaving only some architectural relics to be seen nowadays. Wood constructions and the vegetation were entirely destroyed by fire.

The restoration work meant great efforts and difficulties, this leading to the final decision regarding preservation only.

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WAYS OF USING GLASS IN URBAN ARRANGEMENTS

MODALITĂȚI DE FOLOSIRE A STICLEI ÎN AMENAJĂRILE URBANE

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Abstract. *The study focuses on the ways of using glass when arranging green urban spaces. It can be used as different forms in both constructive and ornamental elements like pavements, glasshouses, ornaments in public squares or private yards, etc. Through shape and colour, glass allows creating the desired effects in the space in which it sits .*

Key words: glass, constructive element, decorative element, urban arrangement.

Rezumat. *În acest studiu sunt dezbătute modalitățile de utilizare a sticlei în amenajările urbane. Sticla poate fi folosită atât în elemnte constructive, cât şi în cele cu caracter decorativ fiind întâlnită sub diferite forme: pavimente, sere, pasarele, obiecte ornamentale în cadrul spațiilor publice urbane sau grădinilor particulare, ş.a. În mod special, prin formă şi culoare, acest material permite realizarea efectului dorit în spațiul în care este amplasat.*

Cuvinte cheie: sticlă, element constructiv, element decorativ, amenajare urbană.

INTRODUCTION

The process of obtaining glass through melting a mixture of sand, lime, sodium carbonate or potasium, seems to have been discovered by the egypitians or fenicians at least 1000 years B.C. In the beginning they made various decorative items, marbles, many opaque or transparent glass vials of different colours. The romans are thought to be the first to have used glass for windows, many pieces of glass having been found among the ruins of roman edifices. This sustains the claim that glass was moderately being used at the beginning of our era. The middle ages see glass being used mainly in gothic architecture (the famous stained glass windows in cathedrals), and later, during the XVII and XVIII centuries, the use of glass broadens.

The XIX and XX centuries bring considerable improvements in the process of making glass, reducing it's cost cosiderably and thus making it largely spread.

The purpose of this paper is that of bringing to attention the many uses that glass has nowadays in urban arrangements, both public and private.

MATERIAL AND METHOD

The method of research used in this paper is based on an extensive documentation of modern landscape arrangements publications, after which a selection was made of the materials that highlight the distinct ways of using glass in

different compozitions: pavements, walls, certain glass & metal structures and various decorative items in parks, public or private yards and urban public squares.

Glass has many uses in modern urban arrangements: from pavements, walls, different glass and metal constructions, to decorative items in parks, public or private gardens, squares, etc.

Glass is a complex mix of silica and silicon dioxide which, by sudden cooling, becomes an amorphous solid, without crystalizing. Glass is very resilient to pressure, impermeable and doesn't burn or freeze. On the down side, it handles stretching very poorly, it's not elastic and is very brittle.

This material is very resilient to common chemical agents and to the destructive nature of atmospherical elements (wind, sun, frost, rain etc.), making it extremely resistant in time.

Due to these traits glass is a favored material in landscape arrangements (parks and gardens) or urban public spaces (squares, resting places etc.)

The main glass types are:

- soda glass, prepared by fusing soda ash, sand and limestone. It is the regular glass used for windows and has a slight greenish tint.
- hard glass, obtained by fusing potassium carbonate and limestone. It is a colorless glass of a superior nature, also known as a Bohemian crystal.
- lead glass, is made from potassium carbonate, lead oxide & sand. This is the highest quality glass, also known as crystal.

To improve the qualities of ordinary glass, certain elemnts are added in the composition (to purify, add colour etc.).

RESULTS AND DISCUSSIONS

My attempt to classify the ways of using glass in landscape arrangements is as follows.

- glass constructions present on site, with landscape or architectural functions: piramids (fig.1), glass houses (fig. 2), covering structures usually made out of glass and metal.

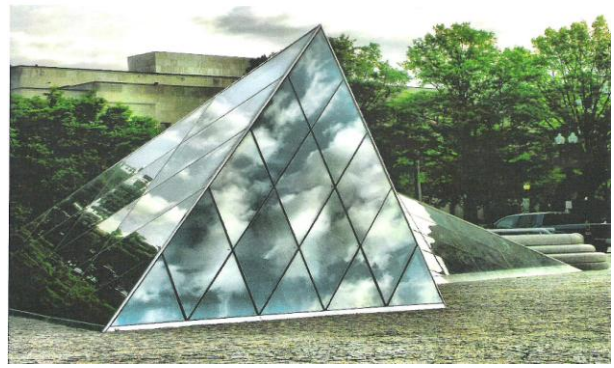

Fig. 1. National Art Gallery, Washington DC.

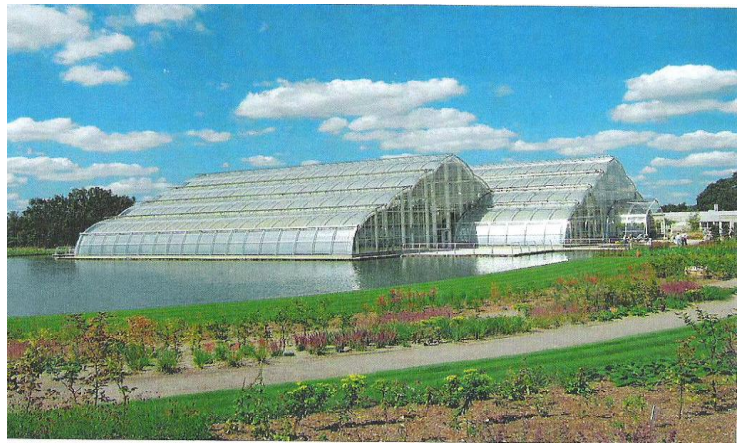

Fig. 2. Modern glass house, Wisley Garden, England

- bridges or gangways in urban arrangements or natural sites. A good example is the cantilever structure of the Grand Canyon Skywalk, Colorado – S.U.A. (fig. 3).

Fig. 3. Skywalk –Grand Canyon - Colorado – S.U.A.

Some structures constructed in the urban landscaping of the past few years benefit from the glass qualities (mainly transparency) and the ability to showcase it through artificial lighting (fig. 4) which creates spectacular effects at night time.

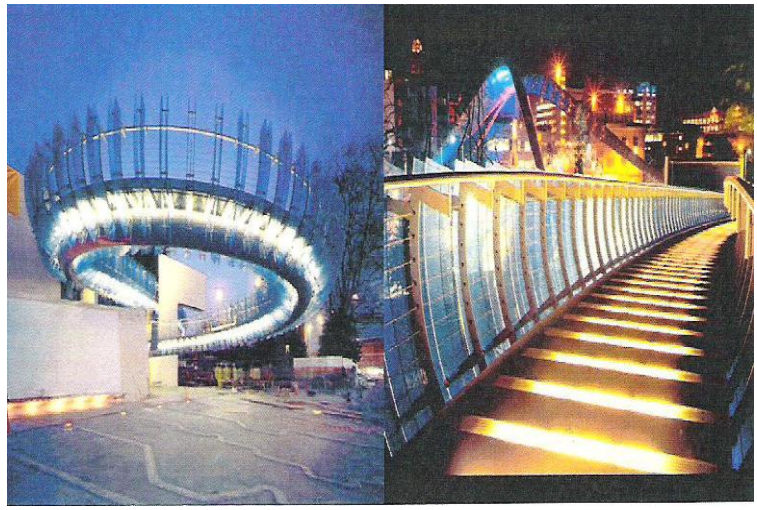

Fig. 4. Artificially lit glass bridge - Coventry

- alleys, acces ways, pavements in private gardens or public urban spaces. Pieces of broken glass are also used to create stunning visual effects (fig.5).

Fig. 5. Exterior arrangement with pieces of broken glass

Glass can also be adjusted in urban squares (Moughtin, Cliff, 1999) through furniture or space separations, using artificial light. (fig.6)

Fig. 6. Broadgate square - Finsbury - London

- monuments, sculptures, fountains, glass waterfalls, decorative objects in parks, gardens and urban public spaces, urban furniture etc. (fig.7,8.9)

Fig. 7. Glass bench – private yard – Germany

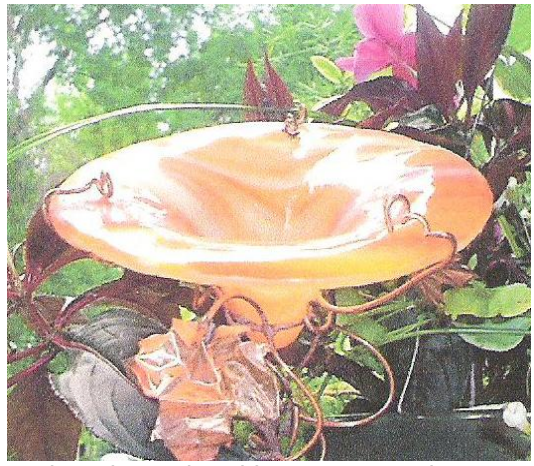

Fig. 8. Glass decorative object – Kew Gardens – London

Fig. 9. Fountain – Toronto, Canada

The colors, shapes and the modern character of the elements previously mentioned are a perfect example of the endless possibilities when using this material, creating the desired effects for the space in which it is placed. (Mostaedi, A., 2004)

Considering that there is a broad range of materials that glass can be combined with and many different processing methods, we can safely say that this material is successfully being used in today's urban landscaping.

CONCLUSIONS

1. Glass is a relatively cheap material which offers a wide range of possibilities when using it in all sorts of urban landscape arrangements.

2. It's visual and esthetic properties make glass especially appropriate for modern arrangements, but also for decorative objects or even practical – functional objects, where the artistic creation involves subtlety or fantasy.

3. Through it's functional and esthetic properties, it can bring a measure of elegance, rafinement and colour in the actual urban environment.

4. This study highlights the use of the various shapes of glass which can be harmoniously integrated in landscape arrangements.

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SICK BUILDING SYNDROME TREATMENT PLANT USING

TRATAREA SINDROMULUI CLADIRILOR BOLNAVE CU AJUTORUL PLANTELOR

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Abstract. *We daily breathe about 12 cubic meters of air, coming almost entirely in enclosed spaces where we spend about 80% of the time. These rooms evolve themselves or objects / installations that contain, a large amount of harmful substances. Plants can be very effective in treating the "sick buildings syndrome" - disease that is manifested by headache, cough, dizziness, lack of concentration, etc. and whose main cause is contamination with pollutants off some buildings (pollution by chemicals, electromagnetic waves, poor ventilation,etc.). In this context, this paper aims to investigate some ways we can purify the indoor air.*

Key words: air quality, depolutant plants, sick building syndrome (SBS).

Rezumat: *Zilnic respirăm circa 12 mc de aer, care provin aproape în întregime din spaţii închise, în care ne petrecem 80% din timp. Aceste încăperi emană, ele însele sau obiectele /instalaţiile pe care le conţin, o cantitate mare de substanţe nocive. Plantele pot fi foarte eficiente în tratarea sindromului clădirilor bolnave "sick buildings syndrome" – afecţiune ce se manifestă prin dureri de cap, tuse seacă, ameţeală, lipsa de concentrare etc. şi a cărei cauză principală este contaminarea cu poluanţi a anumitor clădiri (poluare prin substanţe chimice, unde electromagnetice, proasta ventilaţie, etc). În acest context, prezenta lucrare îşi propune să investigheze câteva modalităţi prin care putem transforma spaţiile închise în spaţii cu un aer mai curat.*

Cuvinte cheie: calitatea aerului, plante depoluante, sindromul clădirilor bolnave (SCB).

INTRODUCTION

Environmental quality is a major issue of concern to humanity at all levels of activity.

Although we care about the planet's health, would be good if, in the same time, we are working to keap our health and health of the areas in which we live and work.

We daily breathe about 12 m^3 of air, coming almost entirely indoors, where we spend 80% of the time. Given that these spaces evolve (themselves or objects they contain) a large amount of harmful substances in these work we intend to investigate ways in which to purify the air in buildings (http://eco-notes.over-blog.com/article-30321522.html).

Meeting hygiene, health and the environment requirements is directly related to areas of building ventilation, which allows:

- Discharge of harmful substances and maintain optimal levels of oxygen in the air;

- Maintenance of favorable levels of humidity and temperature;

- Reducing the concentration of radioactive aerosols (in rare cases).

If in the mainstream construction, buildings were provided with stoves connected to chimneys, which could retrieve and remove the nuisance of rooms and permeability of wood joinery windows allow an easier absorption of fresh air, in our days is not eligible for these conditions. Since been dropped heating stoves and chimneys default and traditional wood joinery is replaced with sealed glass windows with frame type PVC or wood, room ventilation is not only possible by opening windows, thus losing an excessive amount of heat in the winter season, resulting in additional energy consumption.

Settlement building ventilation is essential as is done for several generations, and initial solutions are hard to correct erroneous. Thus it became necessary that appropriate studies and projects to determine at the outset the possibility of natural or artificial ventilation, first way is preferred since it is not involves additional consumption of electricity. There are three categories of ventilation which may be provided separately or together, from the design phase of buildings:

• Natural ventilation - provided by temperature and pressure difference between inner and outer space, and / or by wind action, so the air entering or exiting through windows, leaks, holes and channels (Ştefanescu D., Velicu Cr., 2009);

• Mechanical ventilation - provided by the action of electro-mechanical equipment that causes forced movement of air currents;

• Joint ventilation - using both ways, continuously or intermittently.

Our concern relating to air quality that we breathe the plan remains generally two, especially because we consider ourselves safe from outdoor pollution, in our clean houses or offices, mostly by mechanical ventilated and humidified . Most people ignore the fact that these devices conditioning and / or humidification of air develops a number of microorganisms that cause respiratory illness to occupants of buildings (Chaudet Geneviève, Boixière Ariane, 2007).

Scientific studies have shown that there is a natural means of purification, cooling and humidifying the air, without some of the negative impact of modern technology. These usages of plants as living organisms to decontaminate indoor air. Since the 70s, when research is done first, and by the 90 air purification by plants becomes more widespread, experiments in this connection being made worldwide. Is discovered, inter alia (among other things), that plants can be very effective in treating sick building syndrome "sick buildings syndrome - condition that is manifested by headache, dry cough, dizziness, lack of concentration etc.. and whose main cause is contaminated with pollutants certain buildings (pollution by chemicals, electromagnetic waves, poor ventilation, etc.).

Other examples of application of "bio-cleansing" are organic gardens of some hospitals in Japan (where outside air purification plants have a beneficial

psychological effect on patients), or plant city walls which were intended to reduce noise and air pollution (http://eco-notes.over-blog.com/article-30321522.html).

MATERIAL AND METHOD

The concept of "indoor air quality" originally appeared in the U.S., in 1975, with studies conducted by Bill Wolverton, a research chemist, environmental scientists employed by NASA to study air quality from space for the crew of space rockets. Bill Wolverton was the first scientist who measured the influence of plants on air space where they are and their ability to absorb various chemicals. By creating the first biofilter (plant + an activated carbon vessel containing microorganisms) he realized that the whole plant involved in the process of air purification (both leaves and roots and microorganisms attached to his roots) and that some plants are more efficient than others in the absorption of pollutants (Wolverton B. C., 2007).

His work has inspired scientists around the world, from Canada and Europe. In the '90s, Germany and Switzerland are involved in research on the absorption of air pollutants by plants. In France, we studied whether the formation of an observer of air quality, but that will be created in 2001. Its mission was to conduct sampling of indoor air for analysis. In the Loire region, a group of enthusiasts (landscapers, architects, environmental consultants, florists, gardeners ...) create an association "Plant'Air" takeover of the association to target U.S. "Clean Air Council" that promotes the right of all fresh air.

In 2001, was born the 'Phytair, a meeting between the Faculty of Pharmacy of Lille, Association Plant'Air and Scientific and Technical Center Building (CSTB). In 2007 the program aims to establish a methodology to evaluate processes to remove volatile organic compounds, has been completed (http://www.lanutrition.fr/imprim_article.php?article=2862&dossier=29).

In this context, this paper aims to investigate some ways we can transform the enclosed spaces in areas with cleaner air.

RESULTS AND DISCUSSIONS

How does bio-treatment?

• through photosynthesis - the "equation of photosynthesis" follows: carbon dioxide + water + light energy → glucose + oxygen

• through perspiration - increases moisture in the atmosphere, increasing air quality limits

• the capture and storage in tissues of the leaves and roots of volatile toxic substances that surround them

• the absorption of toxic substances by microorganisms existing around plant roots (http://eco-notes.over-blog.com/article-30321522.html).

Many chemical pollutants are invariant almost any interior space, with serious health effects. Relatively recent studies (Chaudet Geneviève, Boixière Ariane, 2007) presents a complete list of pollutants that can be stored in our homes: volatile organic compounds (benzene, formaldehyde), fibers, mold, carbon monoxide and phthalates present in carpets, insulating walls, paint, paints and cleaning products, etc.. Although there are many sources of indoor pollution, studies have focused mainly on the solution to remove pollutants with plants.

The following volatile organic compounds (VOCs) in indoor meet frequently, evolve the Reversi pieces of furniture or household objects: formaldehyde, benzene, toluene, xylene and glycol ethers. Along with her other indoor air pollutants would be: carbon monoxide, phthalates, insecticides, mosquito products / ants, wood preservative products, mildew, mineral fibers. Also contributes to pollution rooms electromagnetic fields released from various devices currently used.

Table 1

Green filters to remove contaminants to various plants after 24 hours (%)

Plant	Formaldehyde	Benzol	Trichloroethylene
Banana	89	–	–
Bowstring hemp	–	53	13
Chrysanthemums	61	54	41
Dracoena dereménsis (Janet-Craig)	–	78	18
Dracoena dereménsis (Warneckii)	50	70	20
Dracoena dereménsis (massangeana)	70	–	13
Dracoena dereménsis (yellow-variegated)	–	79	13
True aloe	90	–	–
Ivy	–	90	11
Devil's ivy	67	73	9
Spathe flower	–	80	23
Creeping hairy spurge	67	–	–
Ficus benjamina	–	–	11
Gerbera	50	68	35
Green lily	86	81	–
Chinese evergreen (Aglaonema)	–	48	–
Philodendron (domesticum)	86	–	–
Philodendron (oxycardium)	71	–	–
Philodendron (selloum)	76	–	–

In the context of green building, would be ideal, just use green plants to achieve and maintain comfortable room temperatures and humidity and to remove contaminants, without recourse to technical or mechanical means. Extent that this may be possible has been studied at ETH Zurich, referring to a previous research project at NASA. Studies have targeted the plant due to evaporation - cooling by evaporation process, the production of oxygen and removal of contaminants (http://www.lanutrition.fr/imprim_article.php?article=2862&dossier=29). NASA studies on different plants on contaminant removal formaldehyde, benzene, trichlorethylene.

The table 1 shows the rates of elimination of these substances, the percentage for different plants, after 24 hours. It is notable that the removal is initially rapid but slows after a period of two hours. Cologne Botanical Institute is currently exploring the ability of plants or micro-organisms in the soil to purify room air. Despite the measurements, is still unclear whether elimination process reaches a saturation point, in other words, if it falls significantly or even cease altogether after a few days because all studies so far have been conducted for a period of 24 hours (Hindrichs D. U., Daniels Klaus).

To determine the real behavior of plant long-term studies are needed.

According to information from the table above (table 1), some plants are particularly well adapted to remove contaminants. For example, one day in an office, a species of ivy is able to remove 90% of benzol content delivered by tobacco smoke, synthetic fibers, or dyes and plastics. *Aloe vera*, banana, spider plants and philodendron are effective against the agents of formaldehyde from foam insulation and particle board. Trichlorethylene in lakes and glues are better removed with *Chrysanthemum* and *Gerbera*.

Experiments have clearly demonstrated that not plants themselves but the roots of plants and symbiotic microbes in the root system are largely responsible for removing the contaminants.

Figure 1 shows the moisture released by the one of plants in the study, all of them suited to use in office and living areas, depending upon surrounding temperature and humidity as well as the illumination strenght in lx, SI unit of illumination. All the plant give off more moisture in relation to illumination strenght, i.e. the brighter the room the more moisture is released by the plants.

Higher surrounding temperatures further encouraje the moisture is released by the plants, is in some circumstances, negligible. The volumes of moisture release indicated in the diagrams correspond to a water volume of g/mp leaf surface. To better appreciate the dimensions involved, imagine that approx. 1mp of ivy leaf surface corresponds to approx. 5% of the wall surfaces in a average office room. The evaporated volumes of water differ greatly from plant to plant. Peak values exist for the papyrus plant, which evaporates approximately 2,000g of water per day when the plant is approx. 1.5m high.

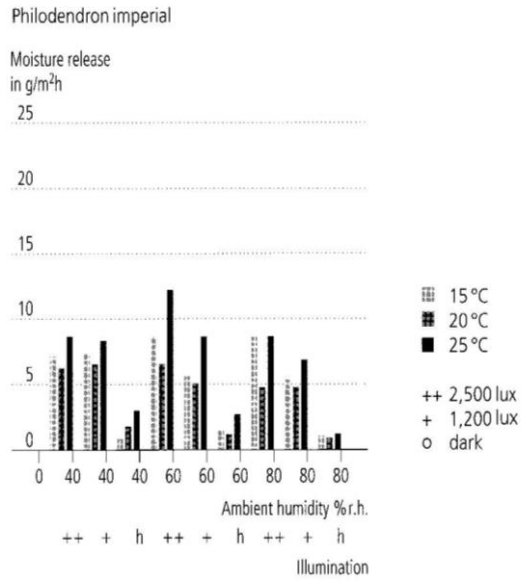

Fig. 1. Moisture released by plants, depending on surrounding temperature and humidity as well as the illumination.

Regarding humidifiers, plants are better than agents humidifiers air powered, even combined with air-conditioning systems, because vegetation does not provide a favorable ground for breeding bacteria.

To determine which plants are able to create a healthy climate chamber studies were performed with five different types of plants. The research team examined the quantities of water evaporated from plants such as *Ficus benjamina,*

Hedera helix, *Dizygotheca castor*, *Dracena*, *deremensis* "Warneckii and imperial *Philodendron* (Hindrichs D. U., Daniels Klaus).

CONCLUSIONS

It was found that plants can only create a loss due to temperature during the summer when all the surrounding areas, except windows, are covered by a large percentage of indoor green plants. However, plants should be used more in future buildings as the overall effects are certainly positive, especially the psychological effect of green plants on the occupants. Experiments have revealed the fact that plants need an environment that provides more than the minimum level of survival (i.e. compensation point between photosynthesis and respiration). This can be achieved by proper choice of the most resistant plants and locations and combining plants that have longer life expectancy. Light source as photosynthesis, plants should be used particularly well naturally lighted spaces, for example, the winter garden atrium sites in windowed office space in hallways and large rooms, open, etc. When lighting conditions are poor, when the plants are forced to grow in an environment less than the compensation point, they start to fade and die after some time (Hindrichs D. U., Daniels Klaus).

Tests and studies have shown that not all plants have the same power of the air filter, not all absorb the same pollutants and not all moisten at the same proportion. Also, each room of the house has some pollutants in excess of other plant so a sharing of the rooms is very useful.

Because experiments were done on a limited number of species, yet detailed studies are needed to detect both specialization and potencies of several species.

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3D COMPUTER MODELING - LANDSCAPE DESIGN ADVANTAGES - PRACTICAL ASPECTS

MODELAREA 3D COMPUTER, AVANTAJELE ACESTEIA ÎN PROIECTAREA PEISAGERĂ - APLICAȚII PRACTICE

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Abstract. *The traditional computer aided design software's are considered outcome, landscape designers being keen on 3D modeling software's. These kinds of programs permit the creation evolution factors instead of a simple drawing tool, the evolution of construction factors instead of a simple projection. The paper presents the main advantages of the 3D concept and its implications in the landscape design insisting upon different compatibility opportunities, pros and cons for different software's (Google SketchUP, Realtime Landscape Architect and CorelDraw). Practical aspects will be discussed: shadow effect study for different landscape designs, video 3D rendering for different aspects of the landscape design, creation of a green rooftop, and several possibilities for its 3D rendering.*
Key words: 3D, render, DWG, DXF, SKP, CDR, irrigation

Rezumat. *Sistemele tradiționale de proiectare asistată de calculator încep a fi considerate depăşite, fiind preferate din ce în ce mai mult, soluțiile care utilizează modele 3D, datorită faptului că acestea permit peisagiştilor să creeze, mai degrabă decât să deseneze, respectiv să construiască, decât să proiecteze. Lucrarea prezintă avantajele conceptului 3D şi implicațiile acestuia în proiectarea peisageră insistând pe compatibilizarea dintre programele existente, avantajele şi dezavantajele diferitelor programe luate în studiu (Google SketchUP, Realtime Landscape Architect şi CorelDraw). In cadrul aplicațiilor practice se va insista pe generarea studiului de umbră al unor amenajări peisagere, randarea video a diferitelor detalii 3D, exportul şi importul diferitelor modele 3D în programele luate în studiu, modalitățile de generare ale unui acoperiş verde pe suprafața unui imobil precum şi reprezentare 3D a acestuia.*
Cuvinte cheie: 3D, randare, DWG, DXF, SKP, CDR, irigare

Computer Aided Design generally knowned as CAD is considered the avangarde of 2D or 3D modeling solution for landscape design. Professional usage of a single landscape aided design software is mostly useless, many times considered insufficient; compatibility issue between different landscape software's seems the proper solution for fulfilling the general concept of CAD. The present paper resolves compatibility issues related to different landscape design software's Google SketchUP, Realtime Landscape Architect and CorelDraw. For outlining certain compatibility aspects between the studied software's we propose the projection of a 3D Building represented by Hostel XII, situated in Hasdeu Student Campus, Cluj-Napoca, for green rooftop implementation. The studied area has an area of 750 m^2. The paper will insist upon vegetation generating possibilities,

animated presentation of the DripMat irrigation system. All the presented aspects assure a proper understanding of landscape design plans using 2D or 3D rendering models.

MATERIAL AND METHOD

The present paper illustrates the importance of computer aided design techniques in landscape design concerning upon compatibility aspects between different software's. By using compatibility aspects between *Google SketchUP 6, Realtime Landscaping Architect* and *Corel Graphics Suite* we propose different approach techniques related to CAD aspects. Compatibility tests where carried on a medium equipped computer: CPU AMD Duron 950 MHz, internal memory 640 MB RAM, Video Board - NVIDIA FX 5500 - 256 MB.

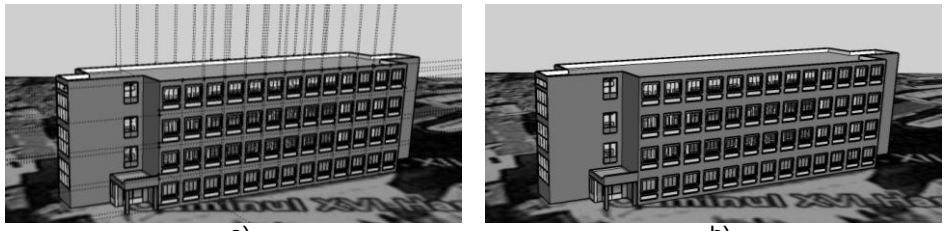
RESULTS AND DISCUSSIONS

Compatibility aspects where created regarding the study of selected area. In most of the cases when a landscape designer doesn't have topography plans of the studied area (raster or vectorial), the main issue consists in obtaining such plans. In response to such requests we propose the usage of Google Earth software associated with Google SketchUP PRO. For obtaining topography information's upon the studied area, in the search box of the Google Earth will type a common address of the area. As a proper example: Cluj-Napoca, Haşdeu. The final result will be concluded as exemplified in figure 1.

Fig. 1. Selection of the studied area in Google Earth and its importing protocol in Google SketchUP using *Get current view* function

Once with the studied area importing protocol, using *Get current view* function from Google SketchUP the following steps are described in chronological order. Redrawing of the studied area is made using powerful drawing tools such as: line, circle, arc and rectangle. Before we consider the 3D Modeling System of the studied area we must calculate the landscape design area. In most of the cases for a proper 3D Modeling System we must be keen on using the Push/Pull tool. Anyhow for certain measurement accuracy we must take proper measurements in the real situation. For a proper graphical representation of the existent

elements we must use the help of generated guide lines (fig. 2). At the end of the 3D Modeling System the guide lines can be deleted using the „Eraser tool" or can be hide by de-activating View-Guides. In most of the cases when a certain repetition of elements accurse (doors, windows, terraces) its better to group them into components and multiply them, simplifying the drawing technique. When these kind of elements are grouped as components any kind of modifications are related to their copies, without the further need of supplementary settings.



a) b)

Fig. 2. Visualization of the 3D Model with the specific guide lines (a) without them (b)

Once created a 3D Model in Google SketchUP its compatibility issues can be quickly resolved. For underlining the extended possibilities of CAD techniques we suggest the compatibility aspects between Realtime Landscape Architect and Corel Draw.

Regarding the first compatibility aspect when the SketchUP model is related to the Realtime Landscaping Software, we must delete the existing map in Google SketchUP, remaining only as 3D Model. The Realtime Landscaping Software recognizes SketchUP created models (skp extension) and 3D Studio Max (3ds extension). For a proper 3D Model importing solution in Realtime software we must follow some essential steps:

- Realtime software start;
- Tools menu access followed by selection of Model Import Wizard;
- saving the 3D Model in a specific library of the software;
- insertion of the 3D Model in the Realtime Landscaping Architect work-file.

The importing of a 3D model in Realtime Landscaping Software is made due to extended landscape possibilities offered by this software: extended plant library, photo rendering system and video rendering system. Figure 3 illustrates the 3D Model import capacity in Realtime Landscaping Architect.

Fig. 3. Theoretical emplacement of vegetation on the green rooftop in Realtime software (photo rendering)

Once imported in Realtime Landscaping Architect, the 3D Model keeps its initial shape size and generated texture, without the need for further settings. Also from this software we can made realistically video rendering exports, with high quality images.

A compatibility aspect of the 3D Model with CorelDraw software follows some chronological protocols:

- GoogleSketchUp software start;
- positioning the 3D Model in the visualization mode named Top;
- exporting the 3D Model as dwg extension, compatible with ArhiCAD software;
- importing the dwg extension into CorelDraw work-file.

The imported dwg model in CorelDraw software will look similar to figure 4.

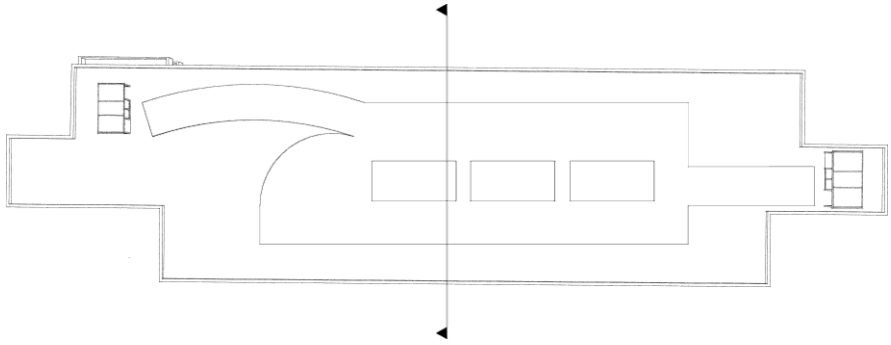


Fig. 4. 2D Model generation in CorelDraw software of the Hostel XII Haşdeu, Cluj-Napoca

Once imported as 2D Model in CorelDraw, its projection becomes technical, being able to create technical details, sections, perspectives. In order to illustrate the technical principle of the irrigation system, creation of a transversal section was imperative. The propose irrigation system is conceived by NetaFim, especially designed for green roof applications, closed irrigation system. DripMat is presented by its producer as a revolutionary irrigation system composed by three distinct layers regarding their functionality and structure (fig. 5).

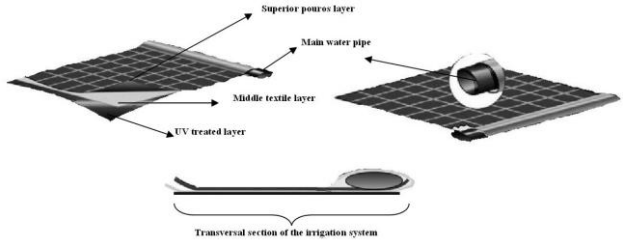


Fig. 5. Constructive elements of DripMat irrigation system generated by CorelDraw software

The three distinct layers of DripMat irrigation system supply the following functions:

- superior porous layer - resistant to mechanical actions;
- middle textile layer - assures better water distribution and drainage;
- polyethylene UV treated layer – preventing roof top water loses.

Overall the system presents important advantages that must be mentioned:

- different plants with different water needs can coexist on the same irrigation system, processes like capillarity effect assuring an optimum distribution of water to any kind of plants, offering an optimum balance between different soil fractions;
- all plants develop with the same intensity, the irrigation system assures an optimum water distribution to any kind of root system;
- labor cost reduction - fully automatic irrigation system;
- in case of fertirigation nutrients loses are reduced;
- the irrigation system can be installed on a maximum slope of 6°.

The irrigation system is highly efficient for water distribution and water drainage. The middle textile layer has double valences for water distribution and drainage.

For a detailed presentation of the irrigation system we propose creation of a transversal section, where all the constructive elements can be specifically represented (fig. 6.).

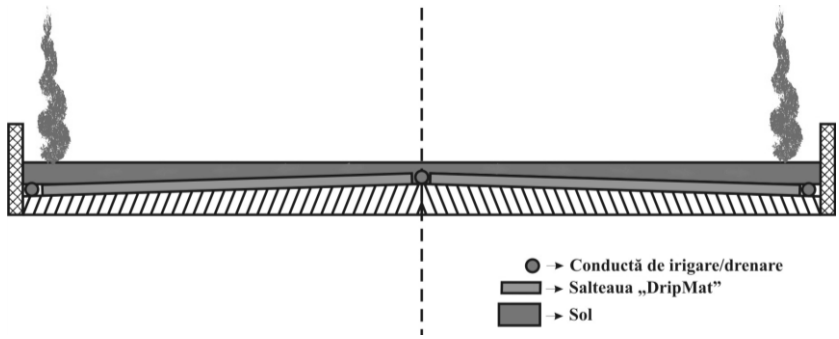


Fig. 6. – Transversal section generated by CorelDraw software

The 3D model compatibility with the studied software offer better visual and understanding capacities to any kind of users (experts or beginners). In order to make a dynamic presentation of the transversal section we can import the model in Corel R.A.V.E. software. Using dynamic effects we can suggest the general principle of the DripMat system (used as irrigation and drainage).

CONCLUSIONS

Compatibility aspects of the 3D Modeling System with 2D Modeling involve optimum capacities for using multiple software's that are related to a

certain optimum relationship. Landscape Computer Aided Design combines multiple software usage by their strong and week points. When a Landscape Computer Aided Design solution doesn't exist we can always relay on compatibility aspects.

Further research can be implemented by using specialized rendering software's like VRay.

The compatibility aspects between CorelDraw, GoogleSketcUP and Realtime Landscaping Architect represent a milestone for further CAD techniques that can be fully perfection.

Animated section using Corel R.A.V.E. software represents futherworks for the education system, assuring a comprehensive teaching and learning system.

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THE METAL IN LANDSCAPE ARRANGEMENTS

METALUL ÎN AMENAJĂRILE PEISAGERE

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Abstract. *The current work studies the diverse forms of metal usage in urban landscaping, public and private green spaces. The study also (debates and) analyses the multitude of functional, esthetical and ambient aspects generated by using metal in the compositional-functional structure of urban landscape arrangements. Because of its multiple qualities, the metal is used in the construction of architectural-functional endowments, as well as in the realization of objects with a decorative character.*
Key words: metal, park, garden, urban public space

Rezumat. *Lucrarea studiază diversitatea modalităților de utilizare a metalului în peisagistica urbană, spațiile verzi publice şi private. De asemenea, studiul dezbate şi analizează multitudinea aspectelor funcționale, estetice şi ambientale generate de folosirea metalului în structura compozițional-funcțională a amenajărilor peisagere urbane. Datorită multiplelor sale calități, metatlul este folosit atât în construcția dotărilor arhitectural-funcționale cât şi în realizarea obiectelor cu caracter decorativ.*
Cuvinte cheie: metal, parc, grădină, spațiu public urban

INTRODUCTION

The deplete and the processing of metal is known from ancient times. The methods were primitive and difficult and the productivity was very low. So it can be explained the lack of metal in construction works until relatively recent times. Until 150 years ago the metals which were used in constructions were bronze, door and gate reinforcements, structures of lead for stained glass, plate of lead or copper used relatively rare for casements.

The XXth century brought a real revolution in iron metallurgical engineering through the development of ferrous metallurgy, opening what some have called "the new iron age". Works of unsuspected ampleness like the Tour Eiffel 314 m tall, the pendent bridge Golden Gate from San Francisco with almost 1300 m bay, the bridge from Cernavodă with a bay of 190 m without intermediate baseboards and a total length of 4087 m, are works of reference for using metal in great ampleness constructions.

The metallurgy of copper and aluminum, like other metals or their alloys (lead, zinc, bronze, yellow copper, cast iron) led to the usage on a large scale in all types of buildings and exterior setups.

The purpose of the paper is to highlight the qualities of metal as a construction material in landscape setups, the variety of usage possibilities and the most diverse esthetical aspects from classical forms to modern ones.

MATERIAL AND METHOD

Frequently, metals are divided in two categories: ferrous metals (iron, cast iron, aluminum) inclusive of numerous alloys.

In any type of constructions and setups metals can be submitted to mechanical forces like: reductions, extensions, flexures, but also to the actions of different external physical, chemical, atmospheric agents. Metals differ a lot one from the other because of the way in which they respond to mechanical forces, but are characterized by a common attribute namely that they can be adapted easily.

Of the methods of adaptation we remind: fount, forging, swaging, cold bending. The interlocking of metallic pieces is made by bolting, clinch or welding. The protection of metals from corrosion is assured by procedures like: alloying, cladding, chemical protection, protection through stain and lacquer, enamelling, and overglazing.

Metal as a construction material is used under the most diverse forms in urban landscape arrangements: pavements, rampants, specific constructions for parks, gardens, urban public spaces, enclosure elements (fences and gates), elements and objects of urban furniture or parks, illuminators, decorative objects, play objects for children, fountains, pools, bowls etc. metal is used both as an independent material as and with other construction materials (wood, concrete, glass, plastic).

The research method applied in the current study was that of documentation regarding the usage of this construction material in landscape architecture as well as the esthetical valence offered by the presence of metal in classical and contemporary gardens.

The study material consists of a selection of representative images for the importance of metal in different public and private green spaces.

RESULTS AND DISCUSSIONS

The presence of metal in landscape setups takes the form of different utilitarian, functional or esthetical aspects (Mc Grath, Dorothy, 2002). The main categories of metal constructions in urban landscaping are:

- bridges, catwalks, means of access in urban public spaces (fig. 1)

Fig. 1. Railway station from Zurich Switzerland realized by Santiago Calatrava

- coverage structures and pergolas (fig.2)

Fig. 2. Pergola from Pioneer Square Park

- enclosure elements, fences, gates, rampants, balustrades (fig.3)

Fig. 3. Gate, the house of painter Saint–Cyr – Bruxelles 1900-1903.
Wrought iron (Realized by Gustave Strauven
Art Nouveau Style)

- playing objects for children (fig.4)

Fig. 4. Functional elements of design made of metallic pipe. Children's Gardens, Botanic Garden of Norfolk, Virginia USA

- urban furniture (fig.5)

Fig. 5. Metallic benches made of stainless steel -Copenhagen

- decorative objects in parks, gardens or public spaces: squares, pedestrian streets, esplanades (fig.6, 7, 8, 9,10)

Fig. 6. Sculpture realized integrally from metal in Roppongi – Tokyo Midtowne

Fig. 7. "Wake" Sculpture of steel, realized by the minimalist sculptor Richard Serra. It can be found in the Olympic Park of Sculpture from Seattle

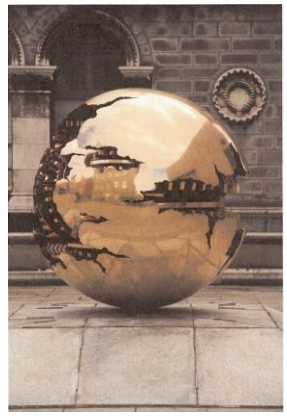

Fig. 8. Metal ball, Dublin, Ireland

Fig. 9. Fountain realized with the help of steel tubes – Fondation Maeght, Saint-Paul de Vence, France

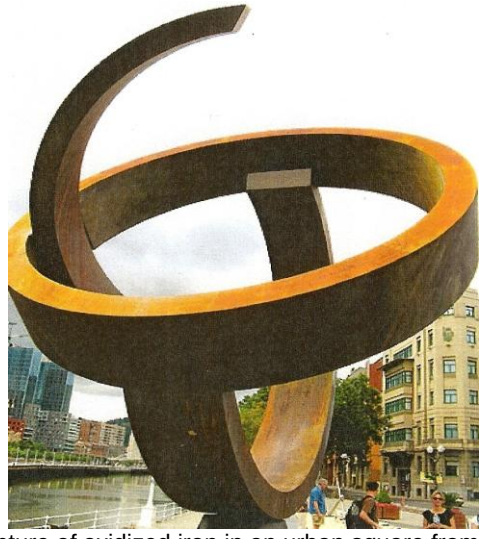

Fig. 10. Sculpture of oxidized iron in an urban square from Bilbao, Spain

Metal is a material frequently used in landscape compositions, because it offers multiple possibilities of usage in setups of green spaces and urban public spaces. The easiness of adaptation and conformation to any type of construction or object, the durability and the esthetical qualities of metal confer it a wide usage in parks, gardens or public spaces, regardless of the size (Gardner C.; Molony R., 2001). One of the important qualities of metal is that it allows the obtaining of the desired character in a setup, may it be classic or modern. The possibilities of adaptation, fount and association with other construction materials (glass, concrete, wood or plastic) are endless, assuring in this way the materialization of any creative intercession (Mostaedi, A., 2004).

The personal contribution in the current study is that of **documentation and selection** of realizations in landscape setups which prove the importance of metal usage and plead for its usage on a larger scale in the organization of green spaces.

CONCLUSIONS

Metal is one of the frequently used building materials in urban landscaping, along with natural stone, artificial stone, wood, glass or concrete.

The variety of metal choices, the easiness of its adaptation and conformation to different construction or decorative elements make possible the usage of metal for the most diverse purposes: functional, utilitarian or esthetical.

Metal contributes to the creation of a specific ambient for each work.

With the help of this construction material there is improved the special composition of the landscape setup regardless of the style in which it was conceived.

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COMPARATIVE STUDY OF 2D, 2.5D AND 3D COMPUTER GRAPHICS REPRESENTATION OF A CIVIL ENGINEERING STRUCTURE

STUDIU COMPARATIV LEGAT DE REPREZENTĂRILE COMPUTERIZATE 2D, 2.5 D ŞI 3D ALE UNOR STRUCTURI DE INGINERIE CIVILĂ

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Abstract. *The work presents a comparative study referring to the approaches for 2D, 2.5D and 3D computer graphics representations of metropolitan furniture elements, both from the viewpoint of 3D shape understanding and of how the component parts made the assembly. This study has as target to establish a relationship between the working volume and the skills of those who made the representations, the understanding ability of the client, the time needed for representing, and the balance between the technical performances of software and hardware systems and their prices.*

Key words: Descriptive Geometry, Technical Drawing, AutoCAD, Triple Orthografic Projection, Axonometric Isometric Projection

Rezumat. *În această lucrare este prezentat un studiu comparativ referitor la posibilităţile de reprezentare computerizată 2D, 2.5 D şi 3D, ale unor elemente de mobilier urban, atât din punctul de vedere al înţelegerii formei tridimensionale, dar şi din punctul de vedere al modului de alcătuire a părţilor componente ale întregului. Acest studiu are ca obiectiv stabilirea unei relaţii între volumul de muncă şi abilităţile celor care realizează reprezentările, capacitatea de înţelegere a beneficiarului, timpul necesar efectuării reprezentărilor, precum şi raportul dintre performanţele tehnice ale sistemelor hardware şi software şi costurile acestora.*

Cuvinte cheie: Geometrie Descriptivă, Desen Tehnic, AutoCAD, Tripla Proiecţie Ortogonală, Proiecţia Axonometrică Izometrică

INTRODUCTION

From the ancient times, graphical representations were used for transmitting of information linked to shape, aesthetics and dimensions of various buildings or parts of constructions, representations in which the most common were only one projection of these elements, generally the front view.

Representation in only one projection of objects leads to a set of drawbacks linked to the impossibility to find the other projections of the object, to the difficulty to determine the way of assembly the component parts and also the impossibility to realise the 3D shape of the object.

By using of the three projection planes [H], [V] and [L] two problems are solved: Passing from the 3D space (where the 3D model is made) to the 2D space

(where the front, plane profile and axonometric views are made) and, reverse, the translation from the 2D space to the 3D space.

Both for effective realisation and visualisation of an object, it is necessary a drawing containing the bi-orthographical or three-orthographical projections (2D) and the axonometric projection (2.5D), which can be made both in the classical manner, by hand with drafting tools, and using computer graphics.

The best variants of object visualisation are those linked to the use of three-dimensional virtual models (3D) which can be made using modelling computer codes or by using of three-dimensional real models (mock-ups), variant having the disadvantage of being expensive.

Before of effective realisation of a part drawing, the necessity of choosing of an optimal variant of graphical representation (2D, 2.5D or 3D) is emerging, because the steps of realisation and visualisation include a set of factors which positively or negatively affecting them.

MATERIAL AND METHOD

As a case study for determining of the optimal method of graphical representation (2D, 2.5D or 3D) of a construction part was choose the representation of a pergola (fig. 1).

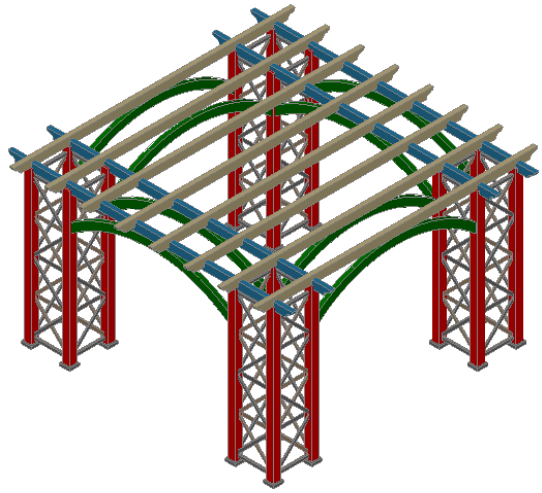

Fig. 1. Representation of a pergola.

The case study was realised along a three days period, each day for a certain representation, and was performed on two groups of 30 students each. From a questionnaire referring to their level of knowledge of plane graphical representation standards (technical drawing), of computer codes (like AutoCAD) (Simion I., 2008), as well as the capacity of the students to virtually see the three-dimensional shape of an element from it's bi-dimensional representation can be found (table 1).

Table 1

Level of students' knowledge

Level of Knowledge (%)	Technical Drawing	3D Visualisation	Computer Graphics		
			2D	2.5D	3D
High	100	75	100	80	75
Sufficient	-	25	-	20	25
Insufficient	-	-	-	-	-

For being able to accomplish the study and synthesise its results, the authors have conceived an analysis system allowing choosing the optimal solution of graphical representation. Thus a table was realised, containing in its rows the graphical representation types (2D, 2.5D, 3D) and in its columns the factors being analysed.

For each representation, a score is granted on a scale from 1 to 5, in which 1 is for the most disadvantageous solution and 5 for the most advantageous one.

The solution obtaining the greatest score is adopted for the representation of an element. In table 2 are presented the most important factors which must be taken in account.

During the survey, the students have to create individually each graphical representation (2D, 2.5D and 3D). At the end of each session the students received a table like the one in table 2 and gave a score to each variant of representation realised.

Table 2

Factors to be analysed in the precursory step of accomplishing of a 2D, 2.5D or 3D graphical represetation

Graphical Representation	Software	Hardware	Training Level of the operator	Time assigned for drawing execution	Drawing Complexity	Transmitting Capacity of technical information	Transmitting Capacity of manufacturing information	Difficulty of understanding the 3D shape of the element	Material and structural Information	Printing Costs	Visual Impact on inexperienced people
(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
2D	-	-	-	-	-	-	-	-	-	-	-
2.5D	-	-	-	-	-	-	-	-	-	-	-
3D	-	-	-	-	-	-	-	-	-	-	-

RESULTS AND DISCUSSIONS

At the end of the study, all the tables containing the scores granted to each graphical representation were gathered and the obtained results were processed. Thus the extreme scores granted to each graphical representation were eliminated and with the other scores an arithmetical mean, rounded at zero decimal places,

was made, mean inscribed in table 2. A sample of table 2 completed with all data is presented in table 3.

Table 3

Final results of the study

Graphical Representation	Software	Hardware	Training Level of the operator	Time assigned for drawing execution	Drawing Complexity	Transmitting Capacity of technical information	Transmitting Capacity of manufacturing information	Difficulty of understanding the 3D shape of the element	Material and structural Information	Printing Costs	Visual Impact on inexperienced people
(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
2D	5	5	5	5	5	5	3	1	2	3	1
2.5D	5	5	1	1	1	2	1	3	3	1	4
3D	1	1	2	3	3	5	5	5	5	1	5

Following the study it is noticed that the bi-orthographical or three-orthographical projections (2D) representations of the pergola (fig. 2) gained a maximum score at factors linked to the time needed for drawing execution and to the training level of the operator.

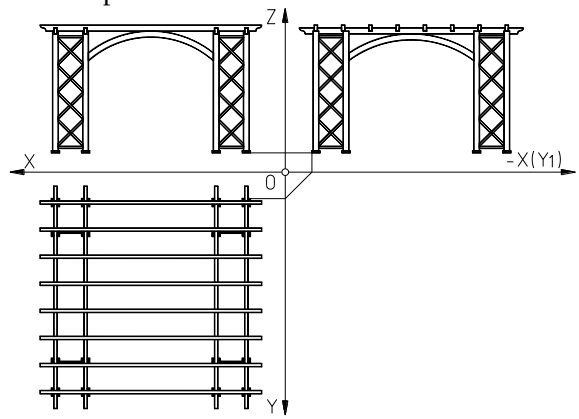

Fig. 2. Three-orthographical representation (2D) of the pergola

In exchange, 2D representations have a minimum score at 3D shape understanding and at the visual impact on inexperienced people. In other words 2D representations don't render the 3D shape of an object. Keeping in mind this aspect, axonometric representations, those are bi-dimensional but render the three-dimensional shape of the object, are used.

As it is known there are six kinds of axonometric representation (2.5D) of an object (Tănăsescu A., 1963), but, generally, the computer codes allows the relatively automatic realisation of only one kind of representation, that is the orthographic isometric axonometric representation.

As it is noticed from the study, axonometric representation has a minimum score regarding two fundamental parameters, namely those linked to the complexity and the time needed to complete the drawing. The difficulty and the time needed to realise an axonometric representation grow with the level of complexity of the object which is represented. Objects with complicated shapes (chamfers, retreats, hollows, curved surfaces and holes in planes different from the horizontal [H], vertical [V] and lateral [L] projection planes) need a much more longer time to represent than those with simple shapes.

E.g., it is presented in fig. 3 the axonometric isometric representation of the pergola in which the beams, the pillars and the panels with bars are depicted.

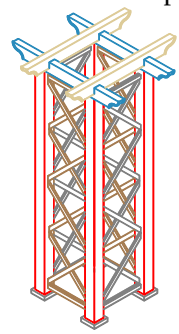

Fig. 3. Pergola. Detail regarding the structure of the pillars and beams' positioning

The axonometric representation has also a relatively small score at the factor linked to the understanding of the 3D shape of the element.

Taking this factor in account, results that even the axonometric representations aren't sometimes sufficient for rendering of all features of a very complex element. In these cases, the 3D representations using surface or solid modelling are used. E.g. in fig. 1 the pergola is presented as 3D solid model.

Following the study, it is noticed that 3D representations have a small score both to the factors linked to the high costs of execution, hardware and software needed and to the factor linked to the longer time needed for constructing 3D complex models. In exchange these representations gain a maximum score both at the factor linked to the capacity to transmit technical and manufacturing information and to the factor linked to the understanding of the 3D shape of the element.

For choosing the optimum variant of graphical representation the scores gained by each factor for each representation in part must be added. How in the realisation of the workshop theme don't enter a cost analysis (columns „1", „2" and „3") and the realised drawings are not plotted (column "10") the following scores are obtained: 2D – 22p, 2.5D – 13p and 3D – 31p. Thus, the recommended variant for the pergola is the 3D representation.

CONCLUSIONS

Despite the high costs the state of the art of technology and the market request impose the use of specialised hardware and software in computer graphics. So, the specialists have the task to choose between a plane computer representation, having relatively low costs, a 2.5D representation, having the same costs as the 2D representation, and a 3D representation having high costs. From the viewpoint of communication between the specialists, analysing the cost – transmitted information volume ratio, the use of 2D representation is recommended, since the 2.5D representation cannot, as a rule, transmit as much information as the 2D representation. Also from the viewpoint of specialists the 3D representation is often lacked of importance since it transmits the same information as the 2D representation but with higher costs, super adding that the specialists can read and decode easily the plane representations.

From the consumers viewpoint the 2D representation doesn't have any advantage since they don't have, generally, the needed knowledge to understand it. The 2.5D representations are easier to understand by the consumers but have the disadvantage that often they don't clearly depict various constructive details. In other words, they offer a general image of the product without giving the opportunity to present details by using of different angles views. The problem of complete rendering in the case of consumers is solved by the 3D representation. This allows both the viewing of the product from any angle and the depicting of its interior.

On the other hand, from the didactic viewpoint, we have noticed that choosing of the representation method differs from one set of students to another. Thus, groups exist in which a great number of students can easily see with the "mind's eye" the 3D shapes of the objects and then, especially, only the 2D representations are used. Other way, the use of 3D representations is recommended.

The analysis we made shows that the 2.5D representations are the harder to realise by the students, needing mental effort and being time consuming. Finally, this way of representation is useful again to those having the ability to see with the "mind's eye". Finally, the teacher has the task to decide which representation system must be preponderant depending on the following factors: the ability of the students to see with "mind's eye", the needs deriving from the didactical tasks and the necessity for the students to cope with the graphical communication manner of the specialists.

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THE INFLUENCE OF CLIMATIC FACTORS ON THE MAIN PHYSIOLOGICAL PROCESSES IN VINES

INFLUENȚA FACTORILOR CLIMATICI ASUPRA PRINCIPALELOR PROCESE FIZIOLOGICE LA VIȚA DE VIE

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Abstract. *Extreme weather phenomena such as atmospheric and pedological drought and rain in the insufficient quantity and unevenly distributed during the vegetative period disrupt the vine metabolism by directly affecting the main physiological processes responsible for growth, development and maturation of the grapes. During 2007-2010, SCDVV Murfatlar develop, in collaboration with the University of Craiova, a research project funded by the CNMP-PNII, which follows, between the main objectives, making eco-physiology research at grapevine varieties prevalent in both centres Murfatlar and Banu Maracine, which wants to give response to next issues: establishing correlations between soil moisture, foliar mass and evolution of physiological processes; dynamics of physiological processes in different varieties; the influence of water regime on the quality and quantity of grape production. These studies will give a background for to developing a new technologic procedure for growing vines in the a restrictive regime of precipitations.*

Key words: climatic conditions, soil moisture, physiological processes, grapes quality

Rezumat. *Fenomenele climatice extreme cum ar fi seceta atmosferică şi pedologică din unele luni de vară şi precipitaţiile slabe cantitativ şi neuniform repartizate pe parcursul anului perturbă metabolismul viţei de vie, prin afectarea directă a desfăşurării principalelor procese fiziologice responsabile de creşterea, dezvoltarea şi maturarea strugurilor. In perioada 2007-2010, SCDVV Murfatlar realizează în colaborare cu Universitatea din Craiova-Facultatea de Horticultură un proiect finanţat de CNMP-PNII, care urmăreşte, ca principale obiective, realizarea de cercetări de eco-fiziologie la soiuri reprezentative pentru centrele viticole Murfatlar şi Banu Mărăcine prin care se doreşte să se dea răspuns la urmatoarele problematici: stabilirea corelaţiilor între umiditatea solului, masa foliară şi evoluţia proceselor fiziologice; dinamica proceselor fiziologice pe diferite soiuri în cele două centre; influenţa regimului hidric asupra calităţii şi cantităţii producţiei de struguri. Studiile respective vor sta la baza elaborării unui procedeu tehnologic de cultivare a viţei de vie în regim hidric restrictiv*

Cuvinte cheie: condiţii climatice, umiditatea solului, procese fiziologice, calitatea strugurilor

INTRODUCTION

Deepening the drying phenomenon in the areas of southern and south-eastern Romania impose to adapt vine growing technology for better use of natural water resources or their substitution by modern methods of irrigation. Balance between production cost and quality grapes depends on the growing system adopted (pruning method, foliage management, supply of water and fertilizer), whose effect can be monitored by determining the development of key physiological processes that manage future harvest

The research project has as a primary aims to deepen understanding of physiological mechanisms to adapt vine growing technology to make better use of water resources, ensuring a high quality of wines.

MATERIAL AND METHOD

It was placed two experimental plots in Murfatlar and Banu Maracine centers, planted with varieties Riesling Italian and Cabernet Sauvignon (non-irrigated and drip irrigated).

Were made the following observations and determinations:

• monitoring of climatic factors: air temperature, sunlight, rain (it is shows only the data from Murfatlar)

• highlight the effect of lack of water on leaves growth conditions (leaf volume): were considered mature leaves located over grapes, scan and analyze with Win-Folia software specialized

• dynamic tracking of key physiological processes: it was made determinations by a porometer and a clorofilmeter

• physic-chemical analysis at grapes and musts

RESULTS AND DISCUSSIONS

Annual average temperatures calculated for the range studied are higher than normal by about 3 ^{0}C (14,27^{0}C in 2007 and 14,5^{0}C in 2008 and 2009 compared with 11.40 ^{0}C - normal). It shows a group of high temperatures (monthly average) in the period from May to August (figure 1).

Concerning **the sunlight**, the first two years of study at Murfatlar see a 5-7% increase in the number of annual sunshine hours, including during the growing season, which increased by 57 hours in 2008 and 86 hours in 2007 (figure 2). Year 2009 is approaching normal

Rainfall regime. Multiyear average rainfall fell in one year is 436 mm at Murfatlar. Between 2007 and 2009 was substantially exceeded this value (579 617.5 mm respectively) because of rain fell between August to November 2007, respectively in July and December 2009. It is noted, however, in recent years, a great variability in rainfall distribution, particularly dry months occurring between May to June in all three years, in June and August 2008 and June 2009 (figure 3), which has influence the processes of growth and development of vines (growing shoots and grain binding.

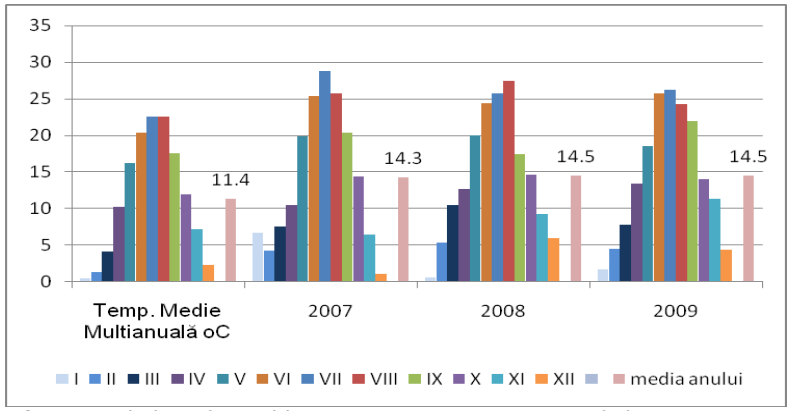

Fig. 1. Evolution of monthly average temperatures. Murfatlar, 2007-2009

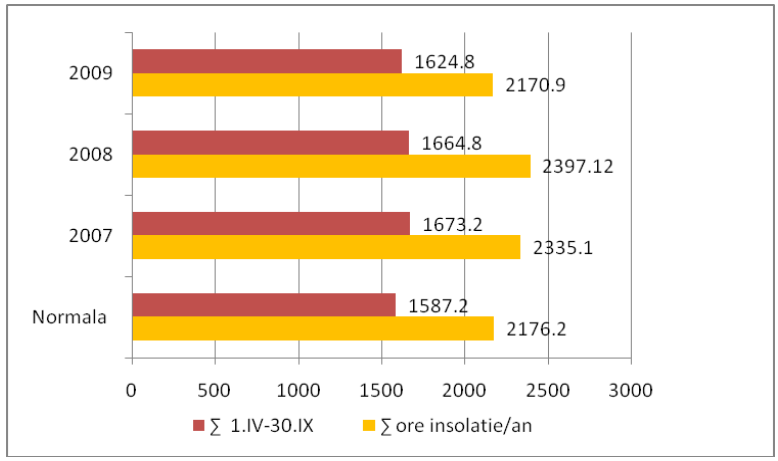

Fig. 2. Amount of insolation hours. Murfatlar 2007-2009

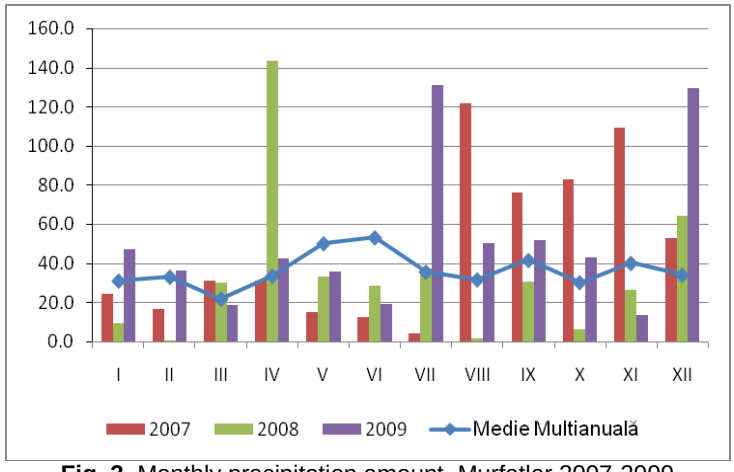

Fig. 3. Monthly precipitation amount. Murfatlar 2007-2009

As the **soil moistur**e in most months, momentary ground water provided was much lower than normal (field capacity), moisture deficit gradually increased with the depth, a maximum value registered at depth of around 80 -100 cm.

Establishing correlations between soil moisture,foliar mass and evolution of physiological processes

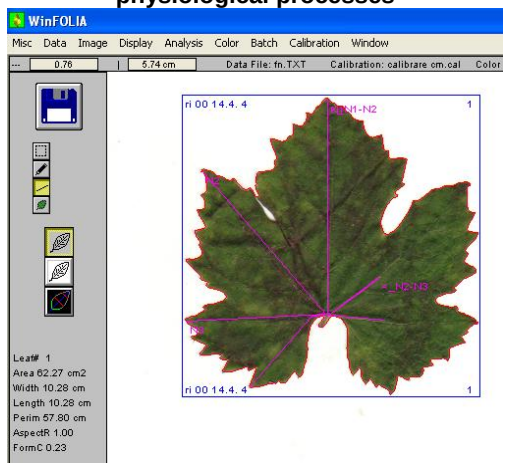

Fig. 4. Example of measurements made in variety Riesling italian with Win Folia (Banu Mărăcine)

The both studied varieties had larger leaves in 2008 and 2009, years characterized by providing a minimum of water resources in intensive growth period (May-July), lower values of leaf area were determined in 2007 when in intense growth period the water content in soil was some lower.

To get a clear picture of the influence of the distribution of water resources affecting leaf size and final length of shoots in the two vine varieties we studied calculated correlation coefficients between length of shoots and water-supply for the entire duration of the growing season and for the beginning of the growing season, when shoots are intensive growing.

Correlation coefficient value shows whether and to what extent the final size of leaf (leaf area) were influenced by moisture conditions in the period under review.

The analysis of correlations between the availability of water and leaf size at the studied varieties show the major influence of water-supply conditions in the interval of intensive growing of leaves (table 1), the period for which correlation coefficients exceeding the P theoretical is significantly distinct at variety Riesling Italian and very significant for Cabernet Sauvignon.

Table 1

Correlations between leaf size and water-supply conditions for different periods of the varieties studied (Banu Mărăcine)

Variety	Interval	Correlation coefficient – r	Signification
Riesling Italian	Vegetative period	0.589	-
	April-July	0.936	***
Cabernet Sauvignon	Vegetative period	0.420	-
	April-July	0.900	**

P 5% - 0,707 P 1%- 0,834 P 0.1% - 0.925

Dynamic key physiological processes

In the interval between beginning of ripening and full maturity were done in dynamic the determinations of stomata conductance values - an important indicator of plant water stress condition and the amount of chlorophyll (table 2). Determinations were performed on experimental variants irrigated (I) / irrigated (nI).

Tabel 2

Evolution of stomata conductance, Murfatlar 2009

Stomata conductance (mmol H2O m-2 s -1)					
	Variant	20 Aug.	27 Aug.	3 Sept.	10 Sept.
Riesling Italian	nI	189.9	143.6	131.9	163.1
	I	202.7	157.1	132.7	185.6
Cabernet Sauvignon	nI	101.7	128.8	112.1	157.1
	I	188.8	160.9	174.1	196.8
Clorophile (mycrograme/scm)					
		20 Aug.	27 Aug.	3 Sept.	10 Sept.
Riesling Italian	nI	41.15	43.1	44.3	40.41
	I	45.11	42.2	41	40.83
Cabernet Sauvignon	nI	43.56	38.9	42.5	41.6
	InS	46.36	46	47.08	44.06

It is noted an increasing of values of stomata conductance on both variants, in the situation of the irrigated variant the values are higher.

Chlorophyll content is not influenced by irrigation factor, dropping it with the grape maturation

Influence of water regime on production quality

Diversity of hydrothermal regime of the period study is reflected in changes in biochemical indices examined. Carbohydrate content in the studied varieties had the highest values, as was normal, in the year with low precipitation regime (2008), while high total acidity values were recorded in years with rich water resources during the verraison- full ripening (2007 şi 2009).

Table 3

Values of the biochemical index which characterize the potential quality for wine quality varieties studied, at the harvest

Variety / Year	Riesling Italian		Cabernet Sauvignon	
	Carbohydrates (g/l)	Acidity (g/l H_2SO_4)	Carbohydrates (g/l)	Acidity (g/l H_2SO_4)
BANU MARACINE				
2007	208.5	4.5	221.3	3.9
2008	214.1	4,1	232,4	3.1
2009	211.3	4.5	230.4	4.0
MURFATLAR				
2007	198	4.5	209	5.0
2008	204	4.1	218	3.8
2009	201.28	4.7	206.58	4.9

Sugars in the must are higher in 2008, when the precipitation regime ensures the proper development of physiological processes. Acidity was normal to low with the data recorded in both centres.

CONCLUSIONS

On the two varieties, it can notice a quality increase in case of variants with drip irrigation.

To ensure smooth grapes production, both qualitatively and quantitatively, during intense vegetative growth, if there is not enough precipitations is recommended to supplement the water resources by located irrigation.

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