

PRELIMINARY STUDIES ON SPECIES AGROBIOLOGY *ORIGANUM VULGARE*

Marlena HOBINCU ¹, Neculai MUNTEANU ¹, Marcela FĂLTICEANU ²

¹ University of Agricultural Sciences and Veterinary Medicine Iași

² Vegetable Research and Development Station Bacău

Abstract

The problems of improving and deepening the organoleptic characteristics proper to various foods underlie civilization. Natural additives come from the vegetable world, being used as whole plants, roots, leaves, flowers, fruit or seeds from different plant species, one of them being the *Origanum vulgare* or marjoram.

Therefore, the paper presents an overview of the research carried out in Romania and abroad, regarding the main elements of agrobiology of this important aromatic herb and spice, *Origanum vulgare*. The general scheme of this synthesis is presented in a conceptual model on the main elements of agrobiologic study regarding: breeding, land choosing, establishing age, distances and density, irrigation system, fertilization regimen, harvesting methods.

The theme chosen for study is of great interest if we consider that there is too little information in our country on the growing and efficiency of this crop. Compared with other vegetable crops, the cultivated herbs and spices cover an insignificant area. Their growing importance, however, has to be determined not so much by the planted area, as by their specific value. By deliberately using specific aromatic herbs and spices in foods, they contribute with the substances they contain to the improvement of the their nutrient quality; the prevention of discoloration or the emphasizing of the coloring of the foods; the prevention of spoilage due to oxidation by antioxidants and sinergent components; the prevention of physical degradation of the foods; the prevention of spoilage due to microorganisms with the help of their antiseptic and antibiotic elements, etc.

The scientific information in this paper will underlay the research that is to be conducted in the thesis.

This paper provides a source of information both for industry professionals and for small farmers who want to modernize their agricultural structures and to practice commercial farming in order to increase economic efficiency in view of profound character of agriculture transformation.

Keywords: *Origanum vulgare*, agrobiology, spices, herbs.

Compared with other vegetable crops, aromatic herbs and spices cover an insignificant cultivated area. But their growing importance must be considered not so much for the planted area, as for their specific value.

Aromatic herbs and spices are used fresh or dried, whole or only parts of them to give flavour and aroma to the foods, or sometimes to spice them. (Stan, N.T. and Stan T.N., 2006).

The using of spices leads us back to primitive age. The Early Masters of spices cultivation were the Etruscans, the Greeks and later the Romans. The spices necessary for Banquets were grown in their gardens, as the wall paintings in the burial chambers prove by the repeated motifs of seasoning plants, but the old writings also show that these spices of the spontaneous flora had been known by the Egyptians, the Chinese, the Greeks and the Romans more than thousands of years before Christ.

In the centuries that followed the collapse of the Roman Empire and Barbarian migration, the

treasure of knowledge of medicinal and aromatic plants had been maintained and enriched by the monasteries of Italy, France, Germany and Syria, as well as by the well-known Arabic medical schools, so the basic principles managed to pull through the times.

Spices were some of the most valuable „currency” for exchange of the trade in the ancient and medieval world. In the Middle Ages, some spices were worth so much that they were used as currency in the true sense of the word.

Spices had been the primary reason why the Portuguese navigator, Vasco da Gama (born in 1469 in Sines – died on 24th December 1524 in Kohi India) set out on a journey to India. It is said that his first sentence when he arrived in India was „We are looking for Christians and spices”. Christopher Columbus (born between August and October 1451 – died on 20 May 1506) accidentally discovered the New World and he rushed to describe it to the investors through the new spices that he had found there. Although he didn't discover India he brought other spices that we are

used to today, including hot peppers, vanilla and allspice.

In Romania, medicinal and aromatic plants had been well known to the monks, the monasteries being known for a long time as the most important settlements in which there had been concerns regarding their cultivation, harvesting and use.

The purpose of this research is to highlight the possibility of obtaining of higher quality output by the correlating the many factors that are in total interdependence, biological and environmental factors.

To this end, the following objectives have been established:

- Botanical and biological features description; knowledge of the species ecological requirements and their impact on the crop; establishing the elements of technology; optimization of harvesting, conditioning and exploitation.

The interweaving of these objectives in a system has resulted in a conceptual model of the main elements of agro biological study.

MATERIAL AND METHOD

The Biological material is covered by the study of species and culture of *Origanum vulgare*. This material is found in the U.A.S.V.M. collection in Iassy.

The working method consisted of the basic bibliographic study on specialized work in the country and also abroad. It was also taken into account the authors' experience in growing vegetables and plants, and especially the species *Origanum vulgare*.

RESULTS AND DISCUSSIONS

Origin and importance of crop

Origanum vulgare or the marjoram is a species of the genus *Origanum*, native from Europe, the Mediterranean region and Central and South Asia.

The plant grows naturally in meadows, meadows, orchards, on the fringe of forests, dry and rocky places, bushes, from lowland to subalpine area, more often in the hills area.

Genus *Origanum* L. includes dwarf shrubs or dicotyledonous herbs, annual, biennial or perennial, specific to warm areas and mountain.

Its name comes from the Greek words "Oros", which means mountain, and "ganos" - ornament. It was known by the Greeks and used by the Arabs. Used since the time of Aristotle (b. 384 BC - 322 BC March 7) and Dioscorides (about (40-90 BC), it was included and described in the herb group of Abbess Hildegard (1098- 1179).

From the *Origanum vulgare* species only the aerial part of the plant is eaten (Herbal *Origani vulgaris*). It presents a variety of uses:

Origanum vulgare species from the air is consumed only plant (Herbal *Origani vulgaris*). It presents a variety of uses:

- Culinary. In food typical to Italian cuisine it is an excellent spice for seasoning soups, salads, sauces, meat dishes, beans and tomato, pizzas, canned meat, pastries;
- Ornamental. It is a decorative plant in the port, shrub and flower, often cultivated in flower pots;
- In perfumery it is found as ethereal oil changed by redistillation, in odoriferous compositions with grassy characteristic or in the fine soaps industry;
- In farming. Since having a repellent effect for insects, oregano is recommended for combination with several vegetable species. It is also envisaged that it is a species that covers well the soil and gives it an herbicide role. (Fălțiceanu, Marcela, N. Munteanu, 2003).
- Honey. Species *O. vulgare* is a good honey plant.
- Medical. Due to the volatile oil components it has antispasmodic action on smooth muscle and sedative action on the central nervous system and particularly on the respiratory centres, causing a mild bronchodilatation.

Bitter substances and tannoids have an action bitter tannoid and slightly astringent, carminative action. It is used in tracheitis and bronchitis and certain stomach diseases, especially in anacids gastritis.

U.S. Department of Agriculture along with university researchers has developed a scale measuring the ability of some foods to neutralize free radicals. As a result of the research it was found that aromatic herbs have an antioxidant action that is stronger than some fruits and vegetables considered the most powerful antioxidant agents.

In table 1, scores for some aromatic species are presented, also including three species of oregano.

Systematic and species range of *Origanum vulgare*

Origanum vulgare belongs to the Lamiaceae family. This family is rich in species, mostly grass and some undergrowth. The species names in different languages are: English - oregano, wild Marjoram, in French - Marjolaine sauvage, in German: Dost, Gemeiner Dost.

Majorana Majorana is one of the synonyms of the species *Origanum vulgare*.

Oregano is still an underused species, meaning that the taxa it includes are not properly exploited, since the market exploits a narrow part of its diversity.

Origanum type (Mentheae tribe, family Labiatae) is characterized by a great morphological and physiological diversity, including 49 taxa (species, subspecies and varieties) after the classification performed by Ietswaart (1980), Carlström (1984), Danin (1990), Danin and Kunne (1996). They belong to a total of 10 different sections.

Most species of *Origanum* (about 75%) are found exclusively in the eastern Mediterranean sub-region and only a few species appear in the western Mediterranean. In particular, three taxa are restricted to Morocco and southern Spain, two occur in Algeria and Tunisia, three are endemic to Cyrenaica, nine are restricted in Greece, southern Balkans and Asia Minor, 21 are found in Turkey, Cyprus, Syria and Lebanon and eight are locally distributed in Israel, Jordan and Sinai Peninsula.

For example, *Dictamnus origanum* is harvested in the wild of Crete, Greece. This species are likely to disappear entirely from this island. Oregano exploitation of natural habitats are, however, more obvious in countries like Morocco, Turkey and Albania, they were traditionally the largest exporter of oregano in the world. In these countries, oregano is heavily collected to meet high market demand and very little is done to regulate the harvesting.

O. dayi, is reported to grow naturally in the northern Negev; the species is a rare taxon and has never been cultivated.

O. syriacum, for which more than 25 populations were found in Israel, where it became a species protected by law.

In Slovenia, as a result of the evaluation of wild oregano the *O. heracleoticum* L species was introduced. In Istria area it was introduced in 1984 after preliminary environmental acclimation studies had been conducted.

In Morocco, there are five species belonging to the *Origanum* type. Three of them are endemic - *O. grosi* Pau, *O. frontqueri* Pau and *O. elongatum* and the other two species *Pollachius O., et Hoffing Link* and *O. compactum* Benth. are common to the Iberian Peninsula and Morocco.

Botanical and biological features

It is an herbaceous, perennial, erect, branched at the top species, being 30-60 cm high (80 cm), with aromatic odour. It is a horizontal gray-brown.



Figure 1 *Origanum vulgare*

Rhizome, 2-3 cm thick from which numerous underground runners as well as many filiform roots start. From the rhizome not only sterile bines as well as floriferous stems start, with four edges less prominent, having greenish or reddish hues, covered with hairs, with branches that start from opposite upper nodes. Herbal Origanum - made of straight stems, branched, 15-25 cm long, without lignified bottom, reddish, finely pubescent.

The leaves are petiolated, entire, and oval, pubescent mainly on the bottom, with a thin serrated edge, having 3-5 pairs of secondary veins. These contain cells with essential oil, which is why they are used as a spice.

The inflorescence arranged in corymb is made up of contracted cymes, making small cylindrical or prismatic ears. The bracts are reddish, ovate, sessile having the calyx length. The flowers have reduced calyx (2 mm), which is bell-shaped, glabrescent. The corolla is up to 6 mm bilabial, tubulose, infundibuliform, reddish-purple, rarely white-pink.

Fruit improperly called seeds are ovoid walnut, 1 mm small, grouped by four in the persistent calyx. The smell is flavoured, characteristic, with bitter – aromatic taste.

General aspects of cultivation technology

Depending on the requirements to environmental factors the following areas are considered as favourable: Transylvania, Banat (Arad, Bistrita-Nasaud, Caras-Severin, Harghita, Hunedoara, Maramures), Oltenia (Gorj, Valcea), Muntenia (Buzau, Ilfov) and Moldova (Bacau, Neamt, Suceava, Vaslui).

Place in rotation

Oregano can return to the same land, generally after 3-4 years, sometimes even after 7-9 years to interrupt the biological cycle and the spread of diseases and pests.

It is advisable to cultivate after the best predecessors as: winter grains, peas, beans, soya, and potatoes but it may come before the crop rotation before wheat or barley.

The land must be clean, clean of weeds, with high fertility and with a certain moisture reserve.

Preparation land

Since this species has small seeds, a well-cut and uniform germinating bed needs to be ensured. Ploughing will be done early, at the best time of soil moisture, for the inturnd layer to settle well by sowing. The depth of the ploughing depends on soil type and species within the rotation. Thus, for the perennial species, the ploughing is about 25-30 cm deep.

Until sowing the ground surface remains loose and without weeds. Before sowing, in spring, especially in dry areas, the roller is to be used.

Crop Establishment

The crop is established by direct sowing in early spring. The crop may also be established through seedling. Seedlings are produced by sowing in the vane pockets in greenhouses equipped multiplier or furrows in the field, depending on planting dates and establishing the crop.

Vegetative plants can grow either by separation plants in spring or fall, or by cuttings harvested from the plant that is rooted, and in summer they can be planted in a permanent place in the field.

Crop establishment by direct seeding can be done in early May. The sowing depth ranges from 0.5 to 1.0 cm.

Distances between rows and between plants on the row are made by taking into account the size of the plant. The most recommended density is of 20-25 cm between plants per row and 50-70 cm between rows. (Stan N.T. and Munteanu, N. 2001).

Maintenance

Firstly the gaps are filled with plants from the same batch and of same age for the crops established by seedling.

In the crops established by direct seeding the thinning is carried out. Throughout the growing season maintenance works are applied: the removal of loose weeds and keeping the soil loose, such as hoeing, weeding and some characteristic works, such as cutting, cleaning.

In cold winters, the plants are covered with mulch and in spring the mulch is removed, the stems are cut, in order for new shoots to develop and it is hoed.

Fertilization is another important work, the quantity of the fertilizer depending on the degree of soil nutrient supply and continuity of crop.

Manure will be applied depending on the nature of the soil in the following quantities: on the clay-sandy soil or clay – sandy soil around 40-50 t/ha will be applied and on the more fertile soils, chernozem type, around 25 to 30 t/ha.

Irrigation is required for areas where there is drought. The optimum watering times are different depending on phenophase, but also on the climatic conditions.

Thus, it should be considered with priority watering in June and July which are dry seasons, usually in terms of our.

As irrigation methods the most commonly used ones are furrow irrigation and sprinkler. One of the most modern methods is the drip irrigation.

This method has the advantage that the water distribution is done in the plant root zone, thus preventing soil compaction and irrigation and due to the fact that it reduces drastically the amount of used water. (Roman, V. et al., 2008)

Harvesting

The harvesting is carried out depending on plant material so as to contain a maximum of active principles.

Because the effectiveness of the phototherapy of medicinal and aromatic plants underlies the relationship active substances - therapeutic action, the quality of plant material is the most important as various remedies are going to be made of it.

There are two important aspects in harvesting, namely the optimum harvest time and the harvest method.

Optimum harvest period is from the beginning of flowering (July-August), when the leaves have reached full size. Plants will be harvested in the morning, after the dew rises. From a twig not all leaves should be harvested once because the plant vegetation can be stopped. The harvest will be echeloned, first the leaves from the bottom and later the top ones. Harvesting of flowers is done when they are completely open, because at this point they have the maximum content of volatile oil. (Păun, E., et al. 1986)

There are two methods of harvesting, namely by pinch or turning.

By pinching the stalk is broken, leaf by leaf, achieving a high quality material.

By turning, the shoots are passed by hand, harvest efficiency is higher, but the plant material is broken and great active principles losses can appear. It can be cut with the hook or knife at the branch overhead, so the product is about 20 cm long, free of lignificate parts.

The efficiency is about 25 t/ha of dried plants, with a moisture content of 14%. The

harvested material is dried directly, using specialized drying equipment available on farms.

Among the most important quality parameters in the final product are:

- (1) leaves containing more than 99.5%;
- (2) ash with a maximum total of 12%;
- (3) essential oil content of more than 1.2%;
- (4) moisture content exceeding 14%.

Table1

Rating aromatic species by their antioxidant value

No. crt.	Species	Score
1	Southwest Oregano (<i>Poliominthia longiflora</i>)	92,18
2	Italian oregano (<i>Origanum majoricum</i>)	71,64
3	Greek Oregano (<i>Origanum vulgare</i>)	64,71
4	Bay leaf (<i>Laurus nobilis</i>)	31,70
5	Dill (<i>Anethum graveolens</i>)	29,12
6	Mint (<i>Menthae Piperita</i>)	19,80
7	Savory (<i>Satureja hortensis</i>)	19,49
8	Ginkgo biloba leaves (<i>Ginkgo biloba</i>)	19,18
9	Rosemary (<i>Rosmarinus officinalis</i>)	19,15
10	Lime (<i>Philadelphus coronarius</i>)	17,88
11	Hay (<i>Hypericum perforatum</i>)	16,77
12	Basil (<i>Ocinum basilicum</i>)	14,27
13	Thyme (<i>Thymus vulgaris</i>)	13,40
14	Sage (<i>Salvia officinalis</i>)	12,28
15	Parsley (<i>Petroselinum crispum</i>)	11,03
16	Caraway (<i>Carum carvi</i>)	10,65

CONCLUSIONS

As a result of the research carried out, and some of them being listed above, we may draw the following conclusions:

The study is of interest because so far, in our country too little information has been available on the development of technologies for *Origanum* organic crop species that can give producers more confidence in achieving safe and high quality harvest.

Optimization of cultivation technology will implicitly determine the economic efficiency of the growing of *Origanum vulgare* species in the conditions in Romania.

BIBLIOGRAPHY

- Fălticeanu, Marcela, N. Munteanu, 2003 - Useful Plants for your garden. Publisher Tipo Moldova.
- Mănescu, B. et Ștefan Marcela, 2005 - Engineered agricultural ecosystems. Publisher ESA.
- Păun, E., et al. 1986 - Treatise of medicinal and aromatic plants cultivation, Romanian Academy Publishing House, Bucharest.
- Roman, V. et al., 2008 - The cultivation and aromatic herbs in organic, Ceres Publishing House, Bucharest;
- Stan, N.T., Stan T.N., 2006 – Aromatic herbs, spices and less widespread crop, Editura „Ion Ionescu Brad” Iassy
- Stan N.T., Munteanu, N., 2001 - Vegetable, vol.II. Editura „Ion Ionescu Brad” Iassy.

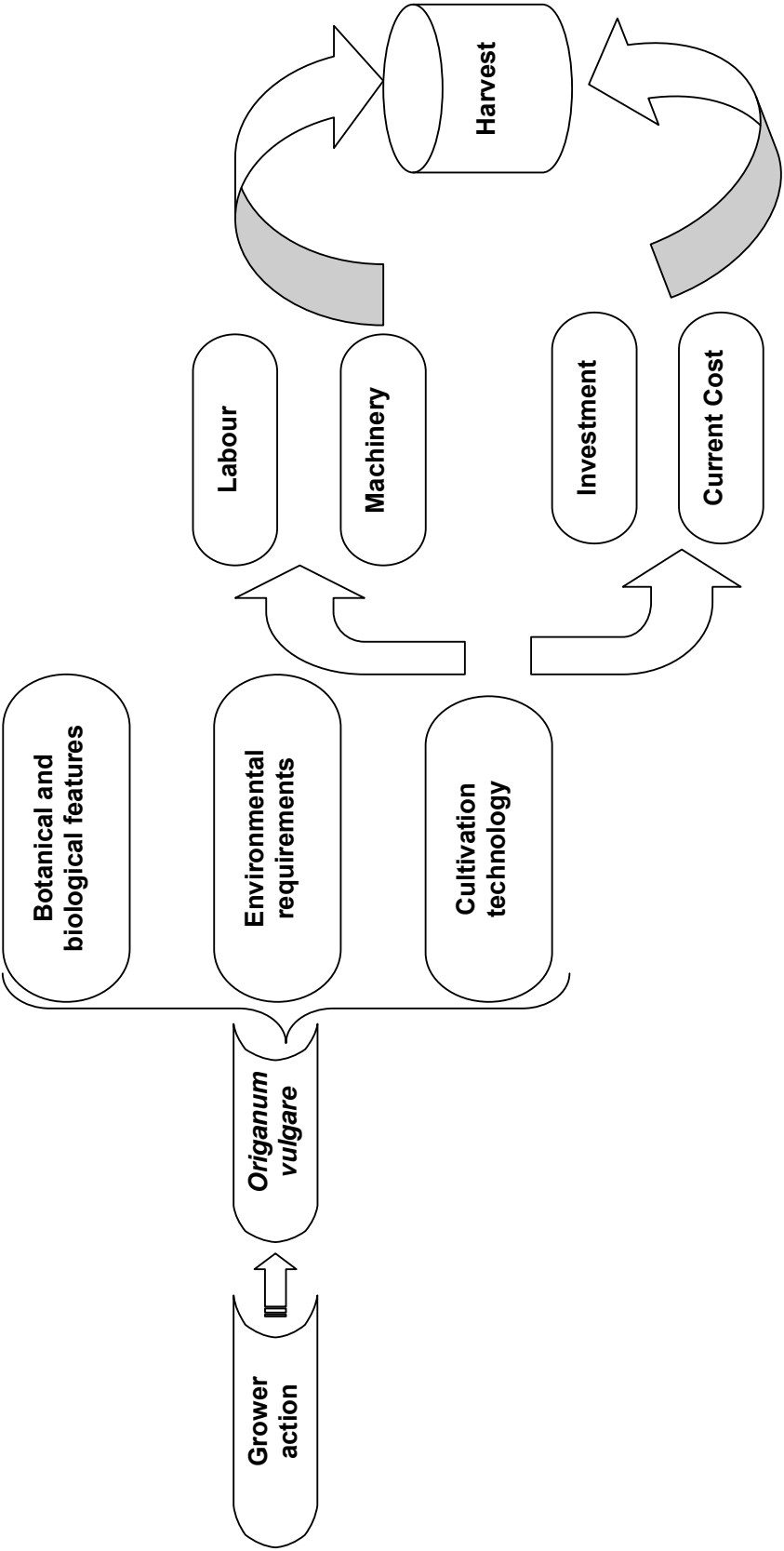


Figura 2 The conceptual model of key elements of agrobiological study
(Mănescu, B., Ștefan Marcela, 2005)