

# ASSESSMENT OF AGROBIOLOGICAL POTENTIAL OF THE *ORIGANUM VULGARE* L. SPECIE UNDER THE INFLUENCE OF THE DIFFERENT DENSITIES OF CULTIVATION

## EVALUAREA POTENTIALULUI AGROBIOLOG AL SPECIEI *ORIGANUM VULGARE* L. SUB INFLUENȚA DIFERITELOR DENSITATI DE CULTIVARE

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**Abstract.** *The study aims to highlight the influence of density of cultivation on the agrobiological potential of the oregano crop. The main characteristics considered in this experiment were: plant height, bush diameter, number of shoots/bush, number of inflorescences/shoot, number of leaves/shoot, the weight of the aerial fresh part, the weight of the aerial dry part, the weight of underground fresh part, the weight of underground dry part. Analyses show that the density of cultivation of 70 cm between rows and 35 cm between plants in turn, is most appropriate to achieve good results in terms of culture of oregano. Influence of the densities cultivation was determined by calculating the coefficient of variability.*

**Key words:** *Origanum vulgare*, agrobiological characteristics, density of cultivation

**Rezumat.** *Studiul urmărește să evidențieze influența densității de cultivare asupra potențialului agrobiologic al culturii de oregano. Principalele caracteristici avute în vedere în cadrul acestei experiențe au fost: înălțimea plantelor, diametrul tufelor, numărul de lăstari/tufă, numărul de inflorescențe/lăstar, numărul de frunze/lăstar, greutatea părții aeriene proaspete, greutatea părții aeriene uscate, greutatea părții subterane proaspete, greutatea părții subterane uscate. Analizele demonstrează că densitatea de cultivare, de 70 de cm între rânduri și 35 cm între plante pe rând, este cea mai indicată pentru a obține rezultate bune în privința culturii de oregano. Influența densității de cultivare a fost apreciată prin calculul coeficientului de variabilitate.*

**Cuvinte cheie:** *Origanum vulgare*, caracteristici agrobiologice, densitate de cultivare

### INTRODUCTION

In Romanian agricultural landscape, *Origanum vulgare* is a species known as the wild and the cultivated flora. The most important species of oregano are presented at the high altitude mountains of the Mediterranean countries, which are common in Greece, Asia Minor, Italy and even in the Balkans (Sarlis, 1994).

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## MATERIAL AND METHOD

Biological material, in this experiment, consist of plants and plant fragments and fresh and dry harvest. Research was performed in the experimental field of Department of Vegetable growing from Faculty of Horticulture, held at the BIAROM Farm, in 2010-2011.

Oregano crop was established in May 2010, by seedlings of 50 days old. The seedlings were produced in the greenhouse conditions.

During the vegetation, the observations and the measurements were performed on the main biometric morphophysiological characteristics under the influence of different density of cultivation: 140 cm between rows and 70 cm between plants in the row, 70 cm between rows and 35 cm between plants in the row and the third density of 60 cm between rows and 30 cm between plants in the row. Each variant had three rehearsals.

Morphological study of plants of oregano was followed by comparative growth stages on phenophases (phenophase shoots issue, phenophase issue floriferous stems, flower buds and the formation phenophase complete flowering).

Influence of cultivation density was determined by calculating the standard deviation, amplitude variation and coefficient of variation. Data were processed by specific statistical methods.

Coefficient of variation was calculated in accordance with the literature, applying the known formulas (Saulescu and Saulescu, 1967) and respecting the following formula:  $V\% = \text{standard deviation} \times 100 / \text{arithmetic average}$ .

- low (close to lower limit) of the indicator indicates a homogeneous series (mean, median, modal value representative),
- high values (close to upper limit) of the indicator shows a heterogeneous series ((mean, median, modal value are unrepresentative).

$V\% \leq 10$  - character variability is considered small;

$V\% = 10$  to  $20$  - character variability is considered medium;

$V\% \geq 20$  - character analysis variability is high.

## RESULTS AND DISCUSSIONS

Visible growth of oregano plant, both in the phenophases period and from one year to another is a first observation that emerges from the results for the three densities analyzed cultivation.

Phenophase shoots issue is that you can see character analyzed the average variability (tab. 1). Its values are above the threshold of 10%, hovering around 14%.

Although in the formation phenophase flower stems, in 2010, this character indicates a low variability in the same phenophase, only a year later, the situation changes and the value easily exceeds ten percent. Values are somewhat stable in formation stage floral bud.

If the dynamics of the oregano plant height could talk about a important leap both in terms of development and growth phenophases and during this study, the same can't be said about the results of oregano bushes average diameters (tab.2).

Table 1

**Dynamics of oregano plant height (2010-2011)**

Phenophase	Issue shoots		Floriferous stems		Flower buds		Full flowering	
	2010	2011	2010	2011	2010	2011	2010	2011
The distance between rows x distance between plants in the row (cm)								
140 X 70	16.2	22.1	37.9	42.2	54.6	60	62.6	67.2
70 X 35	19.8	21.2	42.3	53	57.9	67.4	77.6	80.2
60 X 30	15.3	16.7	39.6	48.2	56.8	61.5	72.3	76.7
average standard deviation	1.37	1.67	1.28	3.12	0.97	2.26	4.39	3.88
amplitude variation	4.50	5.40	4.40	10.80	3.30	7.40	15.00	13.00
V %	13.93	14.47	5.56	11.32	2.98	6.21	10.74	9.01

Size of these plants is well-defined and no major differences that distinguish preference to factor concerned.

Table 2

**Dynamics of shrub diameter of oregano (2010-2011)**

Phenophase	Issue shoots		Floriferous stems		Flower buds		Full flowering	
	2010	2011	2010	2011	2010	2011	2010	2011
The distance between rows x distance between plants in the row (cm)								
140 X 70	60.6	65.3	63.2	67.6	65	75.3	77.5	80.4
70 X 35	62.1	68.8	73.8	74	81	90.9	88.6	97.6
60 X 30	62.0	64.1	63.4	73.7	68	77.5	83.3	98.7
average standard deviation	0.48	1.41	3.50	2.09	4.91	4.87	3.21	5.93
amplitude variation	1.50	4.70	10.60	6.40	16.00	15.60	11.10	18.30
V %	1.36	3.70	9.08	5.03	11.92	10.39	6.68	11.13

At the beginning and end of the vegetation can be the difference of the coefficient of variation from one year to another, within the same phenophase, it has the ascending values. An average degree of homogeneity was determined in the third stage (V% 11.92 - 10.39 V%).

Known that plants need nutrition and development space relatively large, about the number of shoots per plant (table 3) can be identified increases in those two years, but the values differentiated variants particularly those with a distance between rows of 70 cm and 35 cm between plants in the row.

One can appreciate that density affects the number of shoots per plant and hence yield of oregano.

Table 3

**Results on the dynamics of the number of shoots/bush on plants of oregano  
(2010-2011)**

Phenophase	Issue shoots		Floriferous stems		Flower buds		Full flowering	
	2010	2011	2010	2011	2010	2011	2010	2011
The distance between rows x distance between plants in the row (cm)								
140 X 70	78	93	82	100	86	180	95	107
70 X 35	83	90	87	102	93	111	93	116
60 X 30	80	83	84	84	96	88	96	98
average standard deviation	1,45	2,96	1,45	5,70	2,96	27,64	0,88	5,20
amplitude variation	5,00	10,00	5,00	18,00	10,00	92,00	3,00	18,00
V %	3,13	5,79	2,98	10,35	5,60	37,90	1,61	8,41

Average coefficient of variability met in this parameter has a low significance level, coelctivitatea tending to be heterogeneous, especially in flower bud formation stage where the figure recorded is above the average, V% - 37.90, although it is estimated that the coefficient over 35-40%, average is not representative.

The inflorescences means also very much to the success of a culture of oregano, as these crops because of the quality print in oils. In table 4, can be viewed as the number of inflorescences per plant dynamics show clear evidence, from year to year.

Table 4

**Dynamics of the number of inflorescences/shoot at the oregano plants 2010-2011)**

Phenophase	Issue shoots		Floriferous stems		Flower buds		Full flowering	
	2010	2011	2010	2011	2010	2011	2010	2011
The distance between rows x distance between plants in the row (cm)								
140 X 70	4	6	7	8	9	11	12	13
70 X 35	7	8	8	12	11	15	14	16
60 X 30	6	5	6	9	9	12	12	17
average standard deviation	0.88	0.88	0.58	1.20	0.67	1.20	0.67	1.20
amplitude variation	3.00	3.00	2.00	4.00	2.00	4.00	2.00	4.00
V %	26.96	24.12	14.29	21.53	11.95	16.43	9.12	13.58

In this case, the coefficient of variation values are averages chart, with one exception that we find in 2010, the full flowering, V% -9.12. High values of this coefficient we find in the first period of vegetation phenophases over both years, which is between V% - 26.96% and -24.12 V, see very high variability in the number of inflorescences.

Another feature to which we focused is the number of leaves on a shoot (table 5). How they are distributed on the shoot, leaves the important functions they perform (photosynthesis, respiration and perspiration) justify the choice. As can be seen in the table above dynamic number of leaves have a tendency to increase, while presenting the best results for the two density cultivation.

Table 5

**Dynamics of the number of leaves/shoot at the oregano plants (2010-2011)**

Phenophase	Issue shoots		Floriferous stems		Flower buds		Full flowering	
	2010	2011	2010	2011	2010	2011	2010	2011
The distance between rows x distance between plants in the row (cm)								
140 X 70	28	37	50	59	73	84	88	90
70 X 35	36	43	62	70	73	86	96	99
60 X 30	33	41	58	67	71	82	89	96
average standard deviation	2.33	1.76	3.53	3.28	0.67	1.15	2.52	2.65
amplitude variation	8.00	6.00	12.00	11.00	2.00	4.00	8.00	9.00
V %	12.50	7.57	10.78	8.70	1.60	2.38	4.79	4.82

Analyzing the coefficient of variation for this character, it is clear that the media has a high degree of representativeness, the community is homogeneous and uniform, especially in the last two phenophases of vegetation period, where the values are largely constant.

Although the influence of cultivation densities, analyzed in this study reveal no significant differences, however, best results were obtained and this time, the two of densities cultivation.

Table 6

**Dynamic values of the aerial weight, fresh and dried oregano plant (2010-2011)**

Phenophase	Aerial part of fresh mass (Kg)		Aerial part of dry mass (Kg)	
	2010	2011	2010	2011
The distance between rows x distance between plants in the row (cm)				
140 X 70	2.04	2.08	1.33	1.19
70 X 35	2.57	2.6	1.68	1.47
60 X 30	2.42	2.47	1.58	1.4
average standard deviation	0.16	0.16	0.10	0.08
amplitude variation	0.53	0.52	0.35	0.28
V %	11.66	11.35	11.78	10.77

Biomass is a character regarded as one of the most important indicators in assessing productivity. Comparing reference values of the coefficient of variability of results, there is a variability average secondary between and V -

11.35% and V -11.66%, the aerial part fresh mass between V and V% -11.78% and V - 10.77 the aerial part dry mass.

Another aspect studied was the weight of the underground, dried and fresh oregano plant. Studied through the cultivation density in this case, the recommended density 70 cm/35 cm seems.

Table 7

**Dynamic values of the weight of the underground fresh and dried oregano plant (2010-2011)**

Phenophase	Underground part of fresh mass (Kg)		Underground part of dry mass (Kg)	
	2010	2011	2010	2011
The distance between rows x distance between plants in the row (cm)				
140 X 70	2.06	2.10	1.35	1.20
70 X 35	2.60	2.63	1.70	1.49
60 X 30	2.45	2.50	1.60	1.42
average standard deviation	0.16	0.16	0.10	0.09
amplitude variation	0.54	0.53	0.35	0.29
V %	11.76	11.46	11.63	11.05

Also, the follow calculations, variability indicator is considered average, falling within a fairly small interval (V% - 11.46% and V% -11.76 ,underground part of fresh biomass and V% -11.05 and V %-11.63 , underground part of dry biomass).

## CONCLUSIONS

1. The morphological characterization of oregano plants reveal that plants had a morphology that fits in botanical description of this species, experimental conditions presented satisfying environmental requirements of plants, allowing their proper development.

2. Phenological observations have revealed characteristics of oregano plants, is carried out under optimum phenophases ontogenetic evolution of the species, allowing us to conclude that *O. vulgare* found optimal growth and development.

3. The effective density cultivation for this crop, in this study, is 70 cm between rows and 35 cm between plants in the row, and use appropriate technology based on continuous optimization of technological factors is of primary importance.

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