

RESEARCH REGARDING THE ECOLOGICAL CULTIVATION TECHNOLOGY FOR *OCIMUM BASILICUM* L.**Vârban Dan Ioan*, Duda Matei Marcel, Vârban Rodica, Muntean Sorin, Vaida Simona**

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Abstract

Basil is known and used since ancient times. Ocimum genus name comes from the Greek "okimon. of the species Ocimum basilicum L. is used by air (Basil herba) dry or fresh.

Research on this species were made in the project PN II - No partnerships. 51-032 entitled "The implementation of the standardization of herbal raw material for increasing competitiveness in medicinal plant species of interest to the pharmaceutical and cosmetics industry, which USAMV Cluj-Napoca is a partner.

Based on biometric determinations made an average weight of the plant grow from stage 1 to stage 5 (from 60.8 g to 150.1 g) vegetation period was 126 days (16.05 - 18.09). Herba production increase from phase one to phase four harvest harvest, ie from 5910 kg / ha to 16113 kg / ha and decreased in stage five (14241 kg / ha). Content highest triterpenic acids found in the second stage of harvest (2.1462 g%).

Keywords: biometric determinations, potential productive, triterpenic acids

INTRODUCTION

Basil is known and used since ancient times. *Ocimum* genus name comes from the Greek "okimon.

It is a species considered as originating in China and India, Asia, Africa and subtropical regions of America. It is grown in culture in many areas worldwide. In our country over the gardens growing, it recommends to grow in areas south and southwest of the country.

From the species *Ocimum basilicum* L. is used by air (Basil herba) dry or fresh.

Vegetable product contains volatile oil (0.5-1.5%) which has a chemical composition varied depending on the chemotype. Thus, were put in evidence linalool acetate, linolil, metilcavicolul, camphor, tannins (5%) etc.

Compounds from aerial parts have an antiseptic effect intestinal carminativ, fostering digestion and expectorant. It was found that the volatile oil of basil has antibacterial and antifungal action are also used in food, perfumes and cosmetics.

Research on this species were made in the project PN II - No partnerships. 51-032 entitled "The implementation of the standardization of herbal raw material for increasing competitiveness in medicinal plant species of interest to the pharmaceutical and cosmetics industry, which UASVM Cluj-Napoca is a partner.

MATERIAL AND METHODS

The experiments were located in the Botanical Gardens of the Department of Botany, Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca.

1. Biomorphological determinations the species *Ocimum basilicum* L.

In 2008 we established five fenofaze harvest, according to the dynamic development of central and inflorescences main

- F1 - the emergence of freshman flowers at verticilele disposed in basal third;
- F2 - open the verticilele flowers arranged in basal third;
- F3 - immature fruit to verticilele disposed in basal third;
- F4 - fruit maturity at verticilele disposed in basal third;
- F5 - central blossom is the most mature fruit verticilelor;

The biometric approach aimed to determine the shares of the inflorescences, leafs and stem from biomass volume.

To make determinations biomorfologice were harvested every 10 plants in each vegetal phase

2. Determination of the growing season the species *Ocimum basilicum* L. on the 2008

In February 2008, seeds of *Ocimum basilicum* L. I made the shelter germinated in a greenhouse. After emergence the plants were a real leaf I prick out in plastic cups (approximately diameter height of about 6 cm and 10 cm) filled with a mixture composed of 3 parts soil, 3 parts mraniță, 3 parts peat and a part sand. Seedling planting was good when his height was 15 cm and the number of leaves ranged 8-10/plant.

Planting seedlings in the field the species *Ocimum basilicum* L. was achieved in organic crops - 16/05/2008. We set 5 fenofaze the species *Ocimum basilicum* L.:

- Plant - flower appearance freshman
- Freshman appearance flowers - flourished in the third basal
- Flourished in the third basal - immature fruit in basal third
- Immature fruit in the third basal - fruit matured in basal third
- Fruit matured in basal third - maturity.

3. Establishment potential production fenofaze harvesting the species *Ocimum basilicum* L.

We established the species *Ocimum basilicum* L. five variants, depending on age of harvest:

- V1** - the emergence of freshman verticilele arranged flowers at basal third;
- V2** - verticilele opened flowers arranged in basal third;
- V3** - immature fruit to verticilele arranged in basal third;
- V4** - verticilele arranged fruit maturity at basal third;
- V5** - Flowering plant has the most mature fruit verticilelor;

Planting seedlings was 50 cm between rows and 20 cm between plants per row, variant is 4 m² area, three repetitions and experience the area was 60 m².

Upon its establishment in 2008 received manure 40 t / ha.

During 2008, there were 3 and 6 manual weeding spraying with foliar fertilizers with Bionat 0.2% (product accepted in organic crops).

Foliar fertilizer use, has a biostimulator, contains: herbal extract containing auxine and gibereline, stimulating organic compounds, the main nutrients: N, K, P, secondary nutrients: Ca, Mg, S, trace elements: B, Zn, Fe, Mn, Cu. Biona Plus is a soil fertilizer but one ingredient to stimulate the plants react very rapidly absorbed by leaves almost immediately.

4. Determination of acid production potential triterpenici the species *Ocimum basilicum* L.

It was established on 2 and 3 content in fenofazele acids triterpenici the species *Ocimum basilicum* L.

RESULTS AND DISCUSSIONS

1. Biomorphological determination the species *Ocimum basilicum* L.

From Table 1, based on biometric determinations made in ecological experience with *Ocimum basilicum* L. is established that:

- Average weight of the plant grow from stage 1 to stage 5 (from 60.8 g to 150.1 g);
- Leaves average weight increase from phase 1 to phase 4 (from 32.1 g to 37.2 g) and decreases in stage 5 to 30.6 g and the percentage decreases from phase 1 to phase 5 (from 53% to 20%);
- Average weight of the stems increases from stage 1 to stage 5 (from 21.4 g to 72.9 g), and is also the percentage increased from 35% to 49%;
- Average weight of inflorescences grow from phase 1 to phase 4 (from 7.3 g to 55.0 g) and decreases in phase 4 to 46.6 g and the percentage increases between phase 1 and phase 4 (from 12 % to 37%) and decreases in phase 5 to 31%.

2. Determination of the growing season of the species *Ocimum basilicum* L. on the 2008

Planting seedlings in the field the species *Ocimum basilicum* L. was achieved in organic crops - 16/05/2008. The collection of five fenofaze was done, in the following data:

- F1 - the emergence of freshman flowers at verticilele disposed in basal third - 08.07.2008;
- F2 - open the verticilele flowers arranged in basal third - 16.07.2008
- F3 - immature fruit to verticilele disposed in basal third - 01.08.2008
- F4 - fruit maturity at verticilele disposed in basal third - 20/08/2008
- F5 - central blossom is the most mature fruit verticilelor - 18.09.2008.

Table 1

Biometric analyse performed in the end of culture phenophases in *Ocimum basilicum* L. within organic trial (Cluj-Napoca, 2008)

Vegetal phase	Average weight off the plant (g)	Average weight of the leaves (g)	Average weight of stem (g)	Average weight of the blossom (g)
F ₁	60,8 (100%)	32,1 (53%)	21,4 (35%)	7,3 (12%)
F ₂	101,8 (100%)	33,4 (33%)	35,6 (35%)	32,8 (32%)
F ₃	112,9 (100%)	36,2 (32%)	40,1 (36%)	36,6 (32%)
F ₄	148,7 (100%)	37,2 (25%)	56,5 (38%)	55,0 (37%)
F ₅	150,1 (100%)	30,6 (20%)	72,9 (49%)	46,6 (31%)

Vegetation period in 2008 was 126 days in the species *Ocimum basilicum* L. grown in organic (table 2) and lasted fenofazele:

- Plant - flower Freshman appearance was 54 days (43%)
- Freshman appearance flowers - flourished in basal third was 8 days (6%)
- Flourished in the third basal - immature fruit in basal third was 16 days (13%)
- Immature fruit in the third basal - fruit matured in basal third was 19 days (15%)
- Fruit matured in basal third - maturity was 29 days (23%).

Table 2

Determination of the vegetation period the species *Ocimum basilicum* L., ecological culture (Cluj-Napoca, 2008)

year/phase	Planted – blossom appearance	Appearance of sprouts flower – flowering in the third basal part	Flowering in the third basal-immature in the third part	fruit immature fruits in third-couples in the third basal	Basal third-couples in fruit maturity	TOTAL
2008	16.05.08-08.07.08	09.07.08-16.07.08	17.07.08-01.08.08	02.08.08-20.08.08	21.08.08-18.09.08	
Days No.	54	8	16	19	29	126
%	43	6	13	15	23	100

3 Establishment productive potential phase harvesting the species *Ocimum basilicum* L.

Herba production increases from phase one to phase four harvest harvest, is from 5910 kg/ha to 16113 kg/ha and decreases in stage five (14241 kg/ha). As seen in table 3, production of herba register significant positive differences separate the second stage of harvest (10415 kg/ha) and highly significant positive difference in the third stage (13711 kg/ha), fourth (16113 kg/ha) and fifth (14241 kg/ha) compared to control harvesting of a crop phase (5910 kg/ha).

Table 3

Total production of herba on vegetal phase of harvest at *Ocimum basilicum* L., cultivated in ecological system (Cluj Napoca, 2008)

Phases of harvest	Density pl/ha	Production of herba		± Difference	Significance
		kg/ha	%		
F ₁ (Mt)	100000	5910	100	0	-
F ₂	100000	10415	176,2	4505	xx
F ₃	100000	13711	232,0	7801	xxx
F ₄	100000	16113	272,6	10203	xxx
F ₅	100000	14241	241,0	8331	xxx

DL 5%= 3107,71

DL 1%= 4357,07

DL 0,1%= 6158,37

From Table 4 indicates that the smallest leaf production is registered at a stage of harvest (2710 kg/ha) and highest in phase four of harvest (4672 kg/ha) and the fifth stage of harvest decreases to 3003 kg/ha. Note that not register significant differences in the second stage (3242 kg/ha) and fifth (3003 kg/ha) and the third phase (4450 kg/ha) and fourth (4672 kg/ha) harvest are registered very significant differences compared to controls a collection phase (2710 kg/ha).

Table 4

The total leaves production by harvesting phases in *Ocimum basilicum* L., cultivated in organic system (Cluj Napoca, 2008)

Phases of harvest	pl/ha	Production of leaves		± Difference	Significance
		kg/ha	%		
F ₁ (Mt)	100000	2710	100	0	-
F ₂	100000	3242	119,6	532	-
F ₃	100000	4450	164,2	1740	xxx
F ₄	100000	4672	172,4	1962	xxx
F ₅	100000	3003	110,8	293	-

DL 5%= 744,71

DL 1%= 1044,1

DL 0,1%= 1475,75

Production of strains is an increasing trend in harvest stage (2170 kg/ha) to phase five of harvest (6598 kg/ha). Regarding the significance of the results are noted in Table 5 are registered as positive significant differences in phase two (3925 kg/ha) harvest, significant differences separate positive stage three (4415 kg/ha) for cleaning and very significant

differences in positive Phase four (4798 kg/ha) and five (6598 kg/ha) compared to control harvesting of a crop phase (2170 kg/ha).

Table 5
Stem production on harvest phases at *Ocimum basilicum* L., cultivated in ecological system (Cluj Napoca, 2008)

Phases of harvest	pl/ha	Production of stems		± Difference	Significance
		kg/ha	%		
F ₁ (Mt)	100000	2170	100	0	-
F ₂	100000	3925	180,9	1755	x
F ₃	100000	4415	203,5	2245	xx
F ₄	100000	4798	221,1	2628	xxx
F ₅	100000	6598	304,1	4428	xxx

DL 5%= 1274,19 DL 1%= 1786,45 DL 0,1%= 2525,00

From Table 6, we see that among the five options considered for the study, the production of inflorescences appear distinct and very significant differences compared to positive controls. Production of inflorescences grow from one stage of harvest (730 kg/ha) at four harvest stage (6644 kg/ha) and decreases in stage five (4639 kg/ha) harvest. In the second phase (3249 kg/ha) to register significant positive differences separately and in the third phase (4845 kg/ha), fourth (6644 kg/ha) and fifth (4639 kg/ha) harvest differences are registered very significant positive phase control over a collection (730 kg/ha)

Table 6
Production of blossoms on harvest phases at *Ocimum basilicum* L., cultivated in ecological system (Cluj Napoca, 2008)

Phases of harvest	pl/ha	Production of blossoms		± Difference	Significance
		kg/ha	%		
F ₁ (Mt)	100000	730	100	0	-
F ₂	100000	3249	445,0	2519	xx
F ₃	100000	4845	663,7	4115	xxx
F ₄	100000	6644	910,1	5914	xxx
F ₅	100000	4639	635,5	3909	xxx

DL 5%= 1706,33 DL 1%= 2392,31 DL 0,1%= 3381,34

4. Determination of acid production potential triterpenici the species *Ocimum basilicum* L.

Production of acids triterpenici is the largest collection in the second phase of 22.4 kilograms per hectare compared to 13.1 kilograms per hectare are registered as the third stage of harvest (Table 7).

Table 7
Triterpenici acid production of herba, the phase of harvesting the species *Ocimum basilicum* L. grown in organic (Cluj Napoca, 2008)

Phases of harvest	Production of herba Kg/ha	g% triterpenici acid	Production of triterpenici acid kg/ha
F ₂	10415	2,1462	22,4
F ₃	13711	0,956	13,1

CONCLUSIONS

1. The determinations biomorfologice the species *Ocimum basilicum* L. It noted the following:

- percentage leaf falls from stage 1 (53%) at stage 5 (20%);
- strain rate increases from stage 1 (35%) at stage 5 (49%);
- percentage of inflorescences increased from stage 1 (12%) in stage 4 (37%) and decreases in stage 5 (31%).

2. The establishment of the growing season of the species *Ocimum basilicum* L. in 2008
Vegetation period was 126 days (16.05 - 18.09).
3. The potential establishment of production fenofaze harvesting the species *Ocimum basilicum* L.
Herba production increases from phase one to phase four harvest harvest, ie from 5910 kg / ha to 16113 kg / ha and decreased in stage five (14241 kg / ha).
Lowest leaf production is recorded at a stage of harvest (2710 kg / ha) and highest in phase four of harvest (4672 kg / ha) and the fifth phase of the harvest dropped to 3003 kg / ha.
Production of stems is an increasing trend in harvest stage (2170 kg / ha) to phase five of harvest (6598 kg / ha)
Flower production increases from one stage of harvest (730 kg / ha) at four harvest stage (6644 kg / ha) and decreases in stage five (4639 kg / ha) harvest
4. The determination of acid production potential triterpenici
Since the register contents at higher triterpenici acids. (2.1462 g%), recommend F2 (open to verticilele flowers arranged in basal third) optimal age for harvesting the species *Ocimu basilicum* L.

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