Available online at
http://journals.usamvcluj.ro/index.php/promediu

ProEnvironment

ProEnvironment 6 (2013) 574 - 577

Original Article

Monitoring *Satureja Hortensis* L. within Conventional System of Agriculture

VÂRBAN Dan Ioan, RodicaVÂRBAN*

University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca Faculty of Agriculture, Mănăştur St., no. 3 - 5, 400372 Cluj-Napoca, Romania

Received 21 September 2013; received and revised form 21 October 2 013; accepted 1 November 2013
Available online 30 December 2013

Abstract

The name of the *Satureja* genus originated from Latin term "saturare" = to saturate, to feed. *Satureja hortensis* L. originated from the Mediterranean area, being intensively cultivated, but may also be found as spontaneous plant in rocky and calcareous areas located in Mediterranean region up to 1000 m altitude. Herba contains volatile oil with carminative, expectorant and astringent action. Thyme is mostly used in food industry and as spice. The average weight of the plant, leaves and inflorescences grows from Ist up to IIrd harvesting phase. The herbal production (fresh) also grows from Ist up to IIrd harvesting phase, namely from 2,763 kg/ha up to 3,602 kg/ha.

Keywords: production potential, biomorfological determinations, *Satureja hortensis*

1. Introduction

The garden thyme – *Satureja hortensis* L. is an annual spice herbaceous plant, and it is used as medicinal plant with numerous applications. It grows from Ist up to IIrd harvesting phases, mainly in Spais, Southern France, Western and Southern Italy, Morocco, Israel [1, 5, 8, 9].

In our country it is cultivated mainly in Southern part, in Moldavia, and Wester Romania, but in gardens, is spread all over the country [2].

From garden thyme, the aerial part is used (*Saturejae herba*).

Herb contains volatile oil (0.5 – 2.7%), triterpenic acids, mineral salts, etc. The volatile oil contains carvicol and timol. It has flavored smell and hot taste.

It has carminative, expectorant and astringent action It is used as stomachic gastric disorders and anorexia, as anti diarrhea and chronic bronchitis. The garden thyme is mostly used in food industry and as spice [3, 7, 9].

In 1998, *in vitro* studies performed in Japan show that garden thym has a strong activity against HIV virus of type I [4, 6].

2. Material and Method

The experiments were placed at Agricultural Research Development Station Jucu (University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca) in 2009, on argic chernozem, with clay structure, weak acid, rich in humus and fertilizing elements, except phosphorus.

The weeds control was performed by 2 – 3 mechanical works, and 2 -3 mannual works. During the year 6 treatments with foliar fertilizer Fruticare (complex NPK 14-11-25 water soluble

* Corresponding author.
Tel: +40-264-596.384, Fax: +40-264-593.792
e-mail: rodica.varban@usamvcluj.ro

fertilizer, with Mg (1.4), S (2.0) and microelements) were performed. Daria strain was used in culture.

1. Biomorphological determinations performed in *Satureja hortensis* L. specie

In 2009, of four harvesting phenophases initially designed, we harvested only three, function of dynamics of development of the main inflorescences:

- F_1 – when floral buds appeared at first 2 - 3 verticiles la on more that 50% from the number of main inflorescences;
- F_2 – when flowers are opened on the verticiles located within the first half of main inflorescences;
- F_3 – when mature fruits are formed in more than 50% from the number of main inflorescences;

The biomorphological determinations aimed to determined the share of inflorescences, leaves and stems in biomass volume.

In order to perform the biomorphological determinations, 10 plants of each phenophase were harvested.

2. Establishment of production potential by harvesting phenophase in *Satureja hortensis* L.

In each phenophase we established the production of: herba, leaves, stems and inflorescences

3.Results and Discussions

1. Biomorphological determinations performed in *Satureja hortensis* L. specie From table 1, based on biometric determinations performed within conventional trial with *Satureja hortensis* L. we found the followings:

- the average weight of plants increases from harvesting phase 1 to 3 (from 9.9 g to 58.9 g);
- the average weight of leaves increases from harvesting phase 1 to 3 (from 2.0 g to 3.7 g), and percent decreases from phase 1 to 3 (from 20% to 6%);
- the average weight of stems increases from harvesting phase 1 to 3 (from 3.6 g to 12.6 g), and percent decreases from phase 1 to 3 (from 36% to 21%);
- the average weight of inflorescences increases from harvesting phase 1 to 3 (de la 4.3 g to 42.6 g), and percent decreases from phase 1 to 3 (from 44% to 73%).

Table 1. Biomorphological determinations performed at harvesting of each phenophase in *Satureja hortensis* L., within conventional trial (Jucu, 2009)

Phenophase	Plant average weight (g)	Average weight of leaves (g)	Average weight of stem (g)	Average weight of inflorescences (g)
F_1	9.9 (100%)	2.0 (20%)	3.6 (36%)	4.3 (44%)
F_2	24.3 (100%)	2.5 (10%)	8.1 (33%)	13.7 (57%)
F_3	58.9 (100%)	3.7 (6%)	12.6 (21%)	42.6 (73%)

2. Establishment of production potential by harvesting phenophase in *Satureja hortensis* L.

The herbal production increases from harvesting phase 1 to 3, meaning from 2,763 kg/ha to 3,602 kg/ha. As table 2 emphasizes, the herbal production does not record significant differences in the second harvesting phase (2,841 kg/ha), but it records significant differences in the third harvesting phase (3,602 kg/ha) compared to control, first harvesting phase (2,763 kg/ha).

Table 2. Total production of herba (fresh) by harvesting phases in *Satureja hortensis* L., within conventional trial (Jucu, 2009)

Harvesting phases	Density pl/ha	Herbal production		± Difference	Significance
		kg/ha	%		
F_1 (Mt)	100000	**2763**	100	0	-
F_2	100000	**2841**	102.8	78	-
F_3	100000	**3602**	130.3	838	x
DL 5%= 638.06		DL 1%= 894.57		DL 0.1%= 1264.41	

Table 3 shows that the biggest leaves production was recorded in the first harvesting phase (1,527 kg/ha) and the smallest in the third harvesting phase (380 kg/ha). We note very significant negative differences in both second harvesting phase (450 kg/ha) and third harvesting phase (264 kg/ha) compared to control, first harvesting phase (1527 ka/ha).

Table 3. Total production of leaves (fresh) by harvesting phases in *Satureja hortensis* L., within conventional trial (Jucu, 2009)

Harvesting phases	Density pl/ha	Leaves production		± Difference	Significance
		kg/ha	%		
F_1 (Mt)	100000	**1527**	100	0	-
F_2	100000	**450**	29.5	-1077	000
F_3	100000	**380**	24.9	-1146	000
DL 5%= 458.04	DL 1%= 642.18		DL 0.1%= 907.67		

The stem production has an ascendant tendency from first (730 kg/ha) up to the third harvesting phase (1,199 kg/ha). Concerning the significance of differences, table 4 shows that no significant differences were recorded for the second (986 kg/ha) and third (1,199 kg/ha) harvesting phase, compared to control.

Table 4. Total production of stems (fresh) by harvesting phases in *Satureja hortensis* L., within conventional trial (Jucu, 2009)

Harvesting phases	Density pl/ha	Stems production		± Difference	Significance
		kg/ha	%		
F_1 (Mt)	100000	**730**	100	0	-
F_2	100000	**986**	135.1	256	-
F_3	100000	**1199**	164.2	469	-
DL 5%= 500.08	DL 1%= 701.13		DL 0.1%= 990.99		

Concerning the inflorescences production, table 5 emphasizes among four studied variants, significant and very significant differences, compared to control.

The inflorescences production increases from the first harvesting phase (507 kg/ha) to the third harvesting phase (2023kg/ha). In the second harvesting phase, significant differences are recorded (1,405 kg/ha), and in the third harvesting phase (2,023 kg/ha) very significant positive differences are recorded compared to control, first harvesting phase (507 kg/ha)

Table 5. Total production of inflorescences (fresh) by harvesting phases in *Satureja hortensis* L., within conventional trial (Jucu, 2009)

Harvesting phases	Density pl/ha	Inflorescences production		± Difference	Significance
		kg/ha	%		
F_1 (Mt)	100000	**507**	100	0	-
F_2	100000	**1405**	277.3	898	x
F_3	100000	**2023**	399.2	1516	xxx
DL 5%= 576.63	DL 1%= 808.45		DL 0.1%= 1142.68		

4.Conclusions

1. Concerning the biomorphological determinations performed in *Satureja hortensis* L. specie, we found the followings:

- the leaves percent decreases from the first harvesting phase (20%) to the third harvesting phase (6%)
- the stems percent decreases from the first harvesting phase (36%) to the third harvesting phase (21%)
- The inflorescences percent increases from the first up to the third harvesting phases (from 44% to 73%).

2. Establishment of production potential by harvesting phenophase in *Satureja hortensis* L.:

The herbal production (fresh) increases from the first up to the third harvesting phase, from 2,763 kg/ha to 3,602 kg/ha.

The biggest leaves production (fresh) was recorded in the first harvesting phase (1,527 kg/ha) and the smallest in the third harvesting phase (380 kg/ha).

The production of stems (fresh) has an increasing tendency from the first harvesting phase (730 kg/ha) up to the third harvesting phase (1,199 kg/ha).

The inflorescences production (fresh) increases from the first harvesting phase (507 kg/ha) up to the third harvesting phase (2,023 kg/ha).

Acknowledgments

Research was financed by the project: PN-II-51-032/2007 "Implementation of the standardization system of vegetal raw material for increasing competitiveness in medicinal plant species that may be valuated by the pharmaceutics and cosmetic industry ".

References

[1] Baser K.H.C., 2004, Journal of Essential Oil Research, 16, 422-424

[2] Constantinovici Mariana, V. Plugaru, Cătălina Druțu, D. Vârban, 2010, Comparative evaluation of production potential of standardized raw vegetal material for triterpenic acids content using conventional and ecological technologies of cultivation applied to Ocimum basilicum and Satureja hortensis species, Lucrări Ştiinţifice Iasi, vol. 53, seria Agronomie

[3] Crăciun F., O. Bojor, M. Alexan, 1977, Farmacia naturii vol. II. Ed. Ceres, Bucureşti, 125-128

[4] Grigorescu E., M.I. Lazăr, U. Stănescu, I. Ciulei, 2001, Index fitoterapeutic, Ed. Cautes Iaşi

[5] Istudor V., 2001, Farmacognozie, Fitochimie şi Fitoterapie, vol. II, Ed. Medicală Bucureşti

[6] Muntean L.S., M. Tămaş, S. Muntean, L. Muntean, M. Duda, D. Vârban, S. Florian, 2007, Tratat de plante medicinale cultivate şi spontane, Ed. Risoprint, Cluj-Napoca 445-449

7] Vârban Rodica, F. Păcurar, I. Rotar, 2011, Dicționar de botanică, pratologie şi agroecologie, Ed. Risoprint Cluj-Napoca

[8] Vârban D.I, Rodica Vârban, A. Imre, 2005, Plante medicinale cultivate şi din flora spontană, Ed. Risoprint, Cluj-Napoca, 68-69

[9]Vârban Rodica, F. Păcurar, I. Rotar, 2011, Dicționar de botanică, pratologie şi agroecologie, Ed. Risoprint Cluj-Napoca