MONITORING *SALVIA OFFICINALIS* L. SPECIE CULTIVATED IN ORGANIC SYSTEM

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Abstract

The bio-morphological determinations show the followings: in the Ist year of vegetation (2009), leaves represent a share of 68% of the average weight of the plant and shoots 32%; in the IInd second year (2010) the average weight of the plant, leaves and vegetative shoots increases from the first phase up to the fourth phase, harvesting, respectively, and the average weight of shoots and buds increases from the first up to the third phase, harvesting, respectively, and decreases in the fourth harvesting phase.

The fresh herbal production in the year 2010, increases from the first phase (3933 kg/haup to the fourth harvesting phase (16555 kg/ha).

The most increased content of ursolic and oleanolic acids was recorded in the first harvestin phase.

Key words: bio-morphological determinations, content of active principles, *Salvia officinalis* L.

INTRODUCTION

Salvia officinalis L., was described by C. Linnae in 1753, and the name of ***Salvia*** has the origin in the latin ”salvare”, to be healthy, to heal, to save, and ***officinalis*** referrs to the medical use of the plant.

The medical doctor Gallenos (IInd centrury a.c.) ephasized the tonic, diuretical and homeostasic traits of the sage, and beginning with **XVIth** century**,** the use of the oil of this plant is well known.

The Greeks used the sage for the treatments of the illness of digestive tube, gastric ulcer, and even as remedy for the snakes bites.

In the Roman Empire the sage was considered as holly plant and even special ceremonies were kett in the honour of the sage, when harvesting time came; it was also used as food supplement, because it was considered that it stimulates memory, but is was also used as tooth paste.

The herba (*Salviae herba*) and folium (*Salviae folium*), harvested in the beginning of flowering are used from the sage. In herba, volatile oil is present in share of 0.20 - 0.60 %, and in leaves, in share of 1 - 2%. In oil structure the **tuione** is present (up to 50%).

The tuione content of the sage oil oscilates function of the harvesting period, and depends on the plant maturity stage. The tuione content reaches a maximum in October, when plant is in vegetative phase.

It has the following actions: **tonic** upon the digestive apparatus, increasing apetite, and upon nervous system in nervous asthenia; **coleretic** stimulating the stomach and liver functions by increasing the gall secretions; **carminativ** reduces bloatings, calming stomach colic and sickness; **antisweating; antigalactogogus** diminish secretion.

MATERIAL AND METHOD

The experiments were placed in Jucu village, on the experimental field of the Department of Phytotechny, Faculty of Agriculture from the University of Agricultural Sciences and Veterinary Medicine Cluj - Napoca. In culture we used the population of Răzmireşti.

1. The bio-morphological determinations in *Salvia officinalis* L. specie, in the Ist year of vegetation (2009);

Using bio-morphological determinations, we aimed to emphasize the share of the leaves and shoots in the biomass volume.

In the year 2009 (Ist year of vegetation) we perform a single harvesting when plants had vegetative shoots with 7 - 9 pairs of leaves.

In order to perform the bio-morphological determinations 10 plants were harvested.

2. The bio-morphological determinations in *Salvia officinalis* L. specie, in the IInd year of vegetation (2010);

In *Salvia officinalis* L.specie, in the second harvesting year (2010), we considered four variants, function of harvesting pheno-phase:

F_1 – when more than one half of the flower shoots formed flower buds on about one half of the length;

F_2 – when more than one half of the flower shoots had opened flowers on ½ of length.

F_3 – when more than one half of the flower shoots had immature fruits on 2/3 of the length;

F_4 – when more than one half of the flower shoots had mature fruits on 2/3 of the length.

The bio-morphological determinations must include: the share of the leaves, vegetative shoots, and flower shoots from the total bio-mass volume, in each harvesting pheno-phase.

In order to perform the bio-morphological determinations, 10 plants of each pheno-phase were harvested.

3. The establishment of the vegetal raw material production in *Salvia officinalis* L. specie, in thje second year of vegetation (2010);

We esstablished in ***Salvia officinalis* L.** specie four variants function of harvesting period:

V_1 – when more than one half of the flower shoots formed flower buds on about one half of the length;

V_2 – when more than one half of the flower shoots had opened flowers on ½ of length.

V_3 – when more than one half of the flower shoots had immature fruits on 2/3 of the length;

V_4 – when more than one half of the flower shoots had mature fruits on 2/3 of the length.

4. Determination of the content of the active principles, in the second year of vegetation (2010), in *Salvia* officinalis L. specie

The content and production of oleanolic and ursolic acids was determined in *Salvia officinalis* L. specie.

RESULTS AND DISSCUSIONS

1. The bio-morphological determinations in *Salvia officinalis* L. specie, in the Ist year of vegetation (2009);

From the bio-morphological determinations performed in the Ist year of vegetation (2009)on *Salvia officinalis* L. specie results that from the average weight of the plant:

- the average weight of the leaves/plant was of 44.7 g and represents 68%;
- the average weight of the shoots/plant was of 20.7 g and represents 32% (table 1)

Table 1

Bio-morphological determinations performed at *Salvia officinalis* L. harvesting, Ist year of vegetation, cultivated in organic system (Jucu, 2009)

Average weight of the plant (g)	Average weight of the leaves (g)	Average weight of the shoots (g)
65.4 (100%)	44.7 (68%)	20.7 (32%)

2. The bio-morphological determinations in *Salvia officinalis* L. specie, in the IInd year of vegetation (2010);

According to the bio-morphological determinations presented in table 2, in organic experiment with *Salvia officinalis* L. resulted the followings:

- the average weight of the plant increases from the first phase up to the fourth phase of harvesting (from 60.5 g up to 264.2 g)

- the average weight of the leaves increases from the first phase up to the fourth phase of harvesting (from 35.1 g up to166.2 g), and their share of the total bio-mass is within 42 - 63%;

- the average weight of the vegetative shorts increases from the first up to the fourth harvesting phase (from 4.6 g up to 48.9 g), and their share is within 8 - 19%

- the average weight of the shoots with flower buds increases from the first up to the third harvesting phase (from 20.8 g up to 83.6 g) and decreases in the fourth harvesting phase to 49.1 g; the share is within18 - 43 %

Table 2

Bio-morphological determinations performed when all four pheno-phases of *Salvia officinalis* L. specie were harvested, , in organic experiment, IInd year of vegetation (Jucu, 2010)

Harvesting phases	**Average weight of the plant (g)**	**Average weight of the leaves (g)**	**Average weight of the vegetative shoots (g)**	**Average weight of the shoots with buds (g)**
F_1	60.5 (100%)	35.1 (58%)	4.6 (8%)	20.8 (34%)
F_2	190 (100%)	80.0 (42%)	28.4 (15%)	81.6 (43%)
F_3	256.5 (100%)	140.3 (55%)	32.6 (13%)	83.6 (32%)
F_4	264.2 (100%)	166.2 (63%)	48.9 (19%)	49.1 (18%)

3. The establishment of the vegetal raw material production in *Salvia officinalis* L. specie, in the second year of vegetation (2010);

The herbal production increases from the first harvesting phase up to the fourth harvesting phase, As we can find in table 3, the herbal production records positive distinct significant differences in the second harvesting phase (10200 kg/ha) and positive very significant in the third (14955 Kg/ha) and fourth (16555 kg/ha) harvesting phases compared to control, first harvesting phase (3933 kg/ha).

Table 3

The fresh herbal production in the IInd year of vegetation in *Salvia officinalis* L. specie, cultivated in organic system (Jucu, 2010)

Harvesting phase	Density pl/ha	Herbal production		± Difference	Significance
		kg/ha	%		
V_1 (Mt)	66700	**3933**	100	0	-
V_2	66700	**10200**	259.3	6266	XX
V_3	66700	**14955**	380.2	11022	XXX
V_4	66700	**16555**	420.9	12622	XXX

DL 5%= 5117.59 DL 1%= 6923.65 DL 0.1%= 9253.89

4. Determination of the content of the active principles, in the second year of vegetation (2010), in *Salvia* officinalis L. specie

The content in ursolic acids from the dried herba (table 4), cultivated in organic system, varies from 0.72 g% up to1.37 g%. The highest content in ursolic acids was recorded in the first harvesting phase, and was of 1.37 g %. The production of ursolic acids, function of the production of herba/ha, increases from the first up to the fourth harvesting phase (from 5.4 kg/ha up to 20.2 kg/ha).

Table 4

The production of ursolic acid from dried hearba by harvesting phenophases, in *Salvia officinalis* L., in the second vegetation year, cultvated in organic system (Jucu, 2010)

Harvesting phase	Herbal production Kg/ha	g% ursolic acid	Ursolic acids production kg/ha
F_1 (Mt)	**3933**	1.37	5.4
F_2	**10200**	0.72	7.3
F_3	**14955**	0.97	14.5
F_4	**16555**	1.22	20.2

The most increased content in oleanolic acids was recorded in the first harvesting phase, of 0.65 g%, and production of these acids increases from the first up to the fourth harvesting phase (from 2.6 kg/ha up to 8.3 kg/ha) (table 5).

Table 5

The production of oleanolic acid from dried herb by harvesting pheno-phases, in *Salvia officinalis* L. specie, second year of vegetation, cultivated in organic system (Jucu, 2010)

Harvesting phase	Herbal production Kg/ha	g% oleanolic acid	Oleanolic acids production
F_1 (Mt)	**3933**	0.65	2.6
F_2	**10200**	0.36	3.7
F_3	**14955**	0.40	5.9
F_4	**16555**	0.50	8.3

CONCLUSIONS

1. From the bio-morphological determinations performed in the first year of vegetation (2009), results that the leaves represent 68% of the average weight of the plant, and shoots represent 32%.

2. From the bio-morphological determinations performed in the second year of vegetation (2010) results that:

- the average weight of the plant, leaves and shoots increases from the first up to the fourth harvesting phase;
- the average weight of the shoots with buds increases from the first up to the third harvesting phase and decreases in the fourth harvesting phase;

3. The production of fresh herba in 2010, increases from the first phase (3933 kg/ha) up to the fourth harvesting phase (16555 kg/ha).

4. The content and production of ursolic and oleanolic acids increases from the first up to the fourth harvesting phase.

The highest content of ursolic and oleanolic acids was recorded in the first harvesting phase.

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