

# RESEARCH REGARDING THE NUTRITION SPACE, SEEDS GERMINATION AND FREE COMPOUNDS IN *MELISSA OFFICINALIS* L. SPECIES

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**Key words:** nutrition space, germination, seedling, free compounds, *Melissa officinalis* L.

**Abstract:** Its scientific name, *Melissa*, derives from the greek word *Melitta*, which means bee and makes so reference to the bees attraction toward its flower and produced honey quality. The prime material used are the leaves (*Melissae folium*) or the entire plant (the aerial part) (*Melissae herba*), which contain: volatile oil (0,05 - 0,3%), tannin, rosmarinic acid (4%), triterpene, flavonoids etc. The age influences the germinative faculty only in the case of seeds which were put to germinate at temperatures between 20-30°C, when the results are very significant. The highest herba production was obtained at variant with 60 cm between rows and 30 cm between plants on row resulting a density of 55.555 pl/ha. Extraction in propylenglicol:water allows the obtaining of a more concentrated product.

## Introduction

*Melissa* is known since ancient time (I century), the first who describe it is Elade`a doctor, Dioscoride-Pedanius, who mentioned several terapeuthical features.

Scientific research regarding *Melissa* begins in the XVI<sup>th</sup> century, when it appears for the first time “**melissa water**”, and in the year 1582, at Frankfurt on Main, it was obtained *Melissa* oil (*Oleum melissae*).

Its scientific name, *Melissa*, derives from the greek word *Melitta*, which means bee and makes so reference to the bees attraction toward its flower and produced honey quality.

The plant is original **from the east** of Mediterranean area and West Asia. It grows in the spontaneous flora of many countries, but is also cultivated a lot in the west (especially in Spain and France), the centre (south and east of Germany) and East of Europe.

*Melissa officinalis* L. is a perennial plant, maintained in culture for 5 - 7 years. Its flavor is aromatic, like the lemon flavor (very obviously at fresh leaves beaten), and the taste is aromatic and a little bit bitter.

**The prime material** used are the leaves (*Melissae folium*) or the entire plant (the aerial part) (*Melissae herba*), which contain: volatile oil (0,05 - 0,3%), tannin, rosmarinic acid (4%), triterpene, flavonoids etc.

The vegetal product is recommended to treat digestive problems with a nervous origin, cardiac diseases psychosomatic, head aches. The leaves are used to prepare tea: anticolitic, aromatic, laxative.

The volatile oil from *Melissa* is considered one of the most appreciated and expensive essence in perfumes and cosmetic industry.

*Melissa* is a valuable melliferous plant, it is very rich in nectar (150 kg/ha), being a plant desired by the bees.

## Material and method

The soil on which the experience was placed is an alluvial one, soil with a low alkaline reaction; average carbonadoed at the surface, average content in humus, well provided with total nitrogen on the first 30 cm, with a medium clay texture, low clay with a good content of mobile phosphorus and potassium.

Used material is represented by a population from Cluj.

### 1. The study of *Melissa officinalis* L seeds germination.

The experience began in 2010 when the *Melissa officinalis* L seeds were put to germinate according to the standards, in four repetitions of 100 seeds each.

The experience had as a goal the influence of temperature and seeds age upon germinative faculty. As a germinative layer was used top paper (TP –Linhardt germination vase)

The factors taken into study:

#### ➤ Factor A – seeds age :

- with the graduations – after 12 months from harvest
- after 18 months from harvest

#### ➤ Factor B – temperature :

- with graduations - 20 – 30° C
- 25° C
- 5° C

### 2. The study of the nutrition space influence upon the herbal production at *Melissa officinalis* L.

The variants taken into study are :

- V<sub>1</sub> - planted at 60 cm between rows and 20 cm between plants on row, resulting a density of 83.333 plants/ha (Control variant).
- V<sub>2</sub> - planted at 60 cm between rows and 25 cm between plants on row, resulting a density of 66.666 plants/ha.
- V<sub>3</sub> - planted at 60 cm between rows and 30 cm between plant on row, resulting the density of 55.555 plants/ha.
- V<sub>4</sub> - planted at 60 cm between rows and 35 cm between plants on row, resulting a density of 47.619 plants/ha.

The experience was placed after the method of un random blocks in three repetitions with an experience area of 57,6 m<sup>2</sup>. The seedlings planting took place in the spring of 2009 and then it was determines the total leaves production in the second year of vegetation (2010), in the flowering vegetation stage.

The results were statistically interrelated with the help of variant analyze.

### 3. Identification of some free compounds in *Melissa officinalis* L.

Identifying of those compounds in *Melissa officinalis* L. was made in the chemistry laboratory within U.S.A.M.V. – Cluj-Napoca.

From *Melissa officinalis* L. there were prepared three extracts:

- 1.10% in etilic alcohol 35%
2. 10% in propilenglicol:water 1:1
- 3.10% in tap water boiling 10 minutes

There were weight with the analytic balance 10g plant on which was put a volume of 90 ml extraction solvent (**sample 1**-ethanol 35%, **sample 2**-

propilenglicol:water 1:1, **sample 3**-tap water). Sample was left 10 minutes to boil after the extraction solvent was put on. The extraction was made at the room temperature, in the dark, for 24 hours. The obtained extract was filtrated, diluted and spectroscopic print was registered at spectrophometer.

## Results and discussions

### 1. The study of seed germination of *Melissa officinalis* L.

Age influence the germinative faculty only in the case of seeds that were put to germinate at temperatures between 20-30<sup>0</sup> C, when the results are very significant. At the other variants studied, the results are alike the reference variants, the differences aren't assured statistically (table 1).

### 2. The study of nutrition space upon herbal production at *Melissa officinalis* L.

Seedling producing was achieved in the greenhouse, in plastic glasses (with a diameter of about 6 cm and about 10 cm high), filled with a combination of 3 parts soil, 3 maner, 3 parts peat and one part sand.

From Table 2, results the fact that production of herbal oscillated within experiences between 10.556 kg/ha (at V<sub>4</sub> with a density of 47.619 pl/ha) and 17.569 kg/ha (at V<sub>3</sub> with a density of 55.555 pl/ha). V<sub>3</sub> with the density of 55.555 pl/ha (60 cm between rows and 30 cm between plants /row) register significant values positive towards the variant control V<sub>1</sub> with a density of 83.333 pl/ha (60 cm between rows and 20 cm between plants/row). Compared to the control variant V<sub>1</sub> with the density of 83.333 pl/ha V<sub>4</sub> with the density of 47.619 pl/ha register values which are distinctive significant.

Table 1

The influence of seeds age and temperature upon germinative faculty at *Melissa officinalis* L. (Cluj-Napoca, 2010)

Variant		Germinative faculty (%)	%	± Difference	Significance
Temperature	Seeds age				
20-30°C	12 months	76,7	100	-	Control
	18 months	86,2	112	9,5	xxx
25°C	12 months	92,5	100	-	Control
	18 months	93,0	101	0,5	-
5°C	12 months	5,0	100	-	Control
	18 months	4,5	90	- 0,5	-

DL 5%= 4,15

DL 1%= 6,07

DL 0,1%= 9,40

### 3. Identification of some free compounds in *Melissa officinalis* L.

The dates presented in Table 3 indicates the following:

1. The extraction in: water allows to obtain more concentrated product.
2. The active principles present in the juice are:
  - Phenol acids
  - Flavonoide
  - Chlorophyll

Table 2

Fresh herba production at specie *Melissa officinalis* L. depending on the planting distances and density (Cluj-Napoca, 2010)

Variant	Density pl/ha	Herba production		± Difference	Significance
		Kg/ha	%		
60 X 20 (Control)	83.333	14.653	100	0	—
60 X 25	66.666	15.070	103	417	—
60 X 30	55.555	17.569	120	2.917	x
60 X 35	47.619	10.556	72	- 4.097	00

DL    5% = 2.500,35            1% = 3.505,54            0,1% = 4.954,81

Table 3

The main free compounds identified at *Melissa officinalis* L. specie  
(Cluj-Napoca, 2010)

Sample	Dilution	Phenol acids Mg/1000 g sample	Flavonoid Mg/1000 g sample	*Mg/1000 g sample	
				Chlorophyll a	Chlorophyll b
1.	1:100	377	471	263	333
2.	1:100	486	545	935	1271
3.	1:100	467	497	587	832

\*for the spectrum in VIS there was used an undiluted extract (DO<sub>clorofile</sub>).

### Conclusions

1. The fruit are nucule, colored in brown, four of them in a persistent calyx. MMB varies between 0,52 and 0,68 g.

The age influences the germinative faculty only in the case of seeds which were put to germinate at temperatures between 20-30<sup>0</sup>C, when the results are very significant. At the other variants studied, the results are appropriate to the results of the reference variants, the differences aren't statistically assured.

2. From the results obtained it can be seen that the highest herba production was obtained at variant with 60 cm between rows and 30 cm between plants on row resulting a density of 55.555 pl/ha.

We recommend this density and way of planting for production.

3. Extraction in propilenglicol:water allows the obtaining of a more concentrated product.

The active principles present in juice are:

- Phenol acids
- Flavonoide
- Chlorophyll

There were established wave length for the following compounds :

- Phenolic acids ( $\lambda_{max}$ = 280 nm)
- Flavonoide ( $\lambda_{max}$ = 320 nm)
- Chlorophyll ( $\lambda_{max}$ = 675 nm)

## Bibliography

1. Muntean Leon Sorin, Mircea Tămaș, Sorin Muntean, Leon Muntean, Marcel M. Duda, Dan I. Vârban, Simion Florian, 2007, *Tratat de plante medicinale cultivate și spontane*, Ed. Rrisoprint Cluj-Napoca, ISBN 978-973-751-463-9, p 396-402;
2. Muntean Leon Sorin, Solovăstru Cernea, Gavrilă Morar, Marcel M. Duda, Dan I. Vârban, Sorin Muntean, 2008, *Fitotehnie*, Ed. Rrisoprint Cluj-Napoca, ISBN 978-973-744-115-7, p 595-596;
3. Vârban Dan, Rodica Vârban, Albert, Imre, 2005, *Plante medicinale cultivate si din flora spontană* Ed. Risoprint, Cluj-Napoca, Ed. Rrisoprint Cluj-Napoca, ISBN 973-656-991-8, p 54-57