

## INVESTIGATIONS ON NEW DEVELOPED SAVORY VARIETY "DARIA"

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**Key words:** *Satureja hortensis*, genetic resources, stability

### INTRODUCTION

The genus *Satureja* L. comprises over 30 species with wide distribution in the Mediterranean region (Hadian et al., 2008). Among them, many are used as valuable medicinal and spice plants worldwide. *Satureja hortensis* L. (summer savory) is an annual aromatic plant with linear leaves and white to pale red flowers, which are born in erect stems (Rechinger, 1982). In folk medicine, *Satureja hortensis* is used as stomachic, stimulant, carminative, expectorant, aphrodisiac and antispasmodic (Zargari, 1970; Hajhashemi et al., 2000). In addition, summer savory has wide application in the world food, drink and perfume industries (Sefidkon et al., 2006; Skocibusic et al., 2006).

The essential oil of *Satureja hortensis* possesses many activities such as antioxidant, antibacterial and antifungal (Gulluce et al., 2003; Sahin et al., 2003). Main essential oil constituents are phenolic compounds, carvacrol and thymol, as well as  $\gamma$ -terpinene, p-cymene,  $\beta$ -caryophyllene, linalool and other terpenoids (Sahin et al., 2003; Zawislak, 2008).

In comparison with other crops, the concentration of main minerals such as  $Ca^{2+}$ ,  $Mg^{2+}$  and  $Zn^{2+}$  in the leaves of *Satureja hortensis* is very high making it as a potential source of dietary minerals (Ozcan, 2004). Beside, adaptability to harsh environmental conditions, high yield and short growing period make *Satureja hortensis* as a valuable alternative crop in agriculture (Hadian et al., 2008). In the recent years, the interest of growing herbs such as savory as alternative crops is highly increased (Prohens et al., 2003).

The genotype, the interaction with environmental factors and mandatory cross-fertilized of savory plants determine the varieties of this species to occur as populations with a high degree of uniformity.

Studies accomplished at VRDS Bacau showed that variability was observed due to the interaction of several genes with discrete effects named polygenic gens.

By annual analyzing of savory's variability ("Daria" variety), modification or loose of valuable

traits were prevent and variety degeneration was avoid.

### MATERIAL AND METHODS

The biological material used was obtained in 2008, patent number 00124/ 28.03.2008 – savory, "Daria" variety.

The investigations were divided in two directions: (1) variability analysis of the main characters of savory "Daria" variety (2) assessment of volatile oil content of "Daria" variety.

The experiments were conducted at Vegetable Research and Development Station - Bacau during 2009-2014.

Variability study was done on samples taken from statistics population, and our observation and determination concerned the following features:

- plant height - cm
- bush diameter - cm
- seed weight per plant (g)

Traits variability was appreciated using variation and histograms (Potlog and Velican, 1971).

Based on determination of coefficients variation and limits of variation calculated for each feature in the links in the selection scheme, the choice was made on biological material every year in order to maintain "Daria" variety within the specificity and authenticity.

Quantitative assessment of volatile oil content – by hydrodistillation extraction with the Clevenger type device: the material to be extracted was immersed in water, which was then boiled, the vapors of the volatile components were carried by the steam to a condenser, on condensation oil-rich and water-rich layers were formed and separated by decantation. Amount of plant material used was around 1 kg and the time for extraction was around 180 minutes.

Qualitative assessment of savory essential oils was accomplished by GC-MS using a split injection onto a capillary column with a stationary phase containing Poly Ethylene Glycol (PEG). Variation of savory essential oils was comparative investigated using as biological material plants harvested from intensive and ecological culture.

## RESULTS AND DISCUSSIONS

The biological material used was that obtained in 2008, patent no. 00124 / 28.03.2008 – savory, “Daria” variety.

Variability of characters regarding “Daria” variety selection scheme was carried out in two selection fields:

- Field of selection of typical plant
- Pre-basic field

Elites were chosen after biometric measurements on sample survey of 100 individuals, taken at random.

The methods used for selection were:

- Individual selection of typical plants;
- Selection by negative characters in pre-basic seed field.

Placing the field of variants was linearly bunked.

Phenological observations made during growing season were:

- Date of sowing: 02.04;
- Springing time: 09.04;
- Planting date: 22.05;
- Mass flowering time: 25.06;
- Harvest time: 05.10.

In each phenophase of vegetation were monitored climate data as follows: the sum of temperature degrees, rainfall (Table 1).

According to all registrations presented in table 1 “Daria” variety is characterized by a vegetation period of 178 days. This variety requires 3096.25 °C during vegetation period and a minimum of 471.8 mm rainfall. In our experimental condition (NE part of Romania) the sowing is recommended after April 1<sup>st</sup> and seeds of “Daria” variety needed seven days for a proper germination.

The age of seedling is 31 days, and the plants need 34 more days in order to develop flowers.

This investigation are important in order to establish the most suitable areal for cultivation of variety.

Following feature were studied: plant height, bush diameter, seed weight per plant.

Data were processed by statistical and mathematical multiplication method. For each character studied, statistical indices were calculated: mean, standard deviation, coefficient of variation and dispersion limits (Table 2).

From the results obtained, it can be concluded that "Daria" variety of savory presents low variability for plant height feature and medium variability for the other two investigated traits: bush diameter and seed weight per plant.

Analysis of essential oils and odoriferous components were made fresh material harvested at complete flowering moment.

Table 1. The main phenophase at savory, “Daria” variety

Phenophase	Phenophase duration from – to	Phenophase duration number of days	Sum of (°C) degree	Rainfall (mm)
sowing - springing	02.04-09.04	7	-	-
springing – planting time	09.04-22.05	31	-	-
planting time - flowering	22.05-25.06	34	755.10	186.30
mass flowering - maturation	25.06- 30.08	67	1675.25	220.30
complete maturation - harvesting	31.08-05.10	35	665.90	65.20
vegetation period from springing to the last harvest	02.04-05.10	178	3096.25	471.80

Table 2. Variability study of some traits at savory, “Daria” variety

Analyzed traits	The link from selection scheme	Average (x)	Standard deviation (s)	Coefficient of variation (s%)	Limits of variability (k)	Signification
plant height (cm)	C.A./C.P.B	38.79	3.21	8.20	30.20-45.60	small variability
bush diameter (cm)	C.A./C.P.B	20.20	2.35	11.60	16.20-26.20	medium variability
seed weight per plant (g)	C.A./C.P.B	1.20	0.15	12.85	0.72-1.52	medium variability

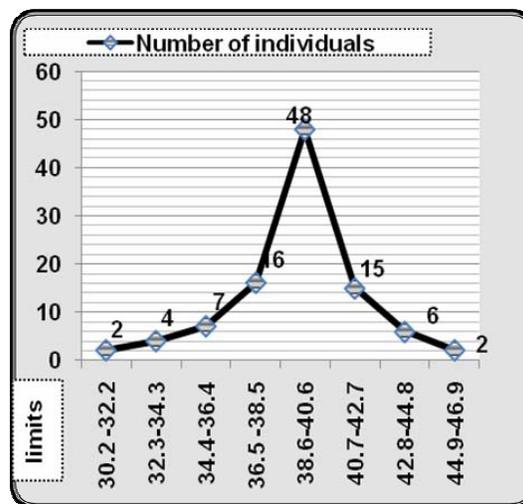


Fig. 1. Histogram of plant's height variation (cm)

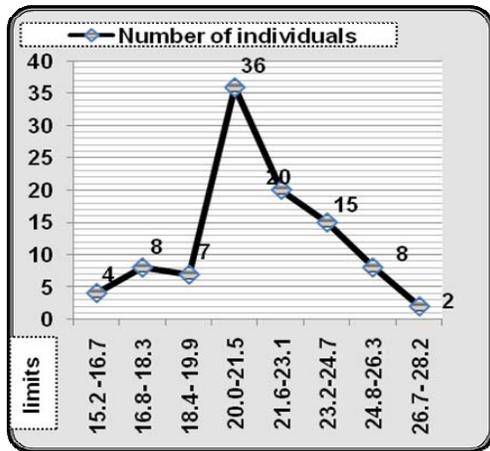


Fig. 2. Histogram of bush diameter variation (cm)

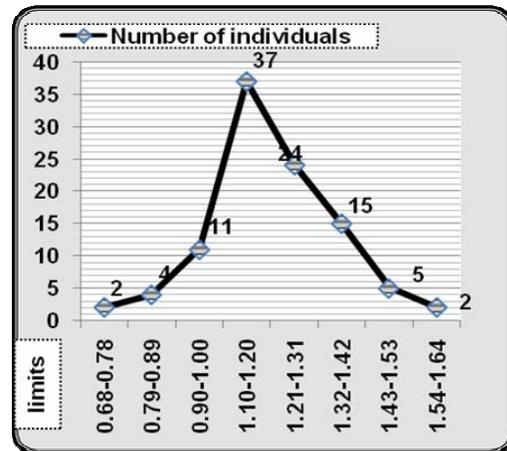


Fig. 3. Histogram of weight seed per plant (cm)

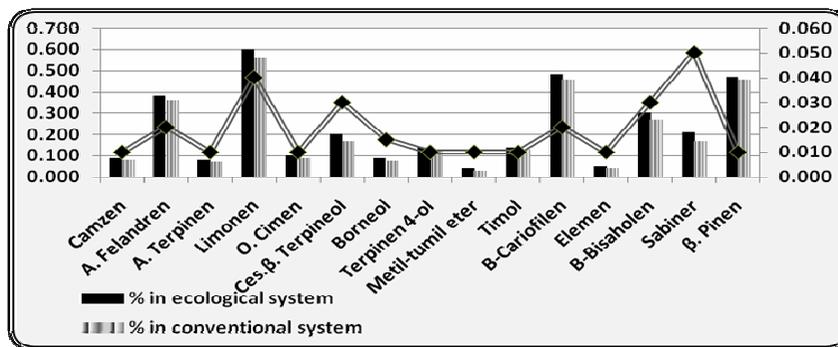


Fig. 4. The variation savory components (lower in 1%), intensive system compared to ecological

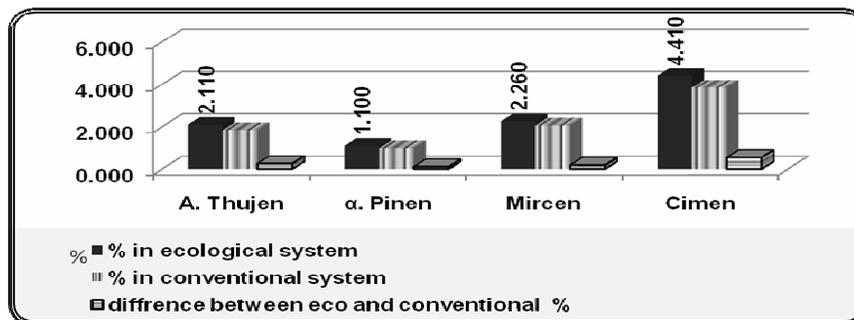


Fig. 5. The variation savory components (1% - 5%) intensive system compared to ecological

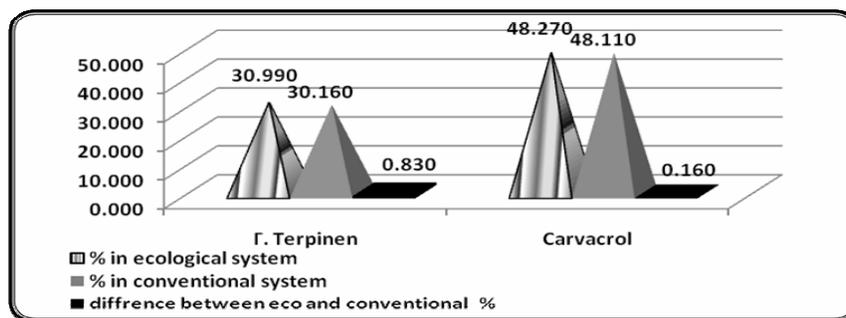


Fig. 6. The variation savory components (more than 30%) intensive system compared to ecological

## CONCLUSIONS

The limits of variation of the variety of savory "Daria" were normal. The number of individuals included in the list of selection was 87%.

The analysis of data showed a difference registered between volatile oil compounds provided by two different cultivation systems.

The volatile oil obtained from ecological savory was higher (2.35%) compared to conventional culture (1.05).

## ACKNOWLEDGMENTS

This work was cofinanced from the Sectorial program ADER 2020

## ABSTRACT

Spicy and aromatic plants constitute an important natural resource of our country, their importance is given to social and economic value and the role of food and therapeutic.

Value food and therapeutic herbs and seasoning is determined by great complexity and diversity in biochemical constituents. Worldwide, spicy and aromatic plants enjoys growing attention and are the subject of numerous research physicochemical and pharmacological.

The study presents results of investigations performed by the variety of savory Daria, Bacau VRDS created and patented under the number 00124 / 28.03.2008. The variety is distinguished by normal variation. Our investigations have involved a comparative analysis of biochemically biological material grown in conventional and organic sitem. Volatile oil content was higher in organic culture.

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