STUDIES REGARDING THE QUANTITATIVE AND QUALITATIVE CHARACTERISTICS AT THE MULTIPLE USES SPECIE *SALVIA SCLAREA* L., IN THE BIOLOGIC CULTIVATION CONDITIONS FROM V.R.D.S. BACAU

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Abstract*: The studies were focused on Salvia sclarea L., known also as the herb of Saint Joan, şarlai, serlei, belongs to Lamiaceae family and in its native form is located in the South Europei, Asia and Middle East. This specie is important through its multiple uses: culinary, ornamental, and especially medicinal (antispasmodic, stimulate appetite, astringent effect, balsamic, tonic etc.), cosmetics, sicative oil etc.*

During 2004 – 2007 period of time, at VRDS Bacău, the biologic material obtained from local populations was studied. This material had a large genetic variability and it was used for the creation of the initial breeding material.

The studies concerning the morphologic characteristics (height and diameter of plants, number of branching, the form of plant, the colour of flowers), the behaviour in the agro-pedologic conditions from VRDS Bacau, the accomplished phonologic observations and the components of the essential oils revealed the value as a plant with multiple uses. In the volatile oil that was extracted from the plants Salvia sclarea a number of 28 components of essential oils were identified.

Rezumat *Studiile s-au efectuat pe Salvia sclarea* L.,., *denumită popular iarba Sfântului Ioan, şarlai, serlei, care face parte din familia Lamiaceae şi în stare nativă se întâlneşte în sudul Europei, Asia Mică şi Orientul Mijlociu. Această specie se remarcă prin utilizările ei multiple: culinară, ornamentală, în special medicinală (antispasmodice, stimulează apetitul, are efect astringent, balsamic, tonic etc.), cosmetică,ulei sicativ etc.*

La SCDL Bacău, în perioada anilor 2004 – 2007, s-a studiat materialul biologic obținut din populații locale, cu o mare variabilitate genetică, din care s-a creat material inițial de ameliorare.

Studiile caracteristicilor morfologice (talia şi diametrul plantei,numărul de ramificații, forma plantei, culoarea florilor. etc), comportarea în condițiile agropedologice de la SCDL Bacău, observațiile fenologice efectuate şi componența uleiurilor esențiale, scot în evidență valoarea de plantă cu utilități multiple a materialului biologic selectat. În uleiul volatil extras din plantele de Salvia sclarea au fost identificați 28 componenți de uleiuri esențiale.

Salvia, the richest genus from *Lamiaceae family*, includes almost 900 species in the entire world. *Salvia sclarea* has a great importance as an aromatic agent in the food, perfumery and cosmetic industry.

Salvia sclarea L., popular named the herb of Saint Joan, şarlai, serlei, belongs to *Lamiaceae* family and is natively found in the South of Europe Asia and Middle East.

The Herb of Saint Joan is a perennial plant of 0,6 – 1,0 m high. The specie is not pretentious towards environmental factors, but prefers the well drained soils, with a good sun exposure, dried or humid. It can not be cultivated at shadow, and the temperatures during winter below - 20 degrees, for a long period of time, can ditroy the plants. The utility rate of plant is 2 : 5.

Salvia sclarea is a plant with multiple uses: c*ulinary* (condiment, salads or teas, substitute for taste of bear, flavour of Muscat in wine); o*rnamental* (is a decorative plants through port, bush and flowers); *medicinal* (antispasmodic, stimulate appetite, has astringent effect, balsamic, tonic etc).; *melliferous*; *cosmetic* (soaps, fixative ş.a.)., and other uses (siccative oil).

The literature mentions that, as a result of oil analysis from *Salvia sclarea*, almost 72 volatile compounds can be identified in the plant. They correspond to 97,2 % from oil, and the majority of compounds were linalool, linalyl, acetate, terpineol, neryl acetat, geraniol, geranyl acetat, nerol, sclareol (D. Biondi, 1993). Other researches demonstrated the fact that in the leaves and flowers of a cultivar from Slovenia Republic were identified 34, respectively 27 compounds in essential oils.

The studies were accomplished at VRDS Bacău, on a biologic material selected from the "ex situ" collection that includes over 200 species with multiple uses cultivated in the accredited polygon of biologic agriculture.

MATERIAL AND METHODS

During 2004 – 2007 period of time at VRDS Bacău, local populations of *Salvia sclarea,* with a large genetic variability were studied. As a result of these studies, the initial breeding material was created and different lines that correspond from the cultivation point of view with the principles and techniques of biologic agriculture were obtained. The lines were selected after the adaptability, plant's height, flower's colour etc.

The cultivation was accomplished according with the principles of biologic agriculture, with low inputs: two phasic fertilisation with Cropmax 0,2 %, in the vegetative period and before blossom; four manual weeding on row and three mechanic weeding between the rows. The treatments for pathogen agent and pests control were not necessary.

The accomplished studies focused on the adaptability to agro-pedologic conditions from the East area of Moldavia, "bio" cultivation and multiple utility.

For the decorative characters the following quantitative and qualitative determinations were made: plant's height, diameter of bush, port, ratio height/diameter, number of floral cane per plant, the colour of flowers, blossom period, precocity to blossom, resistance to low temperatures during winter, starting on vegetation in the spring, branching degree of plants.

The volatile oils were extracted from the leaves of salvia, with hydro-distillation equipment, type Clevenger. The separation of volatile oils was made with gaseous chromatograph, utilising capillary column DB 5, of 25 m length and 0.25 mm diameter. The azotes was utilised as a bearer gas, and the initial temperature in the stove was of 40 ^{o}C, isotherm 5 minutes and raised till 280 ^{o}C, with a gradient of 4 ^{o}C / minute.

For the identification of the compound from the volatile oils the chromatograph in gaseous phase were coupled with the spectrometer IR with transformant Fourier (FT-IR) NICOLET, and the quantitative analyses was accomplished with a detector of ionizer in flame, coupled in parallel, the detector FT-IR not being destructive. For the spectrometer

FT-IR was used a spectral diameter of 4000 – 750 cm^{-1}, resolution of 8 cm^{-1} and an acquisition speed of 7 scan / second, the transfer line being warmed up at 250^0 C, detector MCT cooled with liquid nitrogen.

In the same time retention indexes Kovats were used for the confirmation of the exact position of drops in chromatogram through the utilisation of a series of n-alkali as reference.

RESULTS AND DISCUSSIONS

At *Salvia sclarea* specie the biologic material from the germ-plasma collection is valuable for capitalization in the breeding program, for the creation and promotion of new cultivars.

The studies concerning the quantitative characteristics, the main criteria in the activity of creation of the initial breeding and selection material, that underline the decorative characteristics, are presented in table 1.

Table 1

The quantitative characteristics of the initial breeding material

Cultivar	Plant's height cm	Plant's diameter cm	Ratio height/ diameter	no. inflorescence/plant	inflorescence lenght cm
Line SSA-12/2005	65 - 75	45 - 55	1,4 - 1,36	8 - 9	55-60
Line SSR-42/2005	**64 - 73**	50 - 60	1,28 - 1,22	**9-10**	**60-70**

Salvia sclarea Line SSA-12/2005

The morphologic studies shows that, the two selected lines have an elegant port, a strong branching degree, with a large number of inflorescences per plant, and with a pretty high length of floral cane. The smell of flowers is strong, pleasant and characteristic for the specie.

On remark the Line SSR-42/2005 through a lower port, a bigger number of inflorescences/plant and the length of floral cane

The studied focused on the qualitative characters are referred at plant's port, flower's colour, blossom period, earliness at blossom, resistance to low temperatures during the winter, starting on vegetation in the spring, branching degree of plants and are presented in table 2.

The both lines have the form of plant bush, the colour of flowers is different, the Line SSR-42/2005 is earlier in blossom, present a higher degree of branching and resist better to hibernation in the field.

Table 2.

The qualitative characteristics of the selected and studied lines of *Salvia sclarea*

Cultivar	Plant's port	Flower's colour	Blossom starts	Period of blossom	Resistance to hibernate	Branching degree
Line SSA-12/2005	bush	white	10 - 15 June	June – September	good	strong
Line SSR-42/2005	bush	dark blue	5 - 12 June	June - September	very good	very strong

Due to the high degree of variability of the initial biologic material, the individual selection was made on mother plants (vegetative), followed by the selection on families as a result of the generative multiplication (with seeds from elite plants that produced seeds in the same vegetation cycle). By these means we tried to shorten the selection period, the stabilization of the lines and the accomplishment of the proposed decorative objectives and especially the uniformity of the selected material.

***Salvia sclarea* LineSSR-12/2005**

Because *Salvia sclarea* is recognised specie, mainly as a culinary and medicinal plant, the main components of the volatile oils were determined, only in Line SSR-42/2005 due to the fact that it could be better stabilised from the point of view of distinctively, homogeneity in flower's colour and plants uniformity.

The main components in volatile oils from Line - SSR-42/2005 were identified through correlation between spectrum and the retention time (Table 3 and graphical representation).

On remark that, from the presented dates, the main essential oils have as main components Izopinocamfone (59,22 %) and β - Pinene (18,74 %).

Over 2 %, were found on components Mirtenol (2,88 %), δ - Elemen (2,36 %) and Cis.p.Mentadienol (2,32 %).

From the 28 identified components, 5 have between 1 - 2 % in essential oils:: α - Telandren (1,9 %), Mercen (1,47 %), Sabinen (1,23 %), Linalol (1,12 %) and β - Burbonen (1,05 %).

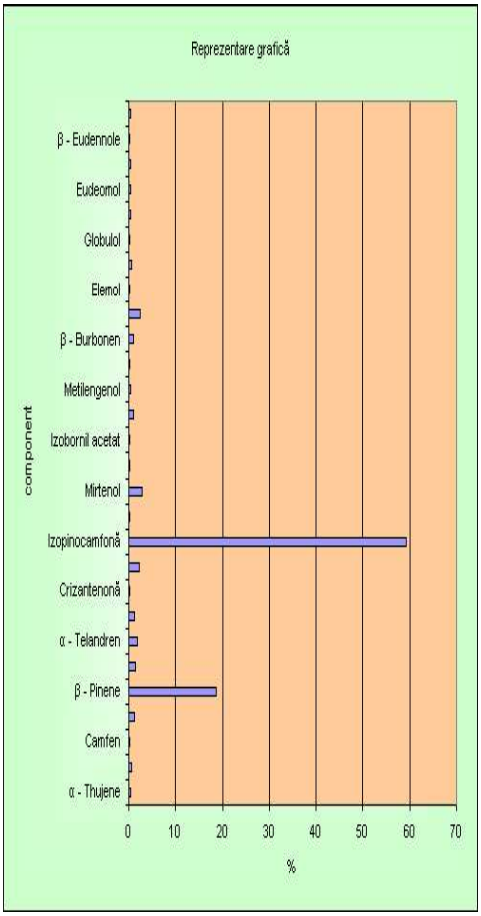
The other identified components are present in a percent of under 1%: α - Burbonen (0,93 %), α - Pinene (0,69 %), Ent - Spatulenol (0,53 %), tan - Cadecrol

(0,42 %), Metilengenol (0,39 %), α - Thujene (0,34 %), Viridefloral (0,33 %), Eudeomol (0,33 %), δ - Eudesmol (0,33 %), β - Eudennole (0,28 %), Homomirtenol (0,27 %), Crizantenonă (0,26 %), α - Corjunen (0,21 %), Globulol (0,21 %), Camfen şi Elemol with 0,17 %, , Izobornil acetat (0,13 %), α - Terpineol (0,12 %).

Table 3.

The main components in essential oils identified at *Salvia sclarea* L., Line - SSR-42/2005

Components	%
α - Thujene	0,34
α - Pinene	0,69
Camfen	0,17
Sabinen	1,23
β - Pinene	18,74
Mercen	1,47
α - Telandren	1,9
Linalol	1,12
Crizantenonă	0,26
Cis.p.Mentadienol	2,32
Izopinocamfonă	59,22
α - Terpineol	0,12
Mirtenol	2,88
Homomirtenol	0,27
Izobornil acetat	0,13
α - Burbonen	0,93
Metilengenol	0,39
α - Corjunen	0,21
β - Burbonen	1,05
δ - Elemen	2,36
Elemol	0,17
Ent - Spatulenol	0,53
Globulol	0,21
Viridefloral	0,33
Eudeomol	0,33
tan - Cadecrol	0,42
β - Eudennole	0,28
δ - Eudesmol	0,33



The other identified components are present in a percent of under 1%: α - Burbonen (0,93 %), α - Pinene (0,69 %), Ent - Spatulenol (0,53 %), tan - Cadecrol (0,42 %), Metilengenol (0,39 %), α - Thujene (0,34 %), Viridefloral (0,33 %), Eudeomol (0,33 %), δ - Eudesmol (0,33 %), β - Eudennole (0,28 %), Homomirtenol (0,27 %), Crizantenonă (0,26 %), α - Corjunen (0,21 %), Globulol (0,21 %), Camfen şi Elemol with 0,17 %, Izobornil acetat (0,13 %), α - Terpineol (0,12 %).

Chromatogram of volatile oil analyses 1 % in pentane is presented in Figure 1.

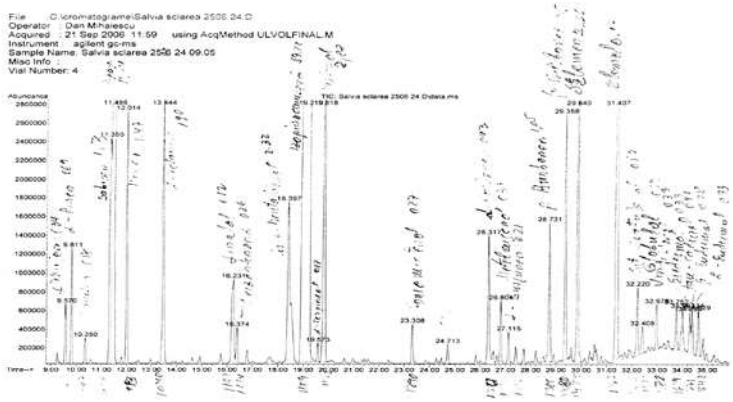


Figure 1. Chromatogram of essential oils from *Salvia sclarea,* Line - SSR-42/2005

CONCLUSIONS

1. At *Salvia sclarea* specie the biologic material from the germ-plasma collection is valuable for the capitalization in the breeding program, for the creation and promotion of new cultivars.

2. On remark the Line SSR-42/2005 through a smaller port, a larger number of inflorescences per plant and the length of floral cane.

3. The both lines have the form of plant bush, the colour of flowers is different, the Line SSR-42/2005 is earlier in blossom, present a higher degree of branching and resist better to hibernation in the field.

4. The main components in volatile oils of Lin - SSR-42/2005 were identified through the correlation between the spectrum and the retention time. On remark that, from the presented dates, the main essential oils have as main components Izopinocamfone (59,22 %) and β - Pinene (18,74 %).

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