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COMPONENT COMPOSITION OF *ELSHOLTZIA STAUNTONII* ESSENTIAL OIL, ROZOVOYE OBLAKO CULTIVAR

Lyudmila Anatolyevna Khlypenko, Taisiya Ivanovna Oryol

Nikita Botanical Gardens – National Scientific Centre, the city of Yalta
298648, the Republic of Crimea, the city of Yalta, urb.vil.Nikita
taisyaorel@yandex.ru

Introduction

Breeding of high-productive sorts of essential oil-bearing plants and their introduction into industry extend assortment of essential oils, the principal components for perfume and cosmetic industry, alcoholic beverage and non-alcoholic drinks, a number of medicines.

The habitat of *Elsholtzia stauntonii* Benth. is North China. In Nikita Botanical Gardens (NBG) it has been investigated as a crop since 1967 [3]. Essential oil of *Elsholtzia stauntonii* Benth. possesses bright antimicrobial action concerning *Staphylococcus aureus* 209P, antibacterial action towards *Escherichia coli* M-17, *Proteus vulgaris*. It was highly rated by specialists (4,5 points) in the field of perfume and cosmetics products [2]. Its essential oil is one of the ingredients of aromatizers, made on the basis of domestic raw materials [3].

Use of essential oils in food industry as natural aromatizers and preservatives demands accurate study of their component composition.

The aim of this research is to identify EO component composition of *Elsholtzia stauntonii* Benth., Rozovoye Oblako cultivar.

Objects and methods of the research

Object of the research is essential oil of *Elsholtzia stauntonii* Benth., Rozovoye Oblako cultivar, that was extracted during mass blooming out of overground parts of the plant which grows on introduction and collection area of NBG (the second decade of September). Mass fraction of essential oil was determined due to method of hydrodistillation by Ginsberg out of raw material [1]. Component composition of essential oil was studied applying chromatograph Agilent Technology 6890N with mass-spectrum detector 5973N. Chromatographic column – capillary HP-1 (30 m long); inside diameter – 0,25 mm. Injector temperature is 250°C. Carrier gas is helium, stream velocity – 1,0 sm³/min. Transfer from gas chromatograph to mass spectrometric detector was heated till 230°C. Source temperature was kept up at 200°C. Electronic ionization was carried out at 70 eV with mass range m/z from 29 till 450. Identification of essential oil components was guided by comparison results obtained in terms of chromatograph of chemical substances mass spectra of study mixtures with publishing data of mass spectra NIST05-WILEY2007 (about 500000 of mass spectra) [5].

Results and discussion

Elsholtzia stauntonii Benth is a semi-shrub of *Lamiaceae* family. Sort Rozovoye oblako enters the State register of selective plants, permitted in the Republic of Crimea in 2015.

In terms of this crop five-years plant gets 100 sm high, 80 sm across diameter, the bush is compact. Leaves are assidenous with opposite position, dark-green color, lancet-lake with biserrateedge, large-sized, 10 sm long and 2,5-3 sm wide. The top side of the leave is smooth, down side is downy a bit. Leave top is pointed. Inflorescence has a shape of spicate

thyrsus, 10-15 sm long, 1,5-2 sm across diameter. Flowers are small-sized, 6-9 mm long and 2,5-3 mm across diameter, corolla has got intensive pink color. (purple) (fig.1).



Fig. 1 Plants of *Elsholtzia stauntonii*, sort Rozovoye oblako, growing on introduction and collection area in Nikita Botanical Gardens

Flower-cup is aedeceous, five-segmental, joined, club-shaped, teeth are folded. The fruit is a nut of light brown color, smooth, rounded, small-sized. Mass of 1000 seeds makes 0,21 g. Under conditions of South Coast of the Crimea vegetation period starts in the end of March – beginning of April. Budding is fixed in July, blooming starts in the 1st decade of September, mass blooming usually opens in the 2nd decade and finishes in the 3rd decade of September. Blooming period keeps on 20-25 days. Seeds ripen in the end of the 1st – beginning of the 2nd decade of October [4]. Crop capacity of raw material makes till 100 center/ha, mass fraction of essential oil is 0,4-0,5% from the raw material, yielding of essential oil is 40-50 kg/ha depending upon weather conditions.

Essential oil of *Elsholtzia stauntonii* is like an orange-colored thin fluid that shares with all plant fragrances. According to organoleptic rate it could be referred to fruit and balsamic type with notes of dry fruits.

As a result of conducted researches in essential oil of *Elsholtzia stauntonii*, sort Rozovoye Oblako, 36 components were revealed, 30 of them were identified (fig.2, table).

Concerning mass fraction monoterpene derivatives prevails in the essential oil, being at the same time acidic heterocyclic compound. Dominant components are rosefuran (41,1%) and its oxid – rosefuraneoxid (24,0%); sesquiterpen caryophyllen (8,5%) (fig.2); this component composition corresponds to publishing data of this very essential oil and considered as a typical characteristic of the cultivar in total. Derivatives of furan are rarely found in essential oils, these compounds are typical for *Elsholtzia* and *Perilla* genera only [1]. Essential oil of *Elsholtzia stauntonii*, sort Rozovoye Oblako, contains valuable components such as phenolic aroma substances eugenol (1,5%), monoterpene alcohol linalool (1,1%) as well as sesquiterpens α -humulen (2,7%) and germacrene d (,1%). Mass fraction of each of them doesn't reach even 1%.

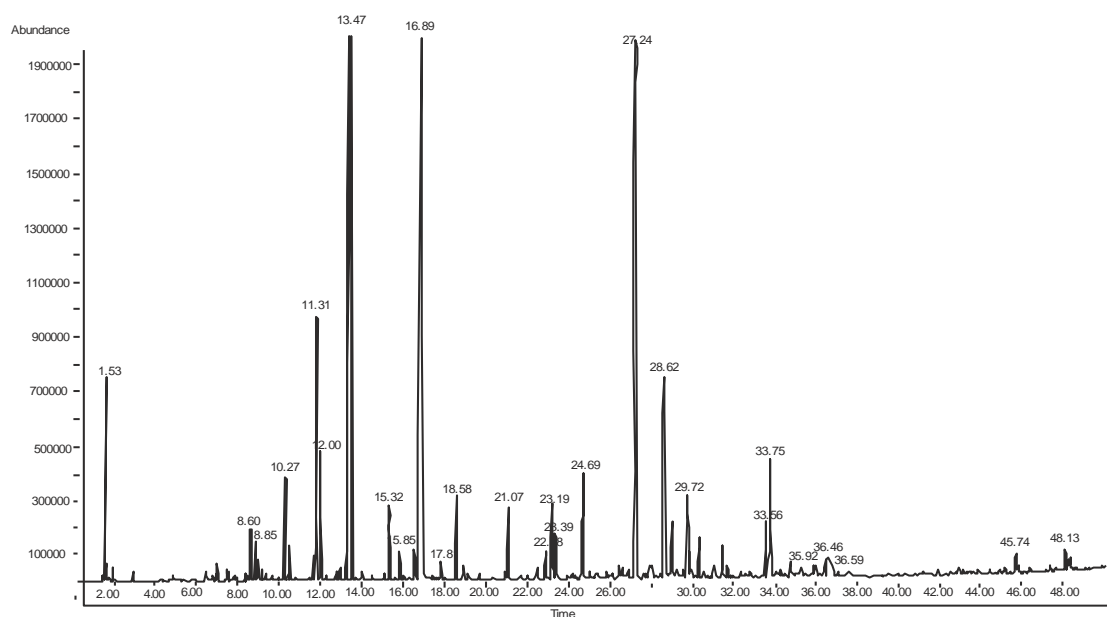


Fig.2 Chromatogram of *Elsholtzia stauntonii* Benth. essential oil, sort Rozovoye Oblako

Besides heterocyclic compounds of pyran, furan and its derivatives *Elsholtzia stauntonii* essential oil also includes sesquiterpenes (15,8%), ketones (6,7%) (artemisia ketone 2,8%, acetophenone 1,4% and etc.), aliphatic alcohols (1,4%), monoterpene alcohols (1,1%), monoterpenes (0,7%). Mass fraction of all these compounds in the essential oil is insignificant.

Table

Component composition of *Elsholtzia stauntonii* essential oil, sort Rozovoye Oblako

Component	Output time, min	Mass fraction of components, %
Ethanol	1,53	0,90
1-okten-3-ol	8,60	0,40
Oktan-3	8,85	0,40
Myrcene	9,00	0,20
Para-cymene	10,27	1,00
1,8-cineol	10,55	0,30
γ -terpinene	11,66	0,30
Artemisia ketone	11,82	2,80
Acetophenone	12,00	1,40
Rosefuran	13,47	41,10
Linalool	13,51	1,10
Camphora	15,33	0,90
Rosefuran epoxide	16,89	24,00
Furan	18,58	1,80
Pyran	22,88	1,30
Eugenol	24,69	1,45
Caryophyllene	27,24	8,54
α -humulene	28,60	2,70
Germacrede d	29,72	1,10
α -curcumene	29,84	0,20

Cadinene	31,44	0,40
Spathulenol	33,56	0,80
Caryophyllene oxide	33,75	1,84
Humulene epoxide	34,74	0,20

Conducted investigations corroborate suitability of these sorts cultivation to get valuable essential oils for perfume and cosmetic industry, food production as aromatizers of drinks and as a natural preservative.

Conclusions

Component composition of *Elsholtzia stauntonii* essential oil, sort Rozovoye Oblako, was determined in terms of the research, 30 components were identified. It was found out that principal components are rosefuran (41,1%), rosefuran epoxide (24,0%) and caryophyllene (8,5%). Essential oil is possible to use in perfume and cosmetic industry and food production.

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The article presents data about mass fraction and component composition of *Elsholtzia stauntonii* essential oil, Rozovoye oblako cultivar, and recommendations for use it in perfume and cosmetic industries.

Key words: *Elsholtzia stauntonii*; cultivar; essential oil; component composition; rosefuran.