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COMPONENT COMPOSITION STUDY OF *OCIMUM BASILICUM* L. ESSENTIAL OIL FROM PLANT MATERIAL OF THE REPUBLIC OF BELARUS

The essential oil of *Ocimum basilicum* L. grown in Republic of Belarus was analyzed by means of GLC. More than 10 compounds were identified in essential oil of *Ocimum basilicum* L. The representative and characteristic components were linalool, methylchavicol, 1,8-cineole, camphor, α- and β-pinene, α-terpineol, eugenol, β-caryophyllene. The methods of plant material preparation and long-term storage of essential oil influence on component composition.

Introduction. Environmental contamination leads to the emergence of diseases associated with environmental violations, the emergence of new diseases and pathogens stock of various infectious diseases. Therefore in recent years efficient and environmentally safe means of plant origin are developed; they have curative and preventive action. Essential oils of spicy-aromatic plants possess high and diverse biological activity due to the combined action of the main and micro-components.

The *Ocimum* L. (basil) plants are used as raw material for the production of drugs used in kidney diseases and gall bladder to prevent possible bleeding. Essential oil of basil has a strong antispasmodic and bactericidal action.

Analysis of published data shows that the component composition of *Ocimum basilicum* L. essential oil of different origin is well enough studied [1]. At the same time it is known [1, 2] that the essential oil component composition depends on many factors, such as differences in chemotypes, climatic and geographical conditions of spicy-aromatic plant growing, the technology of essential oil production and storage and so on. In this regard, the establishment of qualitative and quantitative composition of essential oils of *Ocimum basilicum* L. plants, grown in the Republic of Belarus, is an urgent task.

The purpose of this work is to establish peculiarities of the component composition of *Ocimum basilicum* L. essential oil from plant material of the Republic of Belarus.

Main part. The parts of *Ocimum basilicum* L. plants, grown on the plant introduction site of the Belarusian State Academy of Agriculture (BSAA) were used to obtain essential oil. Essential oil was obtained from freshly crushed or air-dried plant materials by hydro-distillation

GLC analysis of essential oil samples was conducted on gas chromatograph "Tsvet-800" equipped with a flame ionization detector and glass capillary column DB-17 of 30 m length in the programming mode, the temperature of the isotherm at 80 °C for 1 minute with the temperature rise rate at 3 °/min to 115 °C and a temperature rise rate at 4 °/min until the isotherm at 200 °C for 10 min, the temperature of the evaporator and the detector 230 and 280 °C respectively and the linear velocity of the gas-carrier of nitrogen 18. 8 cm / sec. Retention time of nonsorbent gas was considered to be the time of peak methane outlet.

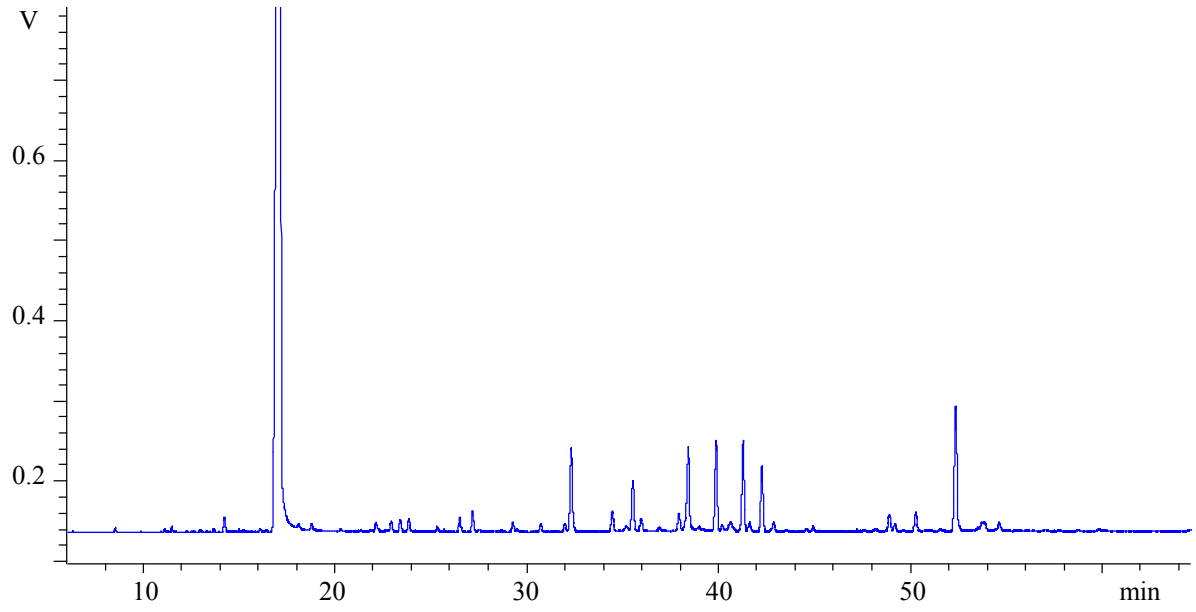
Identification of the major components of the essential oil was performed by comparing calculated values GI with the indexes of standard substances (Superco Park, USA), as well as with the references [3, 4]. For calculating of the generalized retention indexes (GI) n-alkanes C_7H_{16} – $C_{16}H_{34}$ were used as reference components, retention indexes being taken $100 \cdot n$ (Kovatch indexes). The relative amounts of individual components were calculated on the basis of GC peak areas without using correction factors (method of internal normalization).

Fig. 1 shows typical chromatogram of *Ocimum basilicum* L. essential oil after separation on a nonpolar column DB-17.

According to the references [1, 5–8], many aromatic plants exist in different chemotypes with identical morphological characteristics. They produce essential oils with the same set of components, but different ratio.

Method of comparing of chromatographic profiles was used to establish the chemotype of basil plants from the collection BGSA used to extract the essential oil [4]. Method of comparing of chromatographic profiles involves identifying characteristic combination of several peaks, the simultaneous presence and intensity ratio allowing torefer a sample to a specific chemotype. Thus, according to the source [8] high quality *Ocimum basilicum* L. essential oil of European chemotype should contain 35–40% linalool, linalyl acetate 0.8–5.2% and 20–30% methyl chavicol.

In *Ocimum basilicum* L. essential oil from the BGSA collection more than 20 components were registered, the main ones are linalool (GI = 1210), methyl chavicol (GI = 1409), 1,8-cineole (GI = 1153), camphor (GI = 1391), α-pinene (GI = 1006), β-pinene (GI = 1074), α-terpineol (GI = 1346), eugenol (GI = 1317).



Ocimum basilicum L. essential oil chromatogram

Table 1 shows the distribution of the main components of *Ocimum basilicum* L. essential oil. In test samples the content of monoterpene hydrocarbons is small (no more than 1 wt %). A distinctive feature of the test samples of *Ocimum basilicum* L. essential oil is predominant content of oxygenated monoterpenes (over 90 wt %) in comparison with other classes of organic compounds. The most abundant monoterpenoids are linalool (55–58 wt %), methyl chavicol (25–28 wt %), 1,8-cineole (~ 5 wt %).

Table 1

Percentage composition of *Ocimum basilicum* L. essential oil

Compound	Content, wt %
α-pinene	0.1
β-pinen	0.1
1,8-cineole	4.5
linalool	57.5
methylchavicol	27.2
camphor	0.2
α-terpineol	0.4
geranyol	0.6
eugenol	1.0
β-caryophyllene	2.5

Comparison of our data with the literature ones [1] shows that the content of the main components of basil essential oil from the BGSA collection meets the requirements of European chemotype. Quantitative characteristics of the test oil in almost all components fit into the desired concentration range. At the same time, in test samples the concentration of linalool was slightly higher but linalyl acetate content, in contrast to literature data, was observed only in trace amounts.

Sesquiterpene hydrocarbons and their derivatives constitute less than 5 wt % in the investigated oil and are represented mainly by β-caryophyllene (~ 2–3 wt %).

The quantitative composition of essential oils depends on method of plant material preparation. The peculiarity of essential oil obtained from air-dried material is increasing the proportion of monoterpenes and their oxygen-containing derivatives in comparison with the samples of fresh phytomass. Monoterpenoid content rises from 85 to 92 wt %. An increasing the concentration of α- and β-pinenes is noted. The highest changes relate to the linalool content. In the samples of dried plant material its concentration increases by 10–15 wt % with some decrease in the concentration of methylchavicol (from 26 to 22 wt %).

It is known [9, 10] that the component composition of essential oils to a large extent depends on the duration and conditions of storage. To determine qualitative and quantitative changes in the composition of *Ocimum basilicum* L. essential oil during storage, a sample of dried plant material being maintained at room temperature for 6 months. Table 2 shows the distribution of the main components of the investigated oil before (1) and after storage (2).

Table 2

Percentage composition of *Ocimum basilicum* L. essential oil before and after storage

Compound	Content, wt %	
	1	2
1,8- cineole	1.2	0.9
linalool	54.5	56.5
methylchavicol	25.3	24.1

Conclusion. Based on the studies the component composition of Ocimum basilicum L. essential oil was set from BSAA collection. It is shown that the main components of the investigated oil are α- and β-pinens, 1,8-cineole, linalool, linalyl acetate, methylchavicol, α-terpineol, eugenol, β-cariophillene. The reference components, characterizing the *Ocimum basilicum* L. essential oil from BSAA collection are 1,8-cineole, linalool and methylchavicol. The simultaneous presence and concentration ratio of these components allow to attribute the test oil to the oil of European chemotype. It was established that the method of preparation of plant raw materials and long-term storage of basil essential oil have some influence on its component composition.

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