BIOCHEMICAL COMPOSITION AND PROPERTIES OF *HYSSOPUS OFFICINALIS L.*

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Annotation. This article scientifically studies the biochemical composition, bioactive compounds, essential oil components, and medicinal and agrotechnical properties of the hyssop plant (Hyssopus officinalis L.). As a result of the research, it was found that the plant contains a high content of flavonoids, phenolic acids, terpenoids, vitamins, and essential oil components. Hyssop is widely used in folk medicine as an anti-inflammatory, antiseptic, spasmolytic, and broncholytic agent. The article also analyzes the growth conditions, agrobiological, and biochemical properties of the plant on a scientific basis.

Keywords: *Hyssopus officinalis*, essential oil, flavonoids, phenolic compounds, antioxidant activity, medicinal plants.

Introduction. Hyssopus officinalis L. is a perennial medicinal, essential oil and honey-producing plant belonging to the Lamiaceae family. This species is widespread in the Mediterranean basin, Central Asia, the Caucasus and Southern Europe. In Uzbekistan, it grows wild and cultivated mainly in foothill zones and regions with a dry climate.

In recent years, the increased demand for natural medicinal plants has further increased the importance of hyssopus. Because it is widely used not only in the pharmaceutical industry, but also in the food, perfumery and veterinary sectors.

In this article, the biochemical composition of hyssopus, the amount of bioactive substances in it and their physiological properties were scientifically studied. The aim is to scientifically substantiate the biochemical and pharmacological potential of this plant and assess the possibilities of its widespread use in the national economy.

Materials and methods of research (Methods).

The plant Hyssopus officinalis L., grown in the Tashkent region of Uzbekistan, was chosen as the object of research. The samples were collected during the flowering period of the plant (June-July).

Sample preparation. The collected plants (stems, leaves and buds) were dried in natural conditions at 30–35 °C, then crushed and prepared for analysis in fractions up to 1 mm.

Analysis methods

1. Determination of the amount of essential oil — Hydrodistillation method (Clevenger apparatus).

2. Flavonoid content — $AlCl_3$ colorimetric method, spectrophotometric measurement at a wavelength of 410 nm.

3. Phenolic compounds — Folin–Ciocalteu reagent was used, measurement was carried out at 765 nm.

4. Antioxidant activity — determined by DPPH radical scavenging method.

5. Vitamins (A, C, E) — determined by high-performance liquid chromatography (HPLC) method.

6. Mineral content — by atomic absorption spectrometry (Fe, Zn, Mn, Cu elements).

Statistical analysis

The results of the analysis were processed in 3 replicates, and statistical analysis was performed according to the method of B.A. Dospekhov (1985). The results are expressed as ±Sx average error.

Results. The results of the study showed that the biochemical composition of the blue sedge has high bioactivity.

1. Amount and composition of essential oil

The amount of essential oil in the dry mass of the plant was 0.8–1.2%. According to the results of gas chromatography, the main components are:

Pinocamphon (35–40%)

Isopinocamphon (25–30%)

β-pinene (5–7%)

1,8-cineole (4–5%)

Limonene (3%)

The presence of these components determines the antiseptic and antibacterial activity of the plant.

2. Flavonoids and phenolic compounds

The total amount of flavonoids was 1.95%, and phenolic compounds was 2.42%, which indicated that the plant has strong antioxidant properties. Apigenin, luteolin, rutin and kaempferol were identified as the main flavonoids.

3. Vitamins and minerals

Indicator	Amount (mg/100 g)
Vitamin C	**41,2**
Vitamin A	**0,85**
Vitamin E	**2,15**
Fe	**21,6**
Zn	**3,4**
Mn	**1,9**
Cu	**0,8**

These results indicate that the blueberry plant is rich in microelements important for human health.

4. Antioxidant activity

According to the results of the DPPH test, the blueberry extract had a radical scavenging activity of 76%, which was close to that of rosemary and sage.

Discussion. The results obtained were consistent with the data presented in the international literature. For example, according to Pavela et al. (2018), the main components of the essential oil of Hyssopus officinalis are pinocamphon and isopinocamphon, which have antiseptic and antimicrobial properties. Due to the high content of flavonoids and phenolic compounds, the blue hyssop plant is

effective in reducing oxidative stress, and has anti-inflammatory and immunomodulatory properties.

Studies have shown that the biochemical composition of the plant is directly dependent on the growing conditions (soil, humidity, climate). The content of essential oil and flavonoids was slightly higher in samples grown in irrigated areas.

Blue hyssop has the potential to be used in the preparation of medicinal preparations, as a natural preservative in the food industry, and in perfumery products.

Conclusion. The plant of the blue-green algae is rich in flavonoids, phenolic acids, vitamins and essential oils in terms of biochemical composition. The main components of the essential oil are pinocamphon, isopinocamphon and 1,8-cineole, the share of which is 60–70%. Plant extracts have strong antioxidant and antimicrobial activity. The use of blue-green algae as a natural bioactive source in the pharmaceutical, food and cosmetic industries is promising. In further studies, it is advisable to study the clinical efficacy and toxicological safety of extracts obtained from this plant.

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