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## **DIVERSITY AND DISTRIBUTION OF ESSENTIAL OIL-BEARING PLANTS IN CENTRAL ASIA**

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### **Abstract**

The study presents a comprehensive overview of the diversity, taxonomic composition, and geographical distribution of essential oil-bearing plants across Central Asia, with a particular focus on the flora of Uzbekistan. A total of 42 species belonging to 29 genera and 8 families were identified within the Bukhara region, accounting for 6.5% of its total vascular flora. The findings highlight the dominance of Apiaceae, Lamiaceae, and Asteraceae, and demonstrate significant floristic similarities between the Bukhara and Navoi regions. The results contribute to understanding the distributional patterns of aromatic plants in arid environments and provide a foundation for further phytochemical and ecological research.

**Keywords:** Essential oils; Central Asia; Bukhara region; Aromatic plants; Taxonomy; Flora distribution

### **Introduction**

Plant-derived oils and extracts have been utilized for a wide range of purposes over the course of many millennia. The term essential oil was first introduced by Paracelsus in the sixteenth century. Essential oils are complex mixtures of volatile compounds produced as a result of the secondary metabolism of aromatic and certain other plant species [1-3]. Moreover, they are aromatic, oily liquids extracted from various plant parts such as leaves, bark, seeds, flowers, and peels [4-5].

In most fresh green plant tissues, the content of essential oils does not exceed 1%, while in seeds it can reach up to 10%. The accumulation and composition of essential



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oils are influenced by several factors, including the stage of vegetation, sunlight exposure, humidity, climatic conditions, soil type, and even the time of harvest [5]. The twentieth century marked a significant phase in the global study of essential oil-bearing plants and their volatile components. Today, essential oils are widely used in numerous industries, including medicine, cosmetics, perfumery, as well as the food and confectionery sectors. The leading botanical families that include the largest number of essential oil-producing plants are Lamiaceae, Apiaceae, and Asteraceae.

Due to their antidepressant, stimulating, detoxifying, antibacterial, antiviral, and calming effects, essential oils have recently gained increased popularity as natural, safe, and cost-effective agents for the treatment and prevention of a variety of health conditions [6-10].

The total number of essential oil-bearing plants in the global flora is estimated to range from 2,500 to 3,000 species. Within Central Asia — encompassing Uzbekistan, Tajikistan, Turkmenistan, Kyrgyzstan, and Kazakhstan — these plants are widely distributed. In Kazakhstan alone, out of approximately 6,000 species of vascular plants, at least 500 (8.3%) are considered essential oil producers. The most representative families among them include Apiaceae, Lamiaceae, Asteraceae, Rosaceae, and others [11].

One of the pioneering researchers who made significant contributions to the study of essential oils, including those of Kazakhstani flora, was M. I. Goryaev [2].

According to the data reported by M. Khadjimatov [9], more than 1,500 species of wild-growing essential oil-bearing and medicinal plants occur within the territory of the Republic of Tajikistan. Among them, only 42 species are officially used in traditional medicine, while the rest are primarily utilized in folk medicinal practices. The flora of Turkmenistan is particularly rich in economically valuable wild species, with approximately 1,600 plant species containing biologically active substances, including around 600 essential oil-producing taxa [16].

In Kyrgyzstan, literature analyses have identified 388 wild species of aromatic and essential oil-bearing plants, belonging to 141 genera and 47 families [1]. Many of these species are also known as spice and aromatic plants.



In Uzbekistan, essential oil-bearing plants are widespread across various ecological belts and zones. Their distribution follows the general altitudinal and climatic gradients typical of Central Asian vegetation. The southeastern regions of Uzbekistan, comprising mountain systems and foothill plains, harbor the greatest diversity of essential oil-producing species. These plants exhibit considerable variability in their ecological and morphological characteristics as well as in economically significant traits. The dominant group consists of perennial herbaceous plants, though trees, shrubs, and numerous annual weeds are also represented on irrigated lands [10].

Significant contributions to the study of Uzbekistan's essential oil flora were made by M. I. Chizh [11], who summarized the research results on the Samarkand region, identifying 79 essential oil-bearing species from 58 genera and 21 families. Furthermore, G. A. Denisova and K. I. Golubeva [3] analyzed 24 species of essential oil-producing plants collected from the foothills of the Fergana Range.

To date, modern literature lacks comprehensive data concerning the essential oil-bearing plants of the Bukhara region, including their taxonomic composition and distribution across its botanical-geographical and administrative divisions. Therefore, the present study provides a taxonomic characterization of the essential oil flora of the Bukhara region and analyzes their spatial distribution by administrative districts.

### Materials And Methods

The checklist of essential oil-bearing plants in the Bukhara region was compiled using data from the FLORUZ information-analytical system and the National Herbarium (TASH). Latin names of plant species were standardized following the International Plant Names Index (IPNI) and The Plant List. Species distribution was determined using "Flora of Uzbekistan" and "Keys to Plants of Central Asia".

*Results and discussion.* According to A. N. Sennikov et al. [12], the flora of vascular plants in Uzbekistan comprises approximately 4,344 species. Based on the conducted surveys, 650 species of essential oil-bearing plants were identified in the flora of the Republic of Uzbekistan, belonging to 261 genera and 56 families [10].



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Within the framework of the project PZ-20170919165, titled “Cadastre of Rare and Endangered Vascular Plant Species of Navoi and Bukhara Regions”, carried out between 2018 and 2020, the vascular plant diversity of the Bukhara region was analyzed. The regional flora includes 640 species from 323 genera and 62 families. Among them, 42 species, representing 29 genera and 8 families, were identified as essential oil-bearing plants.

These species constitute approximately 6.5% of the total flora of the Bukhara region, meaning that the area harbors more than one-fifteenth of all essential oil-producing species known from Uzbekistan.

The physico-geographical characteristics of the region significantly influence both the distribution and species richness of essential oil-bearing plants. Their relatively low abundance may be attributed, on the one hand, to the arid and harsh climatic conditions prevalent in much of the territory, and on the other hand, to the ongoing expansion of urbanized and agricultural lands, which contributes to the degradation and reduction of natural habitats.

A comparative assessment of the distribution of essential oil-bearing species between the Bukhara and Navoi regions demonstrates a 63% similarity, primarily due to the presence of species belonging to the families Cyperaceae, Fabaceae, Lamiaceae, Asteraceae, and Apiaceae.

Within the Bukhara region, the taxonomic composition of essential oil-bearing plants by families largely reflects the general pattern observed across the Republic of Uzbekistan. In terms of species diversity, the leading families are Apiaceae (14 species from 10 genera), Lamiaceae (8 species from 8 genera), and Asteraceae (13 species from 5 genera).

The conducted study provides a comprehensive taxonomic characterization of the essential oil-bearing flora of the Bukhara region. A total of 42 species belonging to 29 genera and 8 families were identified, accounting for approximately 6.5% of the regional vascular flora. The dominant families — Apiaceae, Lamiaceae, and Asteraceae — mirror the general distribution trends of essential oil-producing plants throughout Uzbekistan.

*Conclusion.* A comparison with the Navoi region revealed a 63% similarity in family composition, mainly due to the prevalence of species within Cyperaceae, Fabaceae,



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Lamiaceae, Asteraceae, and Apiaceae. This pattern highlights the strong floristic connections between the central regions of Uzbekistan, shaped by comparable environmental and climatic conditions.

The relatively limited diversity of essential oil-bearing plants in the Bukhara region is likely a consequence of its arid continental climate, poor soil moisture, and increasing anthropogenic pressure, including agricultural expansion and urban development. Nevertheless, the recorded taxa represent valuable biological resources that may serve as a basis for further phytochemical and ecological investigations, as well as for the development of sustainable utilization strategies of wild aromatic and medicinal plant species.

### References

1. Adilov, B. A., Saitzhanova, U. Sh., & Khaitov, R. (2021). Wild-growing essential oil plants of the Bukhara region. *Khorezm Mamun Academy Bulletin*, (5), 2021.
2. Arykbaeva, N. M., & Turbatova, A. O. (2016). Traditionally used medicinal and aromatic plants of Kyrgyzstan. In *Proceedings of the International Scientific and Practical Conference*. Moscow, pp. 184–189.
3. Goryaev, M. I. (1952). *Essential oils of the flora of the USSR*. Alma-Ata: Academy of Sciences of the Kazakh SSR. 361 p.
4. Denisova, G. A., & Golubeva, K. I. (1960). Some wild essential oil plants of the spurs of the Fergana Range. In *Proceedings of the Botanical Institute of the USSR Academy of Sciences, Series 5: Plant Raw Materials*, 6, 217–225.
5. Egeubaeva, R. A. (2002). *Wild essential oil plants of the southeast of Kazakhstan*. Almaty. 241 p.
6. Kaitmazov, T. B. (2014). *Bioresource potential of aromatic plants in the Republic of North Ossetia-Alania and their practical application*. PhD thesis, Gorsky State Agrarian University, Vladikavkaz. 205 p.
7. *Key to the Plants of Central Asia*. (1971). Vol. 2, pp. 94–109. Tashkent: Fan Publishing House.
8. Tkachenko, K. G. (2011). Essential oil plants and essential oils: achievements, prospects, modern trends in research and application. *Bulletin of Udmurt University*, 11, 88–100.



## International Conference on Economics, Finance, Banking and Management

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9. Flora of Uzbekistan. (1941–1962). Tashkent: Academy of Sciences of the Uzbek SSR.
10. Khadjimatov, M. (1989). Wild medicinal plants of Tajikistan. Dushanbe: Main Scientific Editorial Office of the Tajik Encyclopedia. 368 p.
11. Khodzhimatov, K. (1999). Essential oil plants of Uzbekistan and ways of their rational use. Doctoral dissertation, Institute of Botany, Tashkent. 110 p.
12. Chizh, M. I. (1968). Essential oil plants of the Samarkand region. Author's abstract of PhD dissertation, Samarkand. 24 p.
13. Sennikov, A. N., Tojibaev, K. Sh., Khassanov, F. O., & Beshko, N. Yu. (2016). The Flora of Uzbekistan Project. *Phytotaxa*, 282(2), 107–118.
14. Bassolé, I. H. N., & Juliani, H. R. (2012). Essential oils in combination and their antimicrobial properties. *Molecules*, 17, 3989–4006.
15. Herman, R. A., Ayepa, E., Shittu, S., Fometu, S. S., & Wang, J. (2019). Essential oils and their applications: A mini review. *Advances in Nutrition and Food Science*, 4, 4–13.
16. Tongnuanchan, P., & Benjakul, S. (2014). Essential oils: Extraction, bioactivities, and their uses for food preservation. *Journal of Food Science*, 79(7).