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MEDICINAL POTENTIAL AND BIOECOLOGICAL CHARACTERISTICS OF LAMIACEAE SPECIES IN UZBEKISTAN

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Abstract

The Lamiaceae family, commonly known as the mint family, comprises a vast array of plant species with significant medicinal, aromatic, and ornamental value. This article explores the bioecological properties of various medicinal species within the Lamiaceae family, particularly those found in Uzbekistan. The study emphasizes the importance of these species in local and industrial applications, highlighting their roles in traditional and modern medicine, food, and perfumery industries. Data were collected from various botanical texts, research articles, and field studies conducted in different regions of Uzbekistan. The bioecological properties, traditional uses, and current applications of these species were analyzed to provide a holistic understanding of their significance. Additionally, field observations and specimen collections were conducted to verify the presence and ecological characteristics of specific species. This comprehensive review aims to provide insights into the biodiversity, ecological significance, and potential applications of these plants, underscoring the need for their conservation and sustainable utilization.

Keywords

Lamiaceae, medicinal plants, bioecological properties, Uzbekistan flora, essential oils, conservation

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INTRODUCTION

The mint family (Lamiaceae), one of the largest plant families in the world, is renowned for its rich diversity and wide distribution, particularly in warm and temperate climates. The Lamiaceae family includes more than 230 genera and over 7,000 species [9]. It comprises numerous plants of significant economic and medicinal importance. In Uzbekistan, there are 238 species belonging to 39 genera,

69 of which possess medicinal properties. This article examines the bioecological characteristics of these medicinal species, their traditional uses, and the prospects for their application in modern pharmaceuticals and industry.

LITERATURE REVIEW AND METHODOLOGY

The mint family (Lamiaceae) has been extensively studied due to its economic, medicinal, and ecological significance [2,3,4,6]. This review covers key aspects of its biological diversity, traditional uses, and modern applications. Globally, the Lamiaceae family includes more than 200 genera and nearly 3,000 species, with particularly high representation in the Mediterranean region, Central Asia, and temperate zones [6]. In Uzbekistan, 238 species belonging to 39 genera have been documented, with especially high biological diversity observed in the Fergana Valley. The genera *Salvia* L., *Mentha* L., *Thymus* L., *Ziziphora* L., *Melissa* L., *Leonurus* L., and *Origanum* L. are among the most widespread and well-studied due to their extensive use in traditional medicine and modern pharmacology [2].

Traditional Uses. Historically, species of the mint family (*Lamiaceae*) have been utilized across various conventional medical systems [3]. For example, common sage (*Salvia officinalis*) has been used for centuries in European herbal medicine due to its anti-inflammatory and antioxidant properties. Similarly, spearmint (*Mentha spicata*) and peppermint (*Mentha piperita*) have been employed in both culinary and medicinal contexts for their beneficial effects on digestion and respiratory health. The roots and other parts of Baikal skullcap (*Scutellaria baicalensis*) have long been used in traditional Chinese medicine for their anti-inflammatory and anticancer properties.

In modern medicine, *Lamiaceae* species remain valuable due to their rich content of bioactive compounds such as essential oils, flavonoids, and phenolic acids. For instance, rosemary (*Rosmarinus officinalis*) is widely studied for its general tonic and anti-inflammatory effects. Common thyme (*Thymus vulgaris*) is known for its antimicrobial and antioxidant properties, making it a key ingredient in pharmaceutical and cosmetic industries. Additionally, essential oils derived from lavender (*Lavandula angustifolia*) are extensively used in aromatherapy to relieve stress and anxiety.

Conservation of medicinal species belonging to the mint family (*Lamiaceae*) is particularly important in the territory of Uzbekistan. Overharvesting and habitat loss pose significant threats to these plants. Sustainable practices such as controlled cultivation and proper management of wild populations are essential to ensure their long-term availability. Research on cultivation methods for key species, including *Lagochilus inebrians* Bge. and *Ziziphora tenuior* L. has shown promising results in improving both the yield and quality of medicinal compounds.

In this study, a comprehensive review of available literature on the *Lamiaceae* family was conducted, with particular focus on species widely distributed in Uzbekistan. Data were collected from various botanical texts, research articles, and field studies carried out in different regions of the country. The bioecological characteristics, traditional uses, and current applications of these species were analyzed to provide an integrated understanding of their significance. In addition, field observations and specimen collection were performed to examine the presence, ecological traits, and population conditions of selected species.

RESULTS AND DISCUSSION

In Uzbekistan, the mint family (*Lamiaceae*) is represented by 238 species belonging to 39 genera, exhibiting particularly high diversity in the Fergana Valley, where 59 species across 26 genera are found. Prominent genera include *Lagochilus* Bge., *Ziziphora Tenior* L., *Salvia* L., and *Dracocephalum* L., each comprising several species with notable medicinal properties.

These plants are primarily distributed across warm and temperate zones and occupy a wide range of ecological niches – from rocky and dry habitats to moist, shaded areas. Their ecological plasticity allows them to adapt to various environmental conditions, contributing to their broad use in traditional medicine and increasing interest in their phytochemical and pharmacological potential.

Medicinal Properties and Applications

Several species within the *Lamiaceae* family are traditionally used for their medicinal properties. For example:

- *Marrubium alternidens* Rech. This perennial plant, widely distributed across Tashkent, Fergana, Samarkand, and other regions, is well known for its application in treating respiratory and throat-related ailments. It is traditionally used to relieve cough, cold symptoms, and other respiratory conditions due to its expectorant and soothing properties.

- *Melissa officinalis* L. Commonly known as lemon balm, this plant is used to treat digestive disorders, anaemia, and nervous system conditions. Its pleasant lemon scent also makes it widely used in aromatherapy. Research has demonstrated that its essential oil possesses notable antioxidant and antiviral activities, which support its use in traditional and modern herbal medicine.

- *Mentha arvensis* L. Mint is widely used for its antiemetic, digestive, and calming properties. Its essential oil serves as a key component in various medicinal formulations, particularly in the treatment of irritable bowel syndrome (IBS) and other gastrointestinal disorders.

- *Origanum tyttanthum* L. This small-flowered mountain basil is traditionally employed for its expectorant effects and its ability to stimulate digestion. It is

frequently included in remedies for respiratory diseases. In addition, it has been studied for its antimicrobial activity, particularly against pathogens of the respiratory tract.

- *Lagochilus inebrians Bunge*. This species is distinguished by its hemostatic properties and is traditionally used to stop bleeding and promote wound healing. Studies indicate that its extracts possess significant wound-healing and anti-inflammatory effects.

- *Leonurus turkestanicus V.I. Krecz. & Kuprian*. In traditional medicine, the water-alcohol extract and infusion of this species are used as sedative remedies for the treatment of cardiovascular disorders.

Species	Traditional folk name in Uzbek	Medicinal Properties	Application
Marrubium alternidens	Qatortishli devoltegio't	Treating respiratory diseases	Cough, cold, inhaling problems
Melissa officinalis	Dorivor limono't	Problems with digestion, treating nervous system	Aromatherapy, antioxidant
Mentha arvensis	Dala yalpizi	Antiemetic, problems with digestion	in the treatment of irritable bowel syndrome (IBS) and other gastrointestinal disorders
Lagochilus hirsutissimus	Tikanli bozulbang	In wound healing and for anti-inflammatory purposes	For stopping bleeding and promoting wound healing
Betonica betoniciflora	Tog'quddusi	In gynaecological diseases	In pregnancy and while giving birth
Zizifora	Kiyiko't	To stimulate appetite and to normalise blood pressure	In cardiovascular diseases

The bioecological characteristics of *Lamiaceae* species vary significantly. For example, *Marrubium alternidens Rech.* grows along roadsides, at the base of walls, and on abandoned lands. *Melissa officinalis L.*, on the other hand, prefers rocky, shaded habitats. These species also display diverse morphological traits—for instance, *M. officinalis* has erect, branched stems, whereas *Lagochilus inebrians Bunge* possesses rhomboid-ovate leaves. Understanding these characteristics is essential for developing effective conservation strategies and optimizing their use in various applied fields.

The growing demand for medicinal plants requires an effective conservation strategy. It is crucial to identify important habitats and develop sustainable

harvesting methods to prevent the decline of natural populations. Furthermore, cultivating medicinal species under controlled conditions can help maintain wild populations while meeting industrial demand. Studying the bioecological features of these plants provides valuable insights for breeding programs and for producing high-quality raw materials for pharmaceutical purposes.

Species of the mint family (*Lamiaceae*) hold significant importance across various fields. Essential oils derived from plants such as lavender (*Lavandula angustifolia*) and rosemary (*Rosmarinus officinalis*) are highly valued in the perfumery and cosmetic industries for their fragrance and therapeutic properties. Additionally, the culinary use of thyme (*Thymus vulgaris*) and oregano (*Origanum vulgare*) highlights the family's relevance to the food industry, as their antimicrobial properties contribute both to flavor enhancement and preservation.

CONCLUSION

The mint family (*Lamiaceae*) represents a rich resource of medicinally and economically valuable plants. In Uzbekistan, these species hold an important place in traditional medicine and possess significant potential for industrial applications. Conservation efforts and sustainable utilization practices are essential to ensure the long-term availability of these valuable resources. Future research should focus on fully exploring the potential of *Lamiaceae* species, including their pharmacological properties and applications in modern medicine.

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