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DISTRIBUTION OF ELAEAGNUS ANGUSTIFOLIA L. IN THE PLANT COMMUNITIES OF THE YOZYOVON NATURAL MONUMENT

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Abstract

This article examines the flora of the Yozyovon State Natural Monument, the structure of its plant communities, their ecological and phytocoenotic characteristics, as well as the bioecological features of *Elaeagnus angustifolia* occurring together with landscape-forming and rare plant species. The results of monitoring on the life forms of plant species, their habitats (biotopes), and their useful properties in the study area are presented, along with detailed information on the bioecology of *Elaeagnus angustifolia*. The study revealed that more than 200 plant species have been recorded within the territory of the natural monument, the majority of which are distributed in sandy and saline ecosystems.

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Keywords: *Elaeagnus angustifolia*, Yozyovon Natural Monument, flora, desert ecosystem, plant community, monitoring, landscape, psammophyte, halophyte, phytocoenosis.

INTRODUCTION

Since Uzbekistan gained independence, the rational use and conservation of natural resources have become one of the priority directions of state policy. In particular, the study of natural monuments located in desert regions with unique ecological systems, the identification of their flora and fauna, and the conservation of rare species have acquired special significance. The Yozyovon desert landscape, characterized by its richness and biological diversity, is one of the most remarkable natural areas of the Fergana Valley. This territory possesses a complex ecological structure formed by sandy dunes, saline soils, tugai (riparian) forests, and wetland zones. Therefore, the investigation of plant species diversity, their distribution patterns, ecological adaptations, and phytocoenotic structure within the monument represents a highly relevant and urgent task in contemporary botanical and ecological research.

The Yozyovon Natural Monument was established in the Yozyovon District by the decree of the Governor of Fergana Region dated May 23, 1994 (coordinates: N 40.698228, E 71.471540), with a total area of 1,471.5 hectares (Fig. 1). This natural monument was created for the purpose of protecting unique, irreplaceable natural sites of scientific, ecological, cultural, and aesthetic value represented primarily by sand dune ecosystems. The name of the monument originates from the local desert toponym “Yozyovon,” which literally means “fields and steppes.” The sand dunes of Yozyovon are inhabited by five endemic reptile species and nearly fifty rare insect species [3].

In terms of its uniqueness, the monument is of national importance. Based on long-term field surveys, monitoring studies, comprehensive analysis of collected materials, and their comparison with available scientific sources, it has been

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established that 42 plant families, 188 genera, and 302 plant species occur within the territory of the monument [1]

The continuous growth of the global human population and the expansion of land use have led to a significant reduction and, in some cases, the depletion of natural resources, including the diversity of natural plant reserves. In this context, the inventory and assessment of the current status of natural reserves of medicinal and economically valuable plants represent one of the most important indicators of sustainable resource management. In Uzbekistan, extensive scientific research is being conducted to determine the species composition of medicinal plants, to study their biological characteristics, to assess their populations and natural reserves, to scientifically substantiate population changes under the influence of external factors, to analyze the causes of their decline, and to improve methods for their conservation and reproduction. In this regard, a special emphasis is placed on the development of an international inventory system for poorly studied medicinal plant species that are currently declining as a result of external impacts. Based on the assessment of the scale of influencing factors, modern approaches are being developed for the conservation and enhancement of their natural reserves. One of such valuable medicinal and edible plant species is *Elaeagnus angustifolia* L., commonly known as Russian olive.



Figure 1. *Elaeagnus angustifolia* L. in the flora of the Yozyovon Natural Monument

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MATERIALS AND METHODS

To determine the bioecological and ecogeographical characteristics of *Elaeagnus angustifolia* distributed in the flora of the Yozyovon Natural Monument, field investigations were carried out during 2023–2025. In studying the research object, route-based and semi-stationary floristic methods were applied, along with geographical–comparative and morphological methods of plant systematics. In addition, modern grid-based mapping techniques were employed. During the research process, the distribution areas of the species were identified, and herbarium specimens were prepared.

For the taxonomic identification of the collected specimens, the following sources were used: Key to Plants of Central Asia, Vol. IX and Flora of Uzbekistan, Vol. V. The systematic analysis of taxa was conducted in accordance with the APG IV classification system.

The Yozyovon State Natural Monument was selected as the research area. This monument was established in 1994 and covers an area of 1,820.4 hectares. It is located in the northwestern part of Fergana Region, on the marginal zone of the Karakalpak Desert within the Torlduquduq (Sarson Sand) massif. Monitoring studies were conducted during 2023–2025 using the following methodological approaches:

- Compilation of a floristic checklist (geobotanical route method);
- Identification of plant life forms (based on the Raunkiaer classification);
- Classification according to habitats and biotopes;
- Classification of species based on their useful properties;
- Phytocoenotic observations and landscape analysis.

RESULTS AND DISCUSSION

As a result of the field studies conducted in the Yozyovon Desert State Natural Monument during 2023–2025, the current condition and distribution areas of *Elaeagnus angustifolia* were investigated. It is well known that the degree of

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diversity in the plant world largely depends on the climatic and soil conditions of the area in which plants grow. Based on field observations, monitoring results, information obtained from local residents, analysis of scientific sources, and their subsequent scientific processing, it was established that 60–70 years ago (and even 100 years ago), the area occupied by natural landscapes in the regions of the Yozyovon sandy deserts was several times larger than at present. Extensive flat plains existed among the sand masses, and saline lands, sand dunes, and lakes occupied vast territories.

In these areas, separate populations of *Elaeagnus angustifolia* were widely distributed. However, as a result of anthropogenic impacts and environmental changes, the natural distribution range and population structure of this species have undergone significant transformation.

Distribution of Species by Biotopes

According to the monitoring results, the distribution of plant species by biotopes is as follows:

- ✓ Sandy areas – 75 species;
- ✓ Saline lands – 64 species;
- ✓ Tugai (riparian forest) zones – 34 species;
- ✓ Aquatic and wetland biotopes – 12 species;
- ✓ Weedy and ruderal species – 64 species.

This distribution pattern clearly indicates the dominance of xerophytic and halophytic components typical of desert ecosystems within the flora of Yozyovon.

Plant Communities of Sandy Areas (Psammophytes)

In sandy deserts, air and soil surface temperatures rise to 65–70 °C during the summer months. Under such extreme conditions, only plants adapted to water deficiency are able to survive. Among psammophytic vegetation, the main landscape-forming species include:

Haloxylon persicum and *H. aphyllum* (white and black saxaul), *Salsola richteri* (cherkez), *Calligonum* spp. (qandim species), *Ammodendron conollyi* (rabbit

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bone shrub), *Nitraria schoberi* (white desert thorn), *Astragalus rubellus* and *A. sieversianus* (astragalus species), *Aristida karelinii* (selin grass), and *Carex physodes* (sedge).

In sandy ecosystems, ephemerals and ephemeroïds form a green cover in early spring, constituting the initial plant layer of the community. During the summer, they are gradually replaced by perennial xerophytic species. These seasonal changes reflect the phenological dynamics of phytocoenoses in desert landscapes.

Vegetation of Saline Areas (Halophytes)

Saline lands occupy relatively small areas within the monument; however, their ecological significance is considerable. These habitats are covered by salt-tolerant halophytic species such as: *Halocnemum strobilaceum* (sarsazan), *Kalidium caspicum* (alkaline glasswort), *Salsola arbuscula* (boyalish), *Aeluropus litoralis* (saltgrass), *Limonium meyeri* (statice), and *Karelinia caspica* (oqbosh). These species are adapted to high concentrations of dissolved salts in soil moisture. They are characterized by deep root systems and reduced or absent leaves, which minimize water loss under saline conditions.

Tugai and Wetland Vegetation

The tugai biotopes within the monument are located in low-lying areas close to water bodies and represent some of the most floristically rich ecosystems of the territory. A total of 34 plant species have been recorded in these habitats. The main edicator species include: *Populus pruinosa* (desert poplar), *Elaeagnus angustifolia* (Russian olive), *Tamarix hispida* and *T. ramosissima* (saltcedar), *Glycyrrhiza glabra* (licorice), *Phragmites australis* (common reed), and *Typha angustifolia* (narrowleaf cattail).

In wetland and aquatic habitats, hydrophytes such as *Lemna minor*, *Polygonum amphibium*, and *Mentha asiatica* dominate. The majority of these species play an important role in aquatic and riparian food chains.

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Bioecological Characteristics of *Elaeagnus angustifolia* L.

Elaeagnus angustifolia L. is a tree species belonging to the family Elaeagnaceae and has long been known in the landscapes of Central Asia, the Caucasus, and Western–Central Asia. In our region, it is widely known as “qushjiyda” and is highly valued in local agroecosystems as a windbreak plant, a soil-stabilizing species, and an important source of food and raw materials.

The species was first described by Linnaeus under the name *Elaeagnus angustifolia* L. *Elaeagnus angustifolia* is a tree reaching 3–8 m in height, with a reddish-brown bark. Young shoots and leaves are silvery white in appearance due to the presence of dense, shield-like scaly trichomes covering their surface. The leaves are lanceolate or elliptic-lanceolate in shape, shortly pointed at the apex, 3.5–7 cm long and 7–18 mm wide, with petioles 5–12 mm in length. The flowers are fragrant and borne on short pedicels (2–5 mm), usually arranged in groups of 1–3 in the leaf axils. The outer surface of the perianth is silvery white and densely covered with scales, whereas the inner surface is nearly glabrous and yellowish. The floral tube is 5–6 mm long and 2.5–3 mm wide, terminating in a slightly elongated, ovate-pointed, three-lobed perianth limb. The filaments of the stamens are very short, and the anthers are elongated, approximately 2 mm in length.

The fruit is a drupe of spongy texture, round to oval in shape, about 10 mm long and 7 mm wide. Initially, it is covered with scales, but at maturity it becomes nearly glabrous and yellowish. The stone is elongate-ovoid, slightly pubescent, about 10 mm long and 5 mm wide. In one group of Russian olive forms, the fruits are oval to spherical and glossy, yellowish-red in color, and dry in texture. In another group, the fruits are elongated and ovoid, less fleshy, with sugary exudates accumulating on the surface, and dark in color. These fruits are highly preferred by birds. The fruits of Russian olive are also collected and consumed by local people and are used for the preparation of jams and syrups.

Elaeagnus angustifolia reproduces both by root suckers and by seeds. Its seedlings grow and develop well on slightly saline soils. The flowering period

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occurs in May, while fruit ripening takes place during September–October. The species typically grows in tugai forests (riparian woodlands along riverbanks), and it is also occasionally cultivated.

Distribution

The species occurs in the Tashkent, Fergana, Samarkand, Bukhara, Kashkadarya, and Surkhandarya regions, as well as in the territory of the Republic of Karakalpakstan.

General range. Central Asia, southern Europe, the Caucasus, Western Siberia, the Mediterranean Basin, Iran, Afghanistan, Pakistan, extending to Tibet and the Himalayas.

Russian olive is an important ecological factor in enhancing soil fertility. Throughout its growth and development under various natural conditions, it improves soil quality, reduces erosion processes, and increases the efficiency of land use. Especially in arid and semi-arid regions, *Elaeagnus angustifolia* plays a major role in soil stabilization and enrichment with mineral and organic matter. Its most significant contribution to soil fertility is associated with biological nitrogen fixation through its root system. The roots form a symbiotic association with nitrogen-fixing bacteria, which convert atmospheric nitrogen into plant-available forms, primarily ammonium compounds. As a result, soil nitrogen reserves increase, nutrient availability for plants improves, and the overall nitrogen balance of the ecosystem is enhanced. In this way, *Elaeagnus angustifolia* creates favorable nutritional conditions not only for its own growth, but also for surrounding plant species.

In addition, Russian olive serves as an important source of organic matter. Its leaves, flowers, fruits, and other plant parts decompose rapidly, supplying substantial amounts of organic material to the soil. This stimulates microbial activity, improves the microbiological condition of the soil, and enhances aeration

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and water infiltration processes. Consequently, soil fertility increases in a stable and sustained manner.

Russian olive is also highly valuable for the reclamation of saline soils. *Elaeagnus angustifolia* grows well under saline and drought-prone conditions, absorbs excess salts from the soil, and mitigates their harmful effects. This property is particularly important for the restoration of salt-affected lands and for converting them into areas suitable for agricultural cultivation.

CONCLUSION AND RECOMMENDATIONS

In general, Russian olive (*Elaeagnus angustifolia*) is of exceptional ecological and agronomic importance in enhancing soil fertility, reducing erosion processes, and restoring saline and degraded lands. Due to its high biological activity, nitrogen-fixing capacity, and the rapid decomposition of its organic residues, this species significantly improves the physical, chemical, and biological properties of soils. Therefore, *Elaeagnus angustifolia* plays a crucial role in maintaining ecological stability, preserving the fertility of agricultural lands, and serving as a natural reclamation agent in desert and semi-desert regions. Its fruits are widely used for nutritional purposes and in traditional medicine. The phytochemical composition of the species includes flavonoids (quercetin and kaempferol glycosides), phenolic acids, terpenoids, and saponins. Pharmacological studies have demonstrated its antioxidant, anti-inflammatory, analgesic, wound-healing, and cardioprotective activities.

The desert plant communities of the Yozyovon Natural Monument, where *Elaeagnus angustifolia* is distributed, play a vital role in maintaining ecological balance. The plant species of sandy, saline, and tugai biotopes are closely interconnected and together form a unified landscape system. Consequently, any anthropogenic impact in such areas may lead to a significant decline in floristic diversity. The conservation of the plant communities of the monument, the обеспечение of their natural regeneration, the continuation of systematic

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monitoring, and the development of scientific and educational ecotourism are essential measures to ensure the long-term ecological sustainability of this territory.

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