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TAXONOMY, MORPHOLOGY, AND ECOLOGICAL SIGNIFICANCE OF TAMARIX L. SPECIES DISTRIBUTED IN THE FERGANA VALLEY

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ABSTRACT:

This article explores the morphological, ecological, and geographical characteristics of Tamarix L. species distributed in the Fergana Valley. The research is based on herbarium materials from the National Herbarium of Uzbekistan and field observations. The study analyzes the species' distribution patterns, habitat preferences, and practical significance. Due to their high ecological adaptability, Tamarix species have potential for phytomeliorative applications in arid zones.

INTRODUCTION. Among the rich floristic diversity of Uzbekistan, representatives of the genus *Tamarix* L. occupy a special place. These species are mainly distributed in arid and saline soils, where they play a significant role in ensuring ecological stability [4]. In regions like the Fergana Valley, where natural and anthropogenic factors intersect, species of this genus are particularly important for stabilizing natural ecosystems and reducing land degradation [7]. In recent years, climate change, water scarcity, and increasing soil salinity have highlighted the need for a deeper understanding of the ecological functions and adaptive mechanisms of *Tamarix* species [5]. At the same time, morphological and geographic identification of these species, as well as the study of their distribution patterns, contribute to a more comprehensive understanding of the floristic wealth of the Fergana Valley [6].

The Fergana Valley is located in the eastern part of Uzbekistan and encompasses the Andijan, Fergana, and Namangan regions [8]. Its relief mainly consists of low foothills and plains, surrounded by the Chatkal and Qurama mountain ranges in the north and the Alay

range in the south, forming a naturally enclosed ecosystem [3]. The region is dominated by a semi-desert and desert climate, characterized by extremely hot and dry summers and moderately cold winters. The vegetation period is relatively long, which facilitates the wide distribution of various plant species, including those from the genus *Tamarix*. In certain parts of the valley, soil salinity levels are high, providing a natural habitat for *Tamarix* species [4].

Therefore, the Fergana Valley, as a unique natural-geographical and ecological region, serves as an important research area for studying the distribution, morphological characteristics, and ecological significance of *Tamarix* species. This study analyzes the systematic classification, geographical distribution, and ecological adaptation features of *Tamarix* species found in various natural and regional zones of the valley. The results of the research aim not only to identify the local floristic diversity but also to determine species beneficial for stabilizing desert landscapes. Owing to their physiological and morphological adaptations, representatives of this genus are ecologically important for stabilizing degraded lands and combating wind and soil erosion. Thus, the study of *Tamarix* species is considered highly relevant for the fields of ecology, geography, and floristics [1,3].

Material and methods. The genus *Tamarix* L. – commonly known as "Yulgun" in Uzbek – belongs to the family **Tamaricaceae** Link. It comprises shrubs and, in some cases, small trees, typically reaching heights of 3–4 meters, though some species may grow up to 6–8 meters. In total, 12 species of this genus have been recorded in the flora of Uzbekistan:: *T.androssowii* Litw., *T. arceuthoides* Bunge, *T. bungei* Boiss., *T. elongata* Ledeb., *T. florida* Bunge, *T.hispida* Willd., *T. hohenackeri* Bunge, *T. laxa* Willd., *T.leptostachya* Bunge, *T. litwinowii* Gorschk., *T. meyeri* Boiss., *T. ramosissima* Ledeb. Farg'ona vodiysida esa quyidagi 5 ta turi tarqalgan *T. arceuthoides* Bunge, *T. bungei* Boiss., *T. hohenackeri* Bunge, *T. elongata* Ledeb., *T. litwinowii* Gorschk[11].

Table 1.**Species of *Tamarix* L. occurring in the flora of Uzbekistan as documented in the Uzbekistan National**.

№	Species	Number of herbarium specimens
1	*Tamarix androssowii* Litv, FI.Bot.Muz.Imp.Akad.Nauk 5:41 (1905).	6
2	*Tamarix arceuthoides* Bunge,FI.Russl.:119 (1952).	130

3	*Tamarix aralensis* Bunge, Tent .Gen. Tamar.:59 (1852)	10
4	*Tamarix elongate* Ledeb, FI.Altaiv. 1:421(1829)	25
5	*Tamarix florida* Bunge, Tent .Gen. Tamar.:37 (1852)	16
6	*Tamarix hispida* Wild, Abh. Konigl.Akad.Wiss.Berlin 1812-1813:77 (1816)	133
7	*Tamarix hohenackeri* Bunge, Tent .Gen. Tamar.:44 (1852)	35
8	*Tamarix laxa* Wild, Abh. Konigl.Akad.Wiss.Berlin 1812-1813:82(1816)	86
9	*Tamarix lepostachya* Bunge, Beitr,FI.Russl: 117(1852)	8
10	*Tamarix litvinovii* Gorschk, Spisok Rast. Gerb. Fl. S.S.S.R. Bot. Inst. Vsesojuzn. Akad. Nauk 10(61-64: 24 (1936)	21
11	*Tamarix meyeri* Boiss, Diagn. Pl. Orient. 10: 9 (1849)	19
12	*Tamarix ramosissima* Ledeb, Fl. Altaic. 1: 424 (1829)	330

Results .A total of **819 herbarium specimens** representing 12 species of the genus *Tamarix* are preserved in the **National Herbarium of Uzbekistan (TASH)**. The most widely collected and geographically widespread species is ***Tamarix ramosissima* Ledeb.**, with 330 specimens. This dominance is likely attributed to its high level of ecological plasticity and resilience to anthropogenic environments.

Following *T. ramosissima*, the species with the next highest number of specimens are ***T. hispida* Willd.** (133 specimens) and ***T. arceuthoides* Bunge** (130 specimens), both of which are commonly found across natural and semi-artificial ecosystems of the Fergana Valley.

Less commonly represented species include ***T. leptostachya* Bunge** with 8 specimens and ***T. androssowii* Litv.** with only 6 specimens. These low numbers may reflect a restricted geographic range or under-sampled habitats.

The variation in specimen counts among species may be influenced by two primary factors: (1) their actual distribution and abundance in nature, and (2) the intensity and historical focus of botanical collection efforts. (Tamarix) species are typically found in riparian forests, foothills, and desert regions, often growing densely and forming distinctive landscape elements. They are distributed along riverbanks, lake peripheries, saline soils, and clay flats (takyrs). In addition, these species colonize sandy mounds with elevations of 5–10 meters, forming extensive thickets. Although *Tamarix* species do not naturally originate from sand dunes, they are often observed in areas where wind-deposited sands or fluvial

sediments have accumulated, causing their stems to become partially buried. In such conditions, the buried portions of the plants develop **adventitious roots**, enabling the plant to continue growing and expand vegetatively. These rooting strategies allow *Tamarix* species to rapidly colonize new areas and expand their range effectively.

Importantly, *Tamarix* species exhibit low sensitivity to environmental factors such as heat, moisture, and soil quality [10]. This ecological flexibility also underlies their significance in **sand fixation** and their use as **ornamental plants**.

The following section provides additional information on selected *Tamarix* species distributed in the Fergana Valley.

1. *Tamarix hohenackeri* Bunge, Tent. Gen. Tamar.: 44 (1852).Phanerophyte (nanophanerophyte). A shrub characteristic of river valley habitats, typically forming thickets. Stems can reach up to 6 meters in height. Leaves are lanceolate, ovate-lanceolate, or broadly ovate. The flowers range in color from bright pink or reddish to pale pink and nearly white. The fruit is a dry, thin capsule containing an average of 27 seeds.

2. *Tamarix laxa* Willd., Abh. Königl. Akad. Wiss. Berlin 1812–1813: 82 (1816) .Phanerophyte (nanophanerophyte). This species typically grows in river valleys, saline environments, and at the edges of sandy deserts, as well as along salty streams and sand dunes. Stems may reach up to 2 meters in height. Leaves are ovate or rhomboid in shape. Inflorescences are solitary, broad, and nearly sessile, developing without bracts. Flower colors vary from pale pink to nearly white and even dark violet.

3. *Tamarix ramosissima* Ledeb., Fl. Altaic. 1: 424 (1829) .Phanerophyte (nanophanerophyte). Found primarily in desert river valleys, this species is highly tolerant of various soil conditions, including salinity and fluctuations in moisture. This adaptability enables it to thrive even under extremely harsh conditions, indicating a broad ecological range. The stem may grow up to 6 meters tall. Leaves are small, light green, ovate or cordate with short petioles and slightly curved margins. The species exhibits high variability. One distinctive feature is its ring-like calyx structure that remains intact even after fruit ripening.

4. *Tamarix hispida* Willd., Abh. Königl. Akad. Wiss. Berlin 1812–1813: 77 (1816). Phanerophyte (nanophanerophyte). A small tree or shrub with densely leafy branches covered in short, erect hairs. Leaves on annual shoots are narrow, pointed, greyish-yellow, with broad rounded bases and well-developed auricles. Flowering occurs from mid-summer to late autumn. This species is found in saline soils, riverbanks, salt springs, elevated loamy mounds, and other similar habitats.

Picture 1.*Tamarix hispida* Willd. (Plantarium.ru)

Picture 2. *Tamarix laxa* Willd. (Plantarium.ru)

The ecological characteristics of *Tamarix* species distributed in the Fergana Valley are marked by their high adaptability to local environmental conditions, significant ecological plasticity, and resistance to various extreme factors. Notably, species such as *T. hispida*, *T. laxa*, and *T. ramosissima* demonstrate the ability to thrive even in harsh environments characterized by drought, soil salinity, compaction, and extreme fluctuations in both air and soil temperatures [2].

In their natural habitats, *Tamarix* species are influenced primarily by the following ecological factors:

- **Soil Type**: Prefers saline, sandy, and alluvial soils, particularly along river valleys and ancient irrigation systems;
- **Moisture levels**: highly variable — from extremely arid (salt flats) to moderately moist environments (loess soils near streams);

- **Groundwater table**: in some locations, *Tamarix* species can grow even where groundwater lies as shallow as 1.5–2 meters;
- **Soil salinity**: medium to high salinity levels are optimal, especially for *T. laxa*.

Morphologically, *Tamarix* species exhibit distinct adaptations such as scale-like, extremely small leaves that reduce transpiration, and deep, wide-spreading root systems that enhance their tolerance to water scarcity and saline soils.

From an ecological perspective, these species contribute to reducing wind and water erosion, forming vegetation cover in saline areas, and restoring biogeochemical cycling processes [1]. Their presence is especially vital in degraded regions such as Turaqo‘rg‘on, Chust, Qo‘shtepa, and Jalaquduq, where they help sustain natural landscapes.

Practical Applications of *Tamarix* Species:

- **Phytomelioration**: Key species like *T. ramosissima* and *T. laxa* are used to rehabilitate saline and eroded lands;
- **Landscape architecture and urban greening**: Decorative species that are climate-resilient and require minimal maintenance;
- **Biofiltration**: Act as natural filters that reduce organic pollution along riverbanks and drainage systems;
- **Fire resistance and biomass potential**: In arid zones, some species are being studied as potential sources of biofuel [3].

The ecological and economic importance of *Tamarix* species is directly linked to their contribution to regional landscape stability. Therefore, ecological monitoring, along with both **in situ** and **ex situ** conservation and propagation strategies, holds significant scientific and practical value.

Conclusion. Findings from this study indicate that *Tamarix* species in the Fergana Valley exhibit considerable **morphological, ecological, and geographical diversity**. These species have adapted to a range of environments including river valleys, saline soils, ancient irrigation systems, and sand dunes. Their ability to survive under high salinity and drought stress reflects their high degree of **ecological plasticity**.

This adaptive capacity makes *Tamarix* species not only essential for floristic and ecological research but also valuable for **desert reclamation**, **erosion control**, and **landscape restoration**. Based on these results, it is essential to develop **recommendations for ecological monitoring, propagation, and conservation** of *Tamarix* species, especially under changing environmental conditions.

References:

1. Rusanov, I. F. (1980). *Lesomeliorativnaya rol' tamariksov* [The forest reclamation role of tamarisks]. Leningrad: Nauka.
2. Khasanov, F. O. (2000). *O'zbekiston cho'l o'simliklari florasi* [Flora of desert plants of Uzbekistan]. Tashkent: Fan.
3. Abdullayev, A. A. (2019). *Markaziy Osiyoning cho'l zonalari va o'simliklar qoplami* [Desert zones and vegetation cover of Central Asia]. Tashkent: Universitet.
4. Tugay, T. M., & Khasanov, F. O. (2021). Ecological and geographical characteristics of *Tamarix* L. species. *Bulletin of National University of Uzbekistan, Series of Biological Sciences*, (1), 45–49.
5. Karimov, A. K., & Ruziev, Sh. A. (2019). Plants of desert regions of Uzbekistan and their climate adaptation. *Uzbekistan Journal of Biology*, (2), 32–37.
6. Kudryasheva, A. P. (1982). *Rod Tamarix L. vo flore Sredney Azii* [The genus *Tamarix* L. in the flora of Central Asia]. Tashkent: Fan.
7. Kholmatov, A. S., & Ergashev, M. M. (2020). Plant communities' response to anthropogenic factors in Uzbekistan's desert landscapes. *Ecology and Environmental Protection*, (4), 28–33.
8. Rasulov, N. N., & Mamadaliyev, Sh. M. (2006). *O'zbekiston tabiiy geografiyasi* [Physical geography of Uzbekistan]. Tashkent: Fan.
9. Ergashev, M. M., & Karimov, A. K. (2015). *O'zbekiston iqlimi va o'simliklar qoplami* [Climate and vegetation cover of Uzbekistan]. Tashkent: Ilm Ziyo.
10. Akbarova, M., Maxmudova, M., & Karamatova, G. (2018). The plant ecosystem of Yazyavon natural monument. *Bulletin of Gulistan State University*, 2018(4), 20–24.
11. Vedenskiy, A. I. (1959). *Flora Uzbekistana* (Vol. 4). Tashkent: Publishing House of the Academy of Sciences of the Uzbek SSR.
12. Rusanov, F. N. (1949). *Tamariksy Sredney Azii* [Tamarisks of Central Asia]. Tashkent: Publishing House of the Academy of Sciences of the Uzbek SSR.
13. Plantarium. (2020). *Online plant identifier*. Retrieved January 28, 2020, from http://www.plantarium.ru
14. International Plant Names Index (IPNI). (2020). *IPNI database*. Retrieved January 22, 2020, from http://www.ipni.org