

ENDEMIC PLANTS OF THE REPUBLIC OF KARAKALPAKSTAN

Uzakova Sh.A., Azhiev A.B.

Doctoral Researcher, Department of Biology, Ajiniyaz Nukus State Pedagogical
Institute

Doctor of Biological Sciences, Professor, Department of Biology, Ajiniyaz Nukus
State Pedagogical Institute

Abstract

This article examines the endemic plants of the Republic of Karakalpakstan (the Southern Aral Sea region). It presents data on the composition of the regional flora (approximately 900–1,100 species) and the number of endemic and subendemic species (176 species, including nine strict Karakalpak endemics). The main euendemics are characterized: Anabasis ebracteolata, Salsola deserticola, Salsola chivensis, Ammodendron longiracemosum (A. karelinii), Eryngium mirandum, Lappula parvula, Scorzonera bungei, Cousinia dolichoclada, and Jurinea longicorallaris. Their distribution, ecological characteristics, and economic significance are described. The article also identifies threats to endemic species associated with aridification, soil salinization, and anthropogenic impacts, and discusses measures for their conservation.

Keywords: *endemic species, Karakalpakstan, Southern Aral Sea region, flora, Anabasis ebracteolata, Salsola, Ammodendron, Scorzonera bungei, biodiversity conservation, halophytes, xerophytes.*

Introduction

The Republic of Karakalpakstan occupies the northwestern part of Uzbekistan and forms part of the Southern Aral Sea region. Its territory encompasses highly diverse landscapes, including the Ustyurt Plateau with its escarpments and gypsum outcrops, the residual mountains of Sultan Uvaysdag and Beltau, the sands of the Kyzylkum Desert, the Amu Darya delta, and the extensive areas of the dried Aral Sea bed known as the Aralkum Desert. An extremely arid, sharply continental climate, highly saline soils, frequent dust storms, and substantial anthropogenic pressure, primarily associated with the desiccation of the Aral Sea, have created

conditions conducive to the development of a distinctive flora with a considerable proportion of endemic species [1, pp. 78–80; 2, pp. 130–132].

According to various surveys, the flora of Karakalpakstan comprises approximately 900–1,100 species of higher plants. About 176 endemic and subendemic species have been identified. Strict Karakalpak euendemics, defined as species whose distribution is largely confined to the republic or is very closely associated with it, comprise nine species, accounting for less than 1% of the total flora. Approximately 167 additional species are classified as subendemics. Most of their distribution ranges lie within the Southern Aral Sea region, although some localities have also been recorded in neighboring regions [1, pp. 86–88; 3, pp. 19–20].

The main concentrations of endemic species occur on the Ustyurt Plateau (approximately 37 species), the residual mountains of Sultan Uvaysdag (approximately 29 species), and the gravelly and sandy foothills of the northwestern Kyzylkum Desert (approximately 34 species). Their number is considerably lower on the deltaic plains and along the Aral Sea littoral. Most endemic species occur sporadically or are rare, preferring gypsum-rich, solonetzic, and gravelly slopes, disturbed sandy areas, or specific alluvial soils [1, pp. 88–90; 2, pp. 132–134; 3, pp. 370–383].

Major Endemic Plants of Karakalpakstan and Their Characteristics

Contemporary studies identify the following principal endemic species of Karakalpakstan [1, pp. 88–104; 2, p. 132].

1. Bractless *Anabasis* (*Anabasis ebracteolata* Eug. Kor. / Korovin ex Botsch.)

Family: Amaranthaceae (formerly Chenopodiaceae).

This is a subshrub characteristic of halophytic and xerophytic environments. It grows exclusively on the Ustyurt Plateau. Like other species of *Anabasis*, it has succulent, often jointed shoots and reduced leaves [1, p. 90; 4].

Economic significance: Like many representatives of the former Chenopodiaceae family found in the region, this species may serve as forage for camels and sheep during autumn and winter. However, owing to its rarity, it has virtually no practical economic significance. Its primary value is ecological, particularly its contribution to soil stabilization and desert plant communities [5, pp. 15–20].

2. Desert Saltwort (*Salsola deserticola* Iljin)

Family: Amaranthaceae.

This species occurs on the Ustyurt Plateau and in the Sultan Uvaysdag area. It is a typical halophyte [1, p. 92; 2, p. 132].

Economic significance: Species of the genus *Salsola*, including regionally important forage shrubs such as keyreuk and cherkez, are widely used in desert livestock farming. Because of its restricted distribution, this endemic species remains poorly studied in terms of its economic potential. Nevertheless, it may be of interest as a forage plant and for sand stabilization [5; 6].

3. Khiva Saltwort (*Salsola chivensis* M. Pop.)

Family: Amaranthaceae.

This species is endemic to the Ustyurt Plateau and is classified as a halophyte [1, p. 94; 2, p. 132].

Economic significance: Its potential uses are similar to those of the preceding species. It may serve as forage and as a component of natural pasture communities, but its limited distribution means that it is rarely used in practice [5].

4. Long-Racemed Sand Acacia (*Ammodendron longiracemosum* H. Raik.)

Family: Fabaceae.

In modern taxonomic treatments, this species is often regarded as a synonym of, or a taxonomic form associated with, *Ammodendron karelinii* Fisch. & C.A. Mey., commonly known as Karelin's sand acacia. It is a shrub characteristic of the sands of the Aral Sea region and the former islands of the Aral Sea. Its distinguishing features include silvery-pubescent shoots, spines, and racemose inflorescences [1, p. 96; 7].

Economic significance: Species of the genus *Ammodendron* contain alkaloids, including cytosine, pachycarpine, and anagryne, and are considered poisonous. Nevertheless, they play an important role in stabilizing mobile sands and may contribute to the initial stages of vegetation establishment. Their uses are limited mainly to fuel and phytomelioration. Although their alkaloid composition has been investigated, they have not achieved widespread application in medicine or industry [7; 8, pp. 1–5].

5. *Eryngium mirandum* Bobr.

Family: Apiaceae.

This species is endemic to the residual hills of Beltau. It is a perennial herb characterized by the spiny leaves and head-like inflorescences typical of the genus [1, pp. 98–100; 2, p. 132].

Economic significance: Some species of *Eryngium* are used in traditional medicine or cultivated as ornamental plants. However, this narrowly distributed endemic has scarcely been studied from an economic perspective. Its principal value lies in its contribution to regional biodiversity [1, pp. 98–100].

6. Small Stickseed (*Lappula parvula* Nab. et Zak.)

Family: Boraginaceae.

This small annual or biennial plant occurs in the Sultan Uvaysdag area and bears hooked fruits characteristic of the genus [1, p. 100; 2, p. 132].

Economic significance: Its economic uses have not been established. Like some other members of the Boraginaceae family, it may be of interest as a potential nectar plant. However, its rarity limits its practical significance.

7. Bunge's Scorzonera (*Scorzonera bungei* Krasch. & Lipsch.)

Family: Asteraceae.

This rare endemic occurs in the residual mountains of Sultan Uvaysdag and has also been recorded on the eastern escarpment of the Ustyurt Plateau. It is a perennial plant with flower heads characteristic of the genus. The species is included in the Red Data Book of Uzbekistan [1, p. 102; 2, p. 132; 9].

Economic significance: Many species of *Scorzonera* possess edible or medicinal roots and are traditionally used for respiratory complaints and for their purported anti-inflammatory properties. Because of its extreme rarity, *Scorzonera bungei* is not used commercially. Nevertheless, it may be of scientific interest and warrants further investigation for its potential medicinal properties [10].

8. *Cousinia dolichoclada* Juz.

Family: Asteraceae.

This species is endemic to Sultan Uvaysdag and Kuskanatau. It is a spiny perennial characteristic of the genus [1, p. 104; 2, p. 132].

Economic significance: Most species of *Cousinia* are considered weeds or plants of relatively low forage value because of their spiny structure. The economic properties of this particular endemic remain poorly studied.

9. *Jurinea longicorallaris* Iljin

Family: Asteraceae.

This species occurs in the Sultan Uvaysdag area [1, p. 106; 2, p. 132].

Economic significance: Some species of the genus *Jurinea* are used in traditional medicine; however, specific information concerning the potential uses of this endemic species is lacking.

General Economic and Ecological Significance of Endemic Plants

Most endemic plants of Karakalpakstan remain poorly studied in terms of their economic applications. This is primarily due to their rarity and narrow ecological specialization. Unlike widely distributed species such as saxaul, keyreuk, camelthorn, and licorice, they do not form extensive stands and are not widely used as sources of forage, fuel, or medicinal raw materials [1, p. 148; 5; 6].

Nevertheless, their significance is considerable:

Ecological significance: They contribute to specialized desert and gypsophilous plant communities, help stabilize soils and sands, and support biodiversity.

Scientific significance: They serve as indicators of speciation processes under arid conditions and represent relict elements of the regional flora.

Potential practical significance: Certain species, particularly those belonging to the families Amaranthaceae and Fabaceae, may be of interest as sources of biologically active compounds or as candidates for introduction into phytomelioration projects aimed at improving saline and sandy soils.

Conservation significance: Many of these species are rare or declining and require targeted conservation measures [1, pp. 76–80; 2, p. 140; 3, p. 19].

Threats and Conservation Measures

The desiccation of the Aral Sea, secondary soil salinization, overgrazing, dust storms, and land development have contributed to the degradation of natural habitats. Many endemic species occur only sporadically and have highly restricted distributions.

Their conservation requires the protection of key habitats, particularly the Ustyurt Plateau and Sultan Uvaysdag; regular monitoring of populations; cultivation in botanical gardens, including those in Nukus, to establish ex situ genetic reserves; and further research into their biology and potential economic uses [1, pp. 64–72; 2, pp. 122–130].

The endemic plants of Karakalpakstan constitute a unique and fragile component of Central Asia's natural heritage. Their conservation is important not only for the region itself but also for understanding the evolution and diversification of desert flora.

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