ON THE SPECIES ASTRAGALUS AUSTROFERGANICUS KAMELIN & V.M.VINOGR. LISTED IN THE RED BOOK OF THE REPUBLIC OF UZBEKISTAN

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Abstract: This study presents comprehensive data on Astragalus austroferganicus Kamelin & V.M.Vinogr., a critically rare and narrowly endemic plant species included in the Red Book of the Republic of Uzbekistan. The species, long thought to be extinct, was rediscovered during targeted fieldwork between 2020 and 2024 in the southern foothills of the Chatkal Range (Chust-Pop hills). Morphological characteristics, habitat preferences, distribution range, population size, and major threats were assessed using modern geospatial tools (Google EarthPro, ArcGIS 10.6.1) and herbarium records. The species is threatened primarily by livestock grazing and climate-induced ecological changes. This study emphasizes the importance of continuous monitoring, ex situ conservation, and the establishment of seed banks to ensure the survival of this rare taxon.

Keywords: Astragalus austroferganicus, endemic species, Red Book of Uzbekistan, Fergana Valley, plant conservation, threatened flora, ex situ conservation, biodiversity, habitat degradation, geobotany

О ВИДЕ ASTRAGALUS AUSTROFERGANICUS KAMELIN & V.M.VINOGR., ЗАНЕСЕННОМ В КРАСНУЮ КНИГУ РЕСПУБЛИКИ УЗБЕКИСТАН

Аннотация: В этом исследовании представлены исчерпывающие данные об Astragalus austroferganicus Kamelin & V.M.Vinogr., критически редком и узкоэндемичном виде растений, включенном в Красную книгу Республики Узбекистан. Вид, долгое время считавшийся вымершим, был заново открыт в ходе целевых полевых работ в 2020–2024 годах в южных предгорьях Чаткальского хребта (холмы Чуст-Поп). Морфологические характеристики, предпочтения в местообитаниях, ареал распространения, численность популяции и основные угрозы были оценены с использованием современных геопространственных инструментов (Google EarthPro, ArcGIS 10.6.1) и гербарных записей. Вид находится под угрозой в первую очередь из-за выпаса скота и экологических изменений, вызванных климатом. В этом исследовании подчеркивается важность постоянного мониторинга, сохранения ex situ и создания банков семян для обеспечения выживания этого редкого таксона.

Ключевые слова: Astragalus austroferganicus, эндемичные виды, Красная книга Узбекистана, Ферганская долина, сохранение растений, находящаяся под угрозой исчезновения флора, сохранение ex situ, биоразнообразие, деградация среды обитания, геоботаника

INTRODUCTION

The conservation of rare and endemic plant species is one of the most pressing issues in biodiversity protection today. In many countries, including Uzbekistan, the compilation of national Red Books has become an essential tool for assessing the conservation status of threatened species

and guiding strategic conservation actions. The **International Union for Conservation of Nature (IUCN)** Red List is widely recognized as a global standard for evaluating species extinction risk, serving as a "barometer of life" by providing comprehensive information on the distribution, population trends, and threats facing endangered taxa.

In Uzbekistan, the Red Book plays a significant role in shaping national conservation policies and raising public awareness about the protection of unique and vulnerable ecosystems. Among the rarest plant species listed in the Red Book of the Republic of Uzbekistan is *Astragalus austroferganicus* Kamelin & V.M. Vinogr., a narrowly endemic legume confined to the southern foothills of the Chatkal Range in the Fergana Valley. Historically, this species was known only from a single collection in 1928 and was considered possibly extinct for several decades due to the lack of recent records.

However, targeted botanical surveys conducted between 2020 and 2024 led to the rediscovery of *A. austroferganicus*, providing new insights into its distribution, morphological variability, and ecological preferences. The species is highly threatened by intensive livestock grazing, habitat degradation, climate change, and extremely limited population sizes.

This study aims to present updated and detailed information on the current status of *Astragalus austroferganicus*, including its morphology, distribution range, habitat conditions, population estimates, and major threats. In addition, the research highlights urgent conservation measures needed to protect this critically rare taxon and emphasizes the importance of continuous monitoring, ex situ conservation, and seed banking to prevent its extinction.

MAIN PART

The compilation of Red Lists or the maintenance of Red Books at international, regional, and national levels has become one of the most important tools for assessing the status of populations of endemic, rare, and threatened species of biological diversity. This practice has played a crucial role in the conservation of species in their natural habitats for over half a century. In recent decades, most experts have recognized the IUCN Red List as a "barometer of life," emphasizing its role in gathering the most reliable information about the conservation and threats to rare and endangered species (Stuart et al., 2010). The Red Book is particularly significant in raising public awareness and responsibility for the conservation of natural ecosystems and their individual species.

The research was conducted in accordance with Uzbekistan's botanical-geographical zoning scheme (Tojibaev et al., 2016). Geolocations of the species were identified using Google EarthPro (2019) and ArcGIS 10.6.1. Species composition was determined based on references such as Flora of Uzbekistan (1941–1963), the new edition of Flora of Uzbekistan (2016–2022), Flora of Tajikistan (1957–1991), Key to the Plants of Central Asia (Khasanov, 2015), the International Plant Names Index (IPNI, 2023), Plants of the World Online (POWO, 2023), and the National Herbarium of Uzbekistan (TASH). The composition of rare and endemic species was based on the Red Book of the Republic of Uzbekistan (2019). Field studies employed methodologies developed by A.I. Tolmachev (1974), A.V. Sherbakov, and S.R. Mayorov (Sherbakov & Mayorov, 2006). A grid-based distribution map of Uzbekistan's native flora was created using ArcGIS version 10.6.1.

Astragalus austroferganicus Kamelin & V.M.Vinogr.

Common name: Southern Fergana Astragalus

Russian name: Астрагал южноферганский


Status: EN – B1abc(i)+2abc(ii,iii,iv). A highly rare endemic species from the Fergana Valley.

Threats: The main threats to the Southern Fergana Astragalus include trampling of populations by livestock, extreme ecological factors (flooding, soil erosion, etc.), global warming, drought, and irregular seed regeneration. The impact of these threats is currently considered high. In the future, increased grazing and climate change in the species' primary habitats may escalate these threats, potentially leading to extinction.

Historical Records: The species was first and only collected in 1928 by A. Ioffe from the locus classicus (Type: Fergana Valley, Yangiariq irrigation area. 21.06.1928, A. Ioffe No. 398, TASH). It was included in the Red Book of Uzbekistan (2019) with a status of "possibly extinct" by F.U. Khasanov. However, targeted fieldwork conducted between 2020 and 2024 led to the rediscovery and collection of herbarium specimens from:

Chust District (northern hills of Rezaksoy reservoir, Tuyadum, 01.05.2021; Maydamillat village hills, 22.04.2021),

Pop District (Chap hills along Chorkesar road, 26.04.2020; Chap hills of Pop, 29.04.2020).

Morphological Description: Perennial herb, 10–20 cm tall. Stems slender, covered in white hairs. Leaves with 1–3 pairs of rounded leaflets, 1.2–6 cm long. Calyx 12–18 mm, sparsely white- and black-haired. Standard petal yellow, 20 mm; wings 17–18 mm; keel 18–20 mm. Pods 20–50 mm, stalk 2–3 mm, straight, beak 8–10 mm, covered in white hairs. Blooms in May, fruits ripen in June. Propagation via seeds.

Distribution: Endemic to southern Chatkal Range (Chust–Pop hills: Chap badlands). Main populations located in this area. Extent of Occurrence (EOO): 317.569 km²; Area of Occupancy (AOO): 48 km².

Habitat: Grows on saline and loamy soils, sometimes on stony-gravelly terrain.

Population Size: One known population consists of approximately 10–20 individual plants.

Uses: No recorded uses.

Cultivation: No data available.

Conservation Measures: The species' main populations grow in the Chust–Pop hills of the southern Chatkal Range. Necessary measures include restricting livestock grazing, conducting population monitoring, studying bioecology under ex situ conditions, and creating seed banks.

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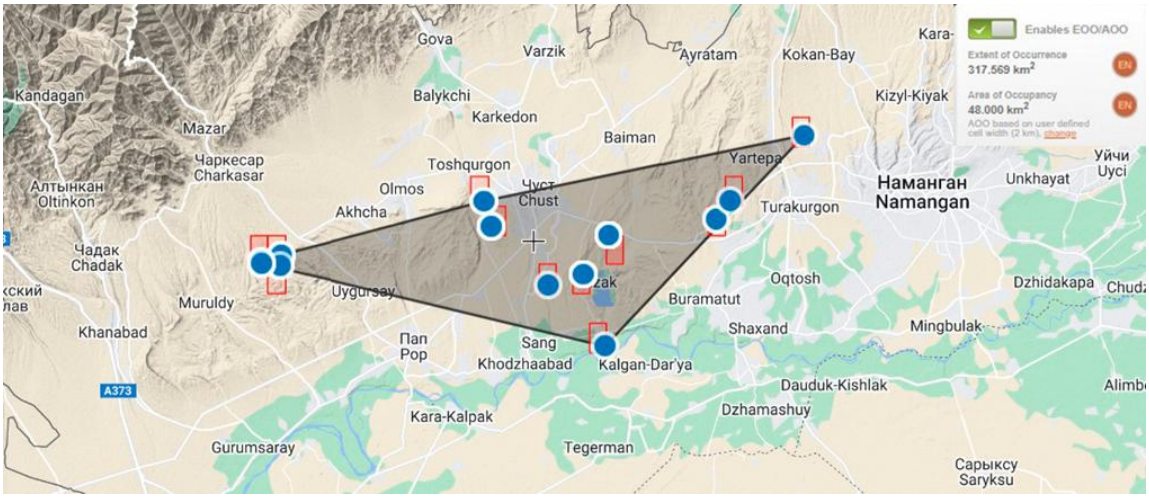

CONCLUSION

The results of this study confirm that *Astragalus austroferganicus* Kamelin & V.M.Vinogr. is a critically rare and narrowly endemic species with a very limited distribution in the southern foothills of the Chatkal Range within the Fergana Valley. After decades of presumed extinction, recent targeted fieldwork has rediscovered several small populations, highlighting both the species' persistence and its extreme vulnerability.

The key threats—overgrazing by livestock, habitat degradation, climate-induced ecological changes, and low seed regeneration—pose an immediate risk to the survival of the remaining populations. Given the species' extremely small population size and restricted area of occupancy, urgent conservation actions are needed, including the protection of its habitats from grazing pressure, the establishment of permanent monitoring programs, and the implementation of ex situ conservation measures such as seed banks and cultivation trials.

This case demonstrates the vital importance of continuous field surveys and the use of modern geospatial tools for monitoring rare flora. The rediscovery of *A. austroferganicus* also underlines the role of national Red Books as effective instruments for raising awareness and mobilizing conservation efforts to protect Uzbekistan's unique botanical heritage.

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