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ENDEMIC AND RARE SPECIES OF THE GENUS ASTRAGALUS IN THE FLORA OF THE BUKANTAU MOUNTAINS

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Abstract

The article examines endemic and rare species of the genus Astragalus distributed in the flora of the Bukantau residual mountains (Kyzylkum Desert). An analysis of their taxonomic composition, ecological characteristics, and current population status was carried out. It was established that representatives of the genus are characterized by a high degree of endemism and a strong association with petrophytic habitats. The necessity of conservation of rare species and monitoring of their populations under increasing anthropogenic pressure is emphasized.
Keywords: *Astragalus, endemism, rare species, Bukantau, Kyzylkum, flora, biodiversity*

Introduction

Global climate change and anthropogenic impacts are transforming natural ecosystems and reducing biodiversity, including floristic composition. Therefore, research aimed at understanding the species composition of flora and assessing the status of rare and endemic plant populations is particularly important. The flora of the arid regions of Central Asia, including the Kyzylkum Desert and its residual mountains, is of significant interest for botanical and geographical research. These areas are crucial for understanding the boundaries of the Turan and Mountainous Central Asian floristic provinces, as well as the processes of flora formation.

The genus Astragalus (Fabaceae) occupies a special place in the flora, with representatives characterized by a high level of endemism and ecological specialization. Despite a long history of studying the region's flora, current data on the composition and population status of Astragalus species in the Bukantau Mountains remain incomplete, making this study particularly relevant.

Material and methods

The study focused on endemic and rare species of the genus Astragalus (Fabaceae) growing in the Bukantau Mountains, located within the Kyzylkum Desert. This region is characterized by an arid climate, pronounced topographic mosaics, and the presence of specific petrophytic habitats, which contribute to the formation of a unique floral complex with a high level of endemism. The research was conducted during field seasons using an integrated approach, including flo-

ristic analysis, route-geobotanical surveys, and a comparative-geographical method. The route surveys covered various terrain elements (gravelly and rocky slopes, rock fissures, and elevated areas), revealing the spatial distribution of Astragalus species and their ecological associations. Species identification was based on classical botanical identification guides, morphological characteristics, and comparison with herbarium specimens. Literary sources and the results of previous studies (I. I. Granitov, P. K. Zakirov, L. A. Kapustina, F. O. Khasanov, and others) were also consulted, ensuring comparability of the obtained data with historical knowledge of the region's flora.

During the study, the species composition of the genus Astragalus was determined, along with their ecological preferences (petrophytes, xerophytes), patterns of distribution, life forms (chamaephytes, therophytes), and conservation status according to the Red Data Book of the Republic of Uzbekistan. Special attention was given to the identification of endemic and subendemic species, assessment of their current population status, and clarification of their distribution ranges. The obtained data were processed using comparative analysis methods in order to identify patterns in flora formation and to evaluate the role of the genus Astragalus in the structure of vegetation cover of the Bukantau residual mountains.

Results and discussion

A floristic analysis revealed that the flora of the Bukantau remnant mountains is significantly represented by endemic and rare species of the genus Astragalus (Fabaceae), which play a key role in shaping the region's unique vegetation. The high abundance of this genus is due to its ecological flexibility and ability to adapt to the extreme conditions of arid regions, particularly evident in the Kyzylkum Desert.

Among the identified species, *Astragalus holargyreus, A. subbijusus, A. centralis,* and *A. remanens* are particularly significant, distinguished by both their ecological characteristics and rarity. Astragalus holargyreus is a rare petrophytic chamaephyte, native to the gravelly and rocky slopes of the Bukantau mountain range. It is characterized by specific morphological features, particularly the way fruit develops, and is included in the Red Data Book of the Republic of Uzbekistan (rarity category 2), demonstrating the need for its conservation.

Astragalus subbijusus is a typical endemic species of the Kyzylkum Remnant Mountains and is widespread on gravelly and rocky slopes. Its range covers several mountain ranges in the region, but within Bukantau, it forms local populations, highlighting its ecological association with specific substrates.

Astragalus centralis deserves special attention – an extremely rare species (rarity category 1), characterized by a narrow ecological niche and limited range. It is confined primarily to rock crevices and rocky slopes, making it particularly vulnerable to environmental changes. The observed decline in numbers and fragmentation of this species' populations indicate unfavorable trends for its existence and the need for urgent conservation measures.

Astragalus remanens is a terrophyte found on fine-grained slopes, demonstrating adaptation to the short growing season and extreme conditions of arid environments. Its biological characteristics allow it to thrive in conditions of moisture deficit and unstable climatic factors.

An analysis of ecological associations revealed that most species of the genus Astragalus are associated with petrophytic habitats – rocky and gravelly substrates characterized by low moisture capacity and poor soil cover. This specialization leads to the formation of a narrow ecological niche, which, on the one hand, helps reduce competition, and on the other, makes the species extremely sensitive to any environmental changes, including anthropogenic impact.

During the research, 14 rare plant species listed in the Red Data Book of the Republic of Uzbekistan were identified in the Bukantau flora, confirming the high conservation value of this region. In addition, two populations of the shrub species *Astragalus scleroxylon*, totaling approximately 20 individuals, were discovered. This fact indicates the need for further study of the species and justification for its inclusion in the next edition of the Red Data Book as potentially vulnerable.

An endemic flora analysis revealed the presence of six endemic species, accounting

for 1.71% of the total flora, confirming its high level of originality. This level of endemism is due to the geographical isolation of the residual mountains, as well as specific environmental conditions, including an arid climate, rocky substrates, and limited moisture resources.

The obtained results are consistent with previous studies and confirm that the Bukantau flora occupies an important place in the Kyzylkum residual mountain system, serving as a conservation center for rare and endemic species. At the same time, the identified trends in the decline of the ranges and abundance of certain species, particularly *Astragalus centralis*, indicate the need for enhanced conservation efforts. Thus, further study of the Bukantau flora, regular monitoring of populations and the development of scientifically based measures for the protection of rare and endemic species of the genus Astragalus are the most important tasks of modern botany and ecology aimed at preserving the biodiversity of arid ecosystems of Central Asia.

Conclusion

The flora of the Bukantau Mountains is characterized by the presence of a significant number of endemic and rare species of the genus Astragalus, many of which are listed in the Red Data Book of the Republic of Uzbekistan. Their association with specific petrophytic habitats and high vulnerability have been established. The obtained results confirm the need for further research, monitoring, and the development of measures to conserve the region's biodiversity.

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