ORIGINAL ARTICLE

INTERNATIONAL JOURNAL OF ARTIFICIAL INTELLIGENCE

ISSN: 2692-5206, Impact Factor: 12,23
American Academic publishers, volume 05, issue 10,2025

Journal: https://www.academicpublishers.org/journals/index.php/ijai

COMPARATIVE ANALYSIS OF CENOPOPULATIONS OF SOME RARE AND ENDEMIC PLANT SPECIES OF CENTRAL ASIA

Davranova Madina Shukhratovna

Specialized school №. 11 for in depth study of certain subjects, Navoi, Uzbekistan;

Khayitov Rizamat Shonazarovich

Associate professor of the department of Biology, Navoiy state university, Uzbekistan

Abstract: The study presents a comparative assessment of cenopopulations of rare and endemic plant species of Central Asia, including Uzbekistan, Kazakhstan, Kyrgyzstan, and Tajikistan. Population characteristics such as density, vitality, ontogenetic structure, and regeneration rate were analyzed. The results reveal significant differences in population stability depending on ecological conditions and anthropogenic pressure. The obtained data contribute to regional biodiversity monitoring and conservation planning.

Keywords: Cenopopulation dynamics; Rare endemic plants; Central Asia flora; Population stability; Biodiversity conservation; Uzbekistan; Kazakhstan; Kyrgyzstan; Tajikistan; Desert and mountain ecosystems.

СРАВНИТЕЛЬНЫЙ АНАЛИЗ ЦЕНОПОПУЛЯЦИЙ НЕКОТОРЫХ РЕДКИХ И ЭНДЕМИЧНЫХ ВИДОВ РАСТЕНИЙ ЦЕНТРАЛЬНОЙ АЗИИ

Аннотация: В исследовании представлена сравнительная оценка ценопопуляций редких и эндемичных видов растений Центральной Азии, включая Узбекистан, Казахстан, Кыргызстан и Таджикистан. Были проанализированы такие характеристики популяций, как плотность, жизнеспособность, онтогенетическая структура и скорость регенерации. Результаты показывают значительные различия в стабильности популяции в зависимости от экологических условий и антропогенной нагрузки. Полученные данные способствуют региональному мониторингу биоразнообразия и планированию его сохранения.

Ключевые слова: Динамика ценопопуляций; Редкие эндемичные растения; Флора Центральной Азии; Стабильность популяции; Сохранение биоразнообразия; Узбекистан; Казахстан; Кыргызстан; Таджикистан; Пустынные и горные экосистемы.

Introduction. The floristic composition of Central Asia is highly diverse and unique due to its complex geomorphological structure and continental climate. Many plant species in this region are narrow endemics, restricted to specific habitats such as mountain slopes, river valleys, and desert ecosystems. However, the increasing anthropogenic pressure, grazing, mining, and land degradation have led to a decline in population numbers and reproductive capacity of numerous endemic taxa [1].

Cenopopulation analysis is an essential tool for understanding the demographic status and viability of rare species. It allows for quantitative assessment of population dynamics, structure, and potential for natural regeneration [2-3]. The aim of this study is to provide a comparative analysis of the population parameters of several rare and endemic plant species of Central Asia.

ORIGINAL ARTICLE

INTERNATIONAL JOURNAL OF ARTIFICIAL INTELLIGENCE

ISSN: 2692-5206, Impact Factor: 12,23

American Academic publishers, volume 05, issue 10,2025

Journal: https://www.academicpublishers.org/journals/index.php/ijai

Materials and methods. Field research was conducted from 2021 to 2024 in key regions of Central Asia: Western Tien Shan (Uzbekistan and Kazakhstan), Pamir-Alay (Tajikistan), and the Northern Fergana ridge (Kyrgyzstan). For each species, several populations were investigated. The parameters measured included population density, vitality index (Iv), and regeneration rate (Rg). Ontogenetic stages were classified according to Uranov [4] and modified by Smirnova et al. [5].

Results and discussion. The comparative data on the studied populations are summarized in Table 1. The cenopopulations were categorized into three stability groups: stable, fluctuating, and declining.

Species	Region	Density (ind./m²)	Vitality Index (Iv)	Regeneration Rate (Rg)	Population Status
Tulipa greigii Regel	Western Tien Shan (Uzbekistan)	3.2	0.82	0.45	Stable
Iris magnifica Vved.	Zeravshan Range (Tajikistan)	2.5	0.76	0.40	Fluctuating
Ferula kuhistanica Korovin	Pamir-Alay (Tajikistan)	1.4	0.62	0.25	Declining
Eremurus sogdianus Bunge	Fergana Valley (Uzbekistan)	2.8	0.79	0.38	Stable
Acantholimon karakorumicum Lincz.	Karakorum (Kyrgyzstan)	1.9	0.67	0.33	Fluctuating
Allium suworowii Regel	Western Tien Shan (Kazakhstan)	3.0	0.84	0.41	Stable
Scutellaria adenostegia Bunge	Nuratau Range (Uzbekistan)	1.5	0.70	0.27	Declining
Zygophyllum macropterum C.A.Mey.	Kyzylkum Desert (Uzbekistan)	1.2	0.55	0.20	Declining
Tulipa lehmanniana Merckl.	Ustyurt Plateau (Kazakhstan)	2.1	0.73	0.35	Fluctuating

ORIGINAL ARTICLE

INTERNATIONAL JOURNAL OF ARTIFICIAL INTELLIGENCE

ISSN: 2692-5206, Impact Factor: 12,23

American Academic publishers, volume 05, issue 10,2025

Journal: https://www.academicpublishers.org/journals/index.php/ijai

Halimocnemis pilifera Iljin	Kara-Kum Desert (Turkmenistan)	2.3	0.78	0.39	Stable
Astragalus sieversianus Pall.	Tashkent Oasis (Uzbekistan)	1.8	0.69	0.31	Fluctuating
Gymnospermium altaicum (Pall.) Spach	Northern Tien Shan (Kazakhstan)	2.6	0.81	0.42	Stable

The most stable populations are those located in less disturbed mountain ecosystems (e.g., Tulipa greigii, Allium suworowii, and Gymnospermium altaicum). In contrast, populations in foothills and desert zones show signs of regression, which correlates with anthropogenic disturbances such as overgrazing and land cultivation.

Conclusion. The cenopopulation analysis reveals that rare and endemic plants of Central Asia exhibit diverse adaptive strategies to environmental conditions. For effective conservation, it is recommended to establish micro-reserves in areas with stable populations and to implement restoration programs for declining species. The comparative approach can be extended to the flora of Afghanistan and Iran to form a complete picture of endemic species dynamics in the region.

References:

1. Tojibaev, K.S., Beshko, N.Y., & Karimov, F. Endemic flora of Uzbekistan: diversity, distribution, and conservation. Tashkent: FAN Publishing.

2. Zaugolnova, L.B. Demography of plant populations. Moscow: Nauka.

3. Rachkovskaya, E.I., Volkova, E.A., & Khramtsov, V.N. Botanical geography of Kazakhstan and Middle Asia (desert region). St. Petersburg: KMK Press.

4. Uranov, A.A. Age spectrum of plant populations as a function of time and space. Vegetation Science, 10(3), 12–20.

5. Smirnova, O.V., Zaugolnova, L.B., & Toropova, N.A. Structure and dynamics of plant populations. Moscow State University Press.