***Original Research Article***

**Conservation Status of *Lepidolopha nuratavica Krasch*: A rare endemic species of the Nuratau range**

**Abstract** Ecosystems that occur on cliffs and rocky outcrops are home to many plants that are specially adapted to harsh environmental conditions. These habitats are seeing increased pressure from development, recreational use, and invasive species, calling for a thorough evaluation of the endangerment of the taxa inhabiting them.  *Lepidolopha nuratavica* Krasch. (Asteraceae) is an endemic and relict plant species with a narrow distribution, exclusive to the Central Asian floristic region. The natural range of this species is primarily restricted to the Nuratau and Aktau mountain systems in central Uzbekistan. It is considered one of the unique and ecologically significant floristic elements of the region. This study provides an in-depth analysis of the species’ geographic distribution, ecological requirements, habitat, coenopopulation status, and its conservation significance. These findings support the classification of *Lepidolopha nuratavica* as Vulnerable (VU) under IUCN criteria.

**Keywords:** *Lepidolopha nuratavica*, rare species, Nuratau, Aktau ranges nature reserve, coenopopulation, IUCN, Conservation

**Introduction**

The International Union for Conservation of Nature (IUCN) Red List of Threatened Species (hereafter referred to as ‘IUCN Red List) provides assessments (IUCN, 2023; Nyberg et al., 2025) which are a starting point to understand the status and general trends of plants. The IUCN Red List is the world's most comprehensive and authoritative information source on the global extinction risk status of animal, fungus, and plant species (IUCN, 2024a). The conservation status of species, often expressed as their risk of extinction, is an example of a fundamentally important metric that is challenging to assess and monitor at the scale of major clades such as plants, c. 350 000 vascular plant species. Accurate prediction of extinction risk requires identifying and obtaining an appropriate set of predictor variables (Bachman et al., 2024). The genus *Lepidolopha* C. Winkl. is endemic to Central Asia which contains numerous rare and relict species [1]. According to the Plants of the World Online database (POWO, 2025), the genus *Lepidolopha* comprises 8 species distributed within the territories of Central Asian countries [2]. All species of this genus are classified as subshrubs in terms of life form [3]. One of them - *Lepidolopha nuratavica* as a relict and endemic species that grows in the Nurata mountain range. The Nurata Range is a moderately elevated mountain system located in central Uzbekistan, extending approximately 200 kilometres from the western spurs of the Turkestan Mountains to the Kyzylkum Desert. It is characterized by its proximity to desert lowlands (the Kyzylkum), its stony and gravelly slopes, the formation of unique plant communities, and a high concentration of rare and endemic species. The Nurata range is considered one of the biodiversity hotspots of Central Asia [4]. Investigating the rare, endemic, and threatened plant species within its flora, including identifying new populations and evaluating their current status—is a central focus of this research.

**Materials and Methods**

The object of this study is *L. nuratavica* (Asteraceae), which is naturally distributed in the Nuratau, Aktau and Kugitang mountain ranges (Fig. 1,3). The geographical and taxonomic analysis of *L. nuratavica* in the Nurata mountain range was carried out based on herbarium specimens, geobotanical descriptions, and literature sources. To clarify the geographic range of the species, field materials collected in 2016-2021 in the framework of the project to compile a vascular plants cadastre of the Samarkand, Jizzakh and Navoi regions were also used [5,6,7]. *L. nuratavica* is considered a relic from the Pliocene epoch [8].



**Figure 1.** *Lepidolpha nuratavica* Krasch. Republic of Uzbekistan, Ambarsay, at approximately 800 m above sea level on a rock. N.Yu. Beshko 2018.

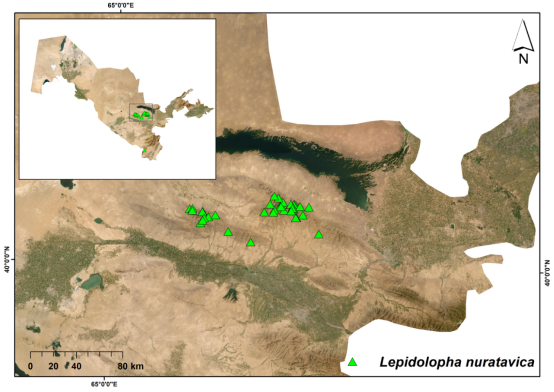
**Results & discussion**

*Lepidolopha nuratavica* is adapted to various edaphic conditions and predominantly grows on rocky and gravelly slopes in the lower and middle parts of mountains (at altitudes of 800–2100 meters above sea level), in xerophytic shrublands and sparse petrophytic communities.



**Figure 2.** Type specimen of *L. nuratavica*, preserved in the LE herbarium.

For precise determination of the species distribution, collected specimens were georeferenced using Google Earth Pro 7.1, and the distribution map of *L.nuratavica* was created based on occurrence points using ArcGIS version 10.6.1 with the Pulkovo 1942 projection (Fig.3).



**Figure 3.** Distribution map of *L. nuratavica.*

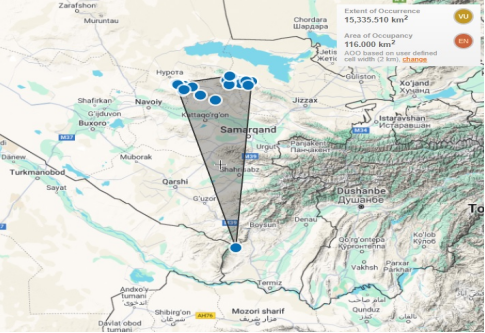
According to Volume 6 of the Flora of Uzbekistan (1962), four species of the genus *Lepidolopha* are recorded within Uzbekistan: *L.fedschenkoana* in the Kugitang range of Central Asia’s Pamir-Alay; *L. komarowii* on the western edges of the Zarafshan range; *L. nuratavica* in the Nuratau, Aktau, and Kugitang ranges; and *L. mogoltavica* in the Mugultau mountains of Tashkent Province [9]. However, in the 2024 cadastral flora research of Tashkent Province by N. Beshko et al., the distribution of *L. mogoltavica* in Tashkent region was not confirmed [10]. This discrepancy is explained by the fact that, when Volume 6 of the Flora of Uzbekistan was published, part of the Mugultau range was located within Uzbekistan, but today, the entire Mugultau range falls under the territory of Tajikistan. The species was collected for the first time by O. Knorring on July 5, 1932, near Chanbaschi village in the Aktau Mountains of the Nuratau range. This specimen was designated as the type herbarium of *L. nuratavica*. Based on this specimen, *L. nuratavica* was described as new species by I.M. Krascheninnikov in 1946 (Figure 2). Additionally, this species was recorded in 1914 near the Uxum Pass in the Koytosh mountains by M. Michelson and in 1932 near the village of Chogshanka in the Sherabad area of the Kugitang range by A.V. Jarmolenko [11]. According to A.J. Ibragimov, *L. nuratavica* also occurs on the rocky slopes of the Surkhan State Nature Reserve, specifically in the Boglidara tract of the Kugitang Ridge, at elevations ranging from 1,200 to 1,500 meters [12]. The note section on *L.nuratavica* in the Flora of Uzbekistan (1962) mentions that the herbarium specimen collected from Kugitang by O. Fedchenko was in an immature stage and was included under *L. nuratavica* only due to its geographic proximity. It was also suggested that further monitoring of *Lepidolopha* populations in Kugitang was necessary for clarification [9]. According to K.Sh. Tojibayev et al. (2021), *L. nuratavica* is a rare endemic species with a disjunct range within the western Pamir-Alay. It occurs in the Nuratau Mountains and the lower to middle parts of the Kugitang range, on gravelly slopes, watersheds, cliffs, and outcrops. It grows within semi-shrublands, sagebrush steppes, tall herb communities, and petrophytic vegetation. Additionally, the monograph notes its occurrence in the Jizzakh region, including sites such as Uchmasoy, Gurdara, Bolosoy, Mexayonsoy, Asrafsoy, Qorasoy, Tikchasoy, Hayotsoy, Andijonsoy, the central part of the Koytosh range, and intermittently in Usmonsoy Gorge, forming small populations of 10–20 to 100–200 individuals [6]. The latest data on the distribution of the species belongs to O. Turgunov (2024), according to whom this species grows in the Nuratiau and Aktau ridges at an altitude of 900-1500 m in shrubland phytocoenotypes [8]. The last herbarium specimen from Kugitang, collected in 2007 by A.J. Ibragimov, lacked flowers, making species identification difficult. No further records of *L. nuratavica* from Kugitang have been confirmed over the past 20 years.

Thus, it is questionable whether the Kugitang specimens belong to *L. nuratavica,* as they lack its key distinguishing features. Based on the available data, the occurrence of *L. nuratavica* in Kugitang has not been scientifically verified, and the claim of its disjunct range is unconfirmed.

In recent years, several local populations of *L. nuratavica* have been studied. T. Rakhimova and colleagues (2021) investigated two coenopopulations of this species near the village of Chuya in Navoi Province: the first of them located approximately 10 km west of the village, and the second found 2.7 km further to the west. The first coenopopulation was studied within a plant community dominated by *Prunus bucharica*, *Atraphaxis seravschanica*, *Artemisia tenuisecta*, and *Ferula penninervis*. The total vegetation cover in this area was 17%, with *L. nuratavica* accounting for 1%. A total of 14 plant species were recorded in the community, 57% of which were perennials. The second coenopopulation was studied within a plant community dominated by *Prunus spinosissima*, *Prunus bucharica*, *Crambe cordifolia*, *Ferula ovina*, and *Poa bulbosa*. In this community, the total vegetation cover reached 35%, with *L. nuratavica* making up 2%. A total of 18 plant species were identified, the majority of which, as in the first coenopopulation, were perennial species. No juvenile or immature individuals of *L.nuratavica* were observed in either coenopopulation, possibly due to the steep slopes and spring floods washing away young plants [13]. In addition, in 2024, the presence of L. nuratavica as an associated species within a plant community dominated by Prunus spinosissima, Taeniatherum crinitum, Bromus tectorum, and Eremurus soogdianus, located near Langar in the Aktau Range, was recorded by N.Yu. Beshko.

In the 1st to 4th editions (1984, 1998, 2006, 2009) of the Red Data Book of Uzbekistan, the species was classified under Category 1. In the 5th edition (2019), it was downgraded to Category 3, indicating that its status has stabilised within protected areas [14,15,16,17,18].

The geographic distribution of *L. nuratavica* was analysed using the GeoCat tool based on existing collection points and herbarium data. The analysis results (http://geocat.kew.org) showed that the species’ Extent of Occurrence (EOO) is approximately 15,335,510 km², while the Area of Occupancy (AOO) is estimated at 116 km² (Fig. 4).



**Figure 4.** *GeoCat* map of the distribution range of *L.nuratavica*.

*Main Threat Factors and Mitigation Measures*

The results of this study show that while plant communities involving *L.nuratavica* within the protected area remain stable, populations of the species located outside the reserve boundaries are in serious need of conservation. Within the reserve territory, only natural factors may limit the species’ distribution range. However, a variety of external influences—including anthropogenic factors (such as unregulated livestock grazing, geological exploration, marble extraction, stone crushing, and mining operations) and natural events (such as the destruction of young plants by floods and the intensification of erosion)—are seriously affecting the distribution area of *L. nuratavica* outside protected zones. Currently, these factors pose a moderate threat to the species’ populations. However, the risk may escalate in the future due to increasing drought and the expansion of the mining industry. Therefore, it is essential to implement a number of conservation measures to maintain the ecological status and restore populations of this species. To this end, it is recommended to prohibit marble and construction stone mining, regulate or restrict livestock grazing on pastures, and conduct targeted identification, mapping, and monitoring of populations. In addition, advanced scientific methods such as ex-situ cultivation of the plant at the Tashkent Botanical Garden, reintroduction efforts, and the establishment of a seed bank are recommended. Implementing these measures will help to strengthen the role of *L. nuratavica* in the ecosystem, preserve its genetic diversity, and ensure the stability of its populations.

**Conclusion**

Based on the above data, *L. nuratavica* is considered a species of exceptional scientific and practical importance, recognized as a rare, endemic, and relict element of Uzbekistan’s flora. It is primarily found in rocky areas, gravelly slopes, and sparse shrub and petrophytic communities of the Nuratau and Аktau ranges, having adapted to various edaphic and ecological conditions. Its presence in the Kugitang range has not been scientifically confirmed, and no reliable findings have been recorded from that region in the past twenty years, indicating that its range has become relatively narrow and fragmented. Analysis at the sуnоpopulational level provides valuable data on the species’ growth, distribution, phytocoenotic role, and competitiveness. The fact that it has been identified in only two coenopopulations unpaired, pre-reproductive individuals dominate-suggests that young plants cannot survive on steep rocky slopes due to natural limiting factors. This indicates a weak natural regeneration process and reflects the species' ecological vulnerability. Furthermore, the low projective cover of the species in phytocoenoses suggests that it mainly plays a participatory rather than dominant role in the communities. This situation necessitates special monitoring and protective measures to conserve *L.nuratavica.* Although the species’ classification in Uzbekistan’s Red Book has been downgraded from category 1 to category 3, which may appear positive, the current number of populations and the slow pace of natural regeneration demand cautious interpretation. Overall, *L.nuratavica* is not only an integral component of Uzbekistan’s floristic wealth but also holds significant biogeographic, ecological, and evolutionary value. Its conservation is a critical strategic task for ensuring the stability of mountain ecosystems, protecting natural resources, and preserving the national flora. The study also applied the IUCN criteria for assessing the species’ ecological risk, assigning it a VU (Vulnerable) status and evaluating it under the criteria B1ab(ii, iii)+2ab(ii, iii)+S2a(i). These reflect the species’ high sensitivity to habitat degradation and environmental changes. Future research should prioritise the development of conservation strategies for *L. nuratavica,* including stable isotope analyses and studies of adaptive traits, which will contribute to ensuring the species’ long-term sustainability. These research findings provide a critical foundation for developing evidence-based conservation measures and biodiversity management policies in Uzbekistan.

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