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The genus *Colchicum* L in Uzbekistan

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Abstract. This study provides new distribution and conservation data for the three *Colchicum* species native to Uzbekistan: *C. kesselringii*, *C. luteum*, and *C. robustum*. Field surveys and herbarium records were used to map species ranges. Morphological descriptions, habitat associations and phenology were recorded. Conservation statuses were assessed using IUCN criteria. Results show *C. kesselringii* and *C. luteum* have wide distributions but face threats from habitat loss. *C. robustum* has a smaller range and may require closer monitoring. Ongoing threats include agriculture, overgrazing and development. Maintaining natural areas is important for long-term species viability. This baseline documentation can guide effective conservation planning for these medicinally valuable plants in Uzbekistan.

Key words: *Colchicum*, Uzbekistan, distribution, conservation, threatened species, field surveys, GIS, habitat.

Introduction.

The genus *Colchicum* belongs to the Colchicaceae family and is a perennial monocotyledon flowering plant with over 160 species. These plants are primarily found in the full sunny plains of western Asia, Europe, and eastern and southern Africa. A key morphological feature of this genus is the bulb-like corms and underground ovaries. The *Colchicum* species are important medicinal plants that have been used to treat various conditions such as osteoarthritis, gout, cancer, inflammation, jaundice, and sexual impotence in different societies. The pharmaceutical properties of *Colchicum* are primarily derived from its corms and seeds. The *Colchicum* species and other Colchicaceae family plants contain valuable bioactive compounds, including alkaloids (especially tropolone and isoquinoline alkaloids), phenolic compounds, tannins, flavonoids, and carbohydrates. The amounts of these compounds depend on the growing cycles and seasons (Gulsoy-Toplan et al., 2018). However, habitat loss from agriculture and

development poses threats to some *Colchicum* populations. Assessing distribution and conservation status is thus needed to guide effective management and ensure long-term viability.

The Central Asian republic of Uzbekistan lies at the western edge of the genus' native range and supports three *Colchicum* species - *C. robustum*, *C. luteum*, and *C. kesselringii* (Tojibayev et al., 2014). However, little has been documented about their ecology and status within Uzbekistan. This study aims to address this gap through field surveys, analysis of herbarium records from the National Herbarium of Uzbekistan, and spatial modeling using geographic information systems (GIS). Specifically, we 1) map the distributions of the three *Colchicum* species, 2) describe the morphology and phenology based on field observations, and 3) assess the conservation status according to IUCN Red List criteria.

Material and methods. Fieldwork was conducted during September-October 2024 across representative ecoregions of Uzbekistan by the authors. Locations of *Colchicum* populations were recorded using a handheld GPS device. At each site, habitat data on vegetation type, elevation, and substrate were recorded. Digital photographs were taken to document plant morphology. Herbarium vouchers were collected and deposited at the Herbarium of National Herbarium of Uzbekistan. ArcGIS 10.8 software was used to create distribution maps of the species. A natural illustration was also developed based on photographs using Adobe Photoshop CS6x64.

Herbarium data from the National Herbarium of Uzbekistan, occurrence records from the Global Biodiversity Information Facility (GBIF), taxonomic information from Plants of the World Online (POWO), and nomenclature validated against the International Plant Names Index (IPNI) were analyzed. Protected area data was obtained from the World Database of Protected Areas (WDPA).

Conservation status was assessed according to criterion B2 of the IUCN methodology. A geo-referenced range map of the species was prepared following Bachman's recommendations to identify conservation priorities for all three species in Uzbekistan based on integrated field and herbarium evidence

Results.

Colchicum kesselringii Regel

Description. The corm is ovoid-oblong or oblong, elongated at the apex, flattened, 10-25 mm wide, with black-brown leathery shells. Stems are underground during flowering, barely protruding when fruiting. Leaves number (2)-3-8, linear, 4-10 mm wide, smooth or less often rough

along the edges Flowers number 1-3-(5) Tepals are white, with a dark purple stripe along the back, linear-lanceolate or lanceolate, 15-25-(40) mm long, 3-3.5 times shorter than the violet-colored tube Stamens are 2 times shorter than the limb, with linear anthers Capsule is oblong, 1.5-2.5 cm long, with pointed sockets at the top

The flowering period is February-May, and fruiting is March-June.

Habitat: It grows on fine-earth substrates from deserts to middle mountain zones

Distribution: The native range of this species is from Central Asia to NW. Pakistan

Protection status in Uzbekistan. Surkhan State Reserve, Hisar State Reserve, Nurota State Reserve, Upper Topalang National Nature Park, Ugam Chatkal National Park, Ugam-Shatkal State Biosphere Reserve

Conservation status. Least Concern (LC). The extent of occurrence is 521,053 km² and the area of occupancy is 117,500 km²

Threats. Conversion of land to agriculture, collecting flowers, overgrazing by livestock, and development activities

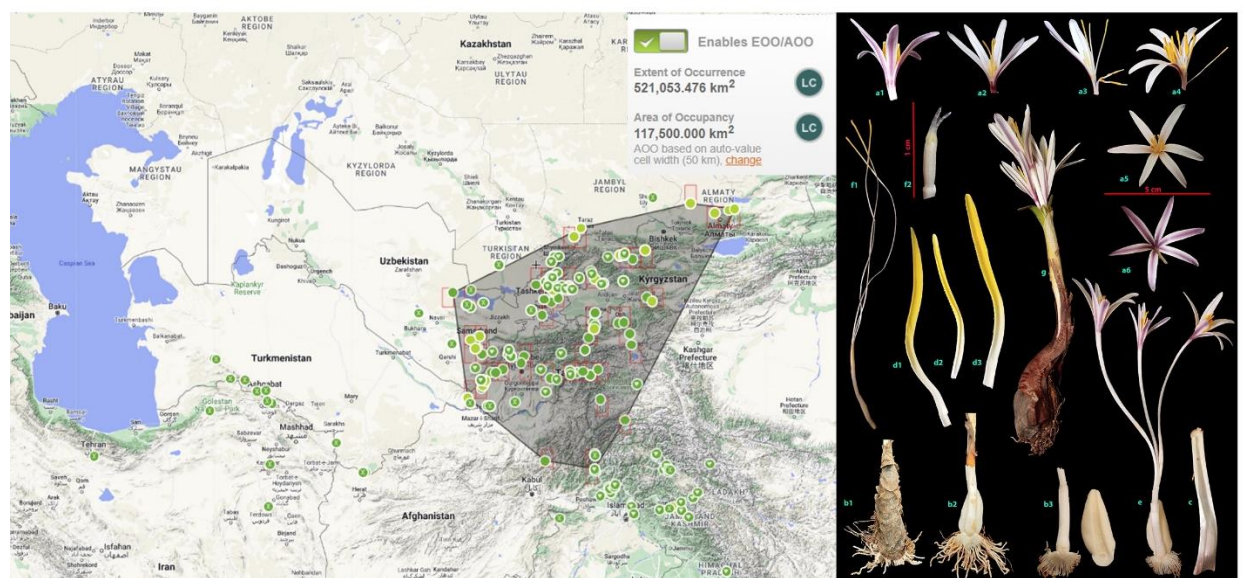


Figure 1. *Colchicum kesselringii* evaluating conservation status (left) and morphological illustration (right)

Colchicum luteum Baker

Perennial plant with an ovoid-oblong, flattened bulb 1.5-3 cm long and 1-2.5 cm broad Bulb tunics prolonged into a tube 5-10 cm long, enveloping the lower part of the stem Leaves (2) 3-4, short and canaliculate at flowering, later linear-ligulate up to 15 cm long and 8-15 mm broad

Flowers 1-3, yellow with yellowish or violet tube 3-7 mm long Perianth segments 1.5-2.6 (3) cm long and 5-7 mm broad, bright yellow, sometimes violet-tinged at base Anthers yellow, narrowly linear, much longer than the filaments Styles filiform, yellow; capsule ovoid, up to 2.5 cm long

Flowering period: April-July

Habitat: Near thawing snow, in mountains and on glaciers, at 1800 to 4000 m elevation

Distribution: The native range of this species is E. Afghanistan to Central Asia and W. Himalaya.

Protection status in Uzbekistan. Surkhan State Reserve, Hisar State Reserve, Nurota State Reserve, Upper Topalang National Nature Park, Ugam Chatkal National Park, Ugam-Shatkal State Biosphere Reserve

Conservation status. Least Concern (LC). The extent of occurrence is 808,001 km² and the area of occupancy is 97,500 km²

Threats. Conversion of land to agriculture, collecting flowers, overgrazing by livestock, and development activities

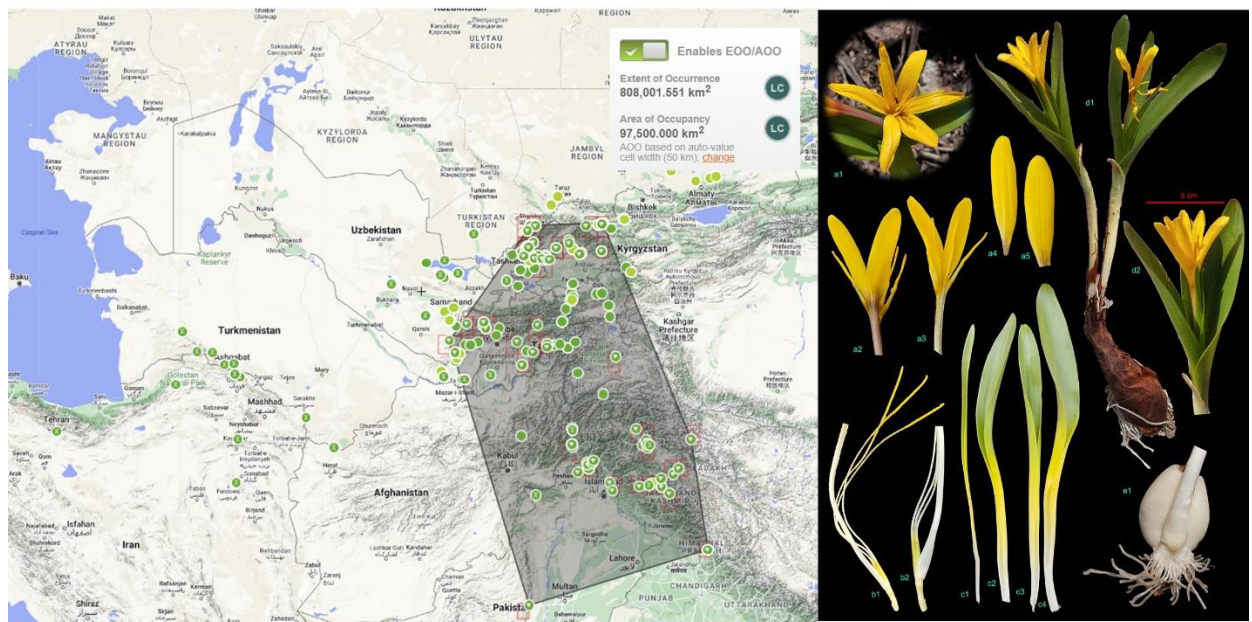


Figure 2 *Colchicum luteum* evaluating conservation status (left) and morphological illustration (right)

Colchicum robustum (Bunge) Stef

Description. Corm: Large, ovoid-oblong, flattened, 2-4 cm across, with coriaceous blackish-brown tunics that extend into a long tube enveloping the base of the stem. Leaves: 3-6 leaves, appearing together with and slightly exceeding the flowers, linear to linear-lanceolate, 1-

2.5 cm broad, slightly spreading, glabrous, with a cartilaginous softly scabrous margin, acuminate, and many-nerved. The lowest leaf can sometimes be slightly distant from the others. Flowers: 2-3 (-8) flowers, white or pink. Perianth: Limb of perianth segments oblong-elliptic, 25-30 mm long and 5-6 mm broad, without auricles (ear-like appendages); claws narrowly linear to subfiliform, 2-3 times the length of the limb. Stamens: About half the length of the perianth limb; anthers linear, greenish-yellow, 6-10 mm long, 3-4 times the length of the filament, basifixed (attached at the base). Capsule: Oblong, 2-3 cm long, with short-beaked fruitlets. Seeds: 20-40, globose.

Flowering period: February-March.

Habitat: Sandy and sandy-clayey hills; sands and sandy-clayey and solonchak (saline) plains.

Distribution: The native range of this species is Iran to Central Asia and W. Himalaya

Protection status in Uzbekistan. Surkhan State Reserve, Nurota State Reserve

Conservation status. Least Concern (LC). The extent of occurrence is 1,478,274 km² and the area of occupancy is 65,000 km²

Threats. Conversion of land to agriculture, collecting flowers, overgrazing by livestock, and development activities

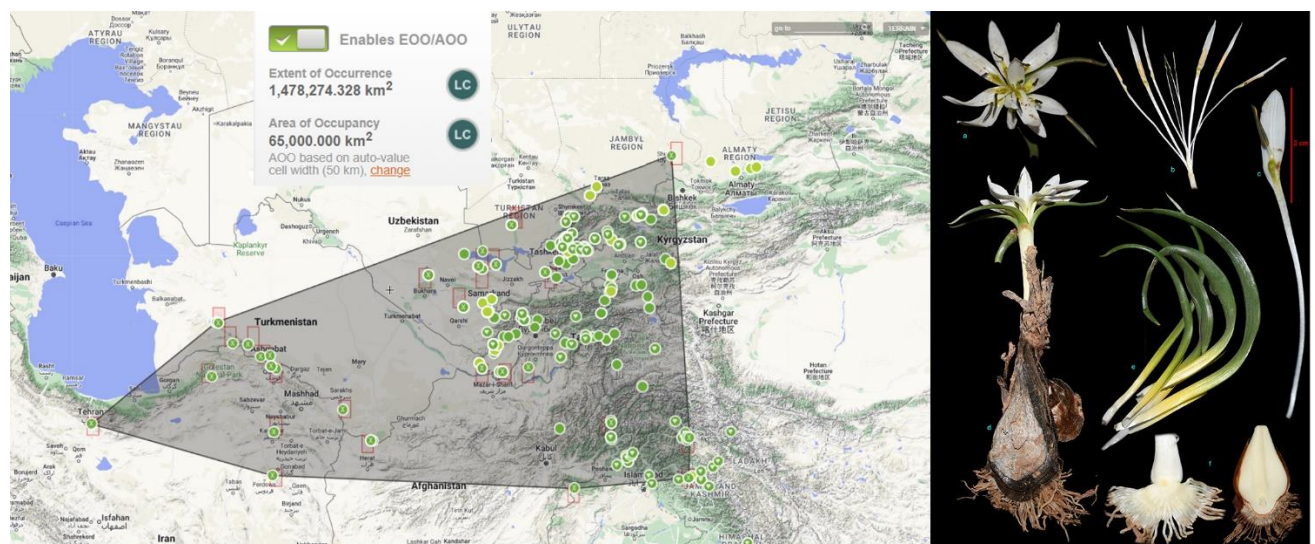


Figure 3. *Colchicum robustum* evaluating conservation status (left) and morphological illustration (right)

Conclusion

This study provided new information on the distributions, habitats, and conservation statuses of the three *Colchicum* species native to Uzbekistan *C. kesselringii*, *C. luteum*, and *C. robustum*. Field surveys and herbarium records revealed that all three species have relatively wide

distributions across different ecoregions in the country. However, their populations face ongoing threats from activities like agricultural expansion, overgrazing, and development projects. While *C. kesselringii* and *C. luteum* were assessed as Least Concern based on IUCN criteria, further monitoring is needed given the habitat loss trends. *C. robustum* has a smaller estimated range and would likely benefit from additional protected area coverage. Overall, maintaining remaining natural and semi-natural habitats will be important for the long-term viability of these medicinally important *Colchicum* populations within Uzbekistan. Integrating spatial data on species distributions with threats can help prioritize sites in need of enhanced protection measures to safeguard these species and their ecosystems in the changing landscape of Uzbekistan.

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