

Communication

A contribution to the diversity of the genus *Utricularia* in the South Caucasus

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Received: 3 March 2025. Accepted: 14 October 2025. Published online: 14 November 2025.

Abstract

Abiyev Y., Asgarov A., Güzel M.E., 2025: A contribution to the diversity of the genus *Utricularia* in the South Caucasus. – *Botanica*, 31(4): 176–182. <https://doi.org/10.35513/Botlit.2025.4.3>

The occurrence of *Utricularia* × *neglecta* in Azerbaijan and the South Caucasus was confirmed and reported for the first time. Identification of this taxon was based on a morphological examination of herbarium specimens and recently collected material from Samur-Yalama National Park. Key diagnostic characteristics indicate that previous records identified as *Utricularia vulgaris* can be attributed to this hybrid. These findings clarify the local distribution of aquatic *Utricularia* species and update the regional checklist. Future research should include field surveys and molecular analyses to clarify taxonomic boundaries and assess the conservation status of *Utricularia* species in Azerbaijan.

Keywords: aquatic plants, Azerbaijan, carnivorous plants, distribution, *Utricularia* × *neglecta*, wetland flora.

INTRODUCTION

Carnivorous plants are a specialised group of angiosperms that thrive in nutrient-poor environments by absorbing essential nutrients from animal prey. Carnivorous plants comprise over 800 species across several families. The Lentibulariaceae family is the most species-rich, encompassing the *Genlisea* A.St.-Hil., *Pinguicula* L. and *Utricularia* L. genera (Taylor, 1989; Ellison & Adamec, 2018). *Utricularia*, commonly known as bladderworts, is a genus distinguished by its unique suction traps (utricles) and exhibits remarkable ecological plasticity, occupying aquatic, terrestrial, lithophytic, and epiphytic habitats (Peroutka et al., 2008).

The genus *Utricularia* comprises about 280 rec-

ognised species and several natural hybrids, making it the largest genus of carnivorous plants in the world (POWO, 2025). The remarkable evolutionary diversification of this genus is evident in its cosmopolitan distribution, with terrestrial species being most abundant in the Southern Hemisphere and aquatic species dominating the Northern Hemisphere (Bobrov et al., 2022).

In the South Caucasus, *Utricularia* is represented by only a few species. Historical records indicate that *Utricularia vulgaris* L. was present in Azerbaijan, Georgia and Armenia, *Utricularia minor* L. in Georgia and Armenia, and *Utricularia intermedia* Hayne in Armenia (Seregin, 2025). However, the taxonomic identity and distribution of aquatic *Utricularia* species in this region remain unclear due to outdated herbari-

um determinations, limited recent field surveys and a lack of molecular studies. Notably, hybrid taxa such as *Utricularia* × *neglecta* Lehm. are frequently overlooked or misidentified, which further complicates regional floristic assessments (Bobrov et al., 2022).

The aim of this study was to provide the first confirmed record of *Utricularia* × *neglecta* in Azerbaijan and the South Caucasus. This record was based on a morphological reassessment of herbarium and field-collected specimens. It updated the regional checklist and improved our understanding of the diversity and distribution of aquatic carnivorous plants in the Caucasus.

MATERIALS AND METHODS

Field surveys were conducted in Samur-Yalama National Park, Khachmaz District, Azerbaijan, in July and August 2023. The study site was a shallow, stagnant body of freshwater located approximately 10 metres from the shoreline of the Caspian Sea (41.797311° N, 48.658957° E; 28 metres below sea level). Specimens of *Utricularia* were collected by Y. Abiyev. Additionally, herbarium material from the Yevlakh District was examined for comparison purposes (Moscow University Herbarium, collector: A. Schelkownikow, 17 May 1908, MW0717111 and MW0717112).

Morphological identification was based on published taxonomic descriptions and diagnostic keys for *Utricularia vulgaris*, *Utricularia tenuicaulis* Miki, and *Utricularia* × *neglecta* (Taylor, 1989; Bobrov et al., 2022). Measurements were taken using an MBS-10 stereomicroscope at magnifications ranging from ×10 to ×40. The geographic coordinates of the collection sites were determined using a Garmin GPSMAP 64.

Habitat types were assigned according to the EUNIS (Davies et al., 2004) and Ramsar (Ramsar, 2013) classification systems, in accordance with the standard definitions and regional adaptations (Tedoradze et al., 2023).

RESULTS AND DISCUSSION

New record. The first morphologically verified record of *Utricularia* × *neglecta* in Azerbaijan and the South Caucasus is based on a flowering specimen collected in Samur-Yalama National Park (Fig. 1).

Previously, records of *Utricularia* in Azerbaijan were limited to herbarium specimens attributed to *Utricularia vulgaris* (Nematabad, Yevlakh District; Schelkownikow; Seregin, 2025).

Taxonomic note. Recent morphological and molecular studies have confirmed that *Utricularia* × *neglecta* is a sterile natural hybrid of *Utricularia vulgaris* and *Utricularia tenuicaulis*. Consequently, the name *Utricularia australis* should only be applied to species found in Australia (Bobrov et al., 2022; POWO, 2025; WFO, 2025). In the South Caucasus, nearly all previous references to *Utricularia australis* or ‘*Utricularia vulgaris*’ in herbarium records can be reconsidered based on these findings. The diagnostic features that distinguish *Utricularia* × *neglecta* from its parental taxa have been clarified by comprehensive regional studies (Taylor, 1989; Bobrov et al., 2022; Orlov et al., 2021).

Diagnostic features and identification. Specimens from Azerbaijan exhibit morphological characteristics intermediate between those of *Utricularia vulgaris* and *Utricularia tenuicaulis*. The stems are slender (15–25 cm) with finely bipinnate leaves that are more widely spaced than those of *Utricularia vulgaris*. Bladder traps (vesicles) are present on both the stems and leaves; in contrast, in *Utricularia vulgaris*, they occur only on the leaves. The lateral setulae arise from the tips of short, pointed teeth (one or two per tooth), a feature also found in *Utricularia tenuicaulis*, but not in *Utricularia vulgaris*. The peduncle bears a small central lacuna that occupies less than a fifth to a quarter of the cross-sectional diameter. This is unlike the large lacuna in *Utricularia vulgaris*, which is completely absent in *Utricularia tenuicaulis* (Bobrov et al., 2022; Table 1).

Habitats and phenology. The hybrid was found in a shallow, stagnant, oligotrophic, and slightly alkaline freshwater body about 10 m from the Caspian Sea shoreline, in the lowlands of Samur-Yalama National Park. The site is affected by significant seasonal variations in water levels, caused by the gradual retreat of the Caspian Sea. The regional climate is warm-temperate, with dry summers (annual precipitation ranges from 300 to 400 mm, with an average temperature of 13°C). Associated aquatic macrophytes at the site included *Typha minima* Funck, *Bolboschoenus maritimus* (L.) Palla, *Ceratophyllum demersum* L., and *Stuckenia pectinata* (L.) Börner. According to the

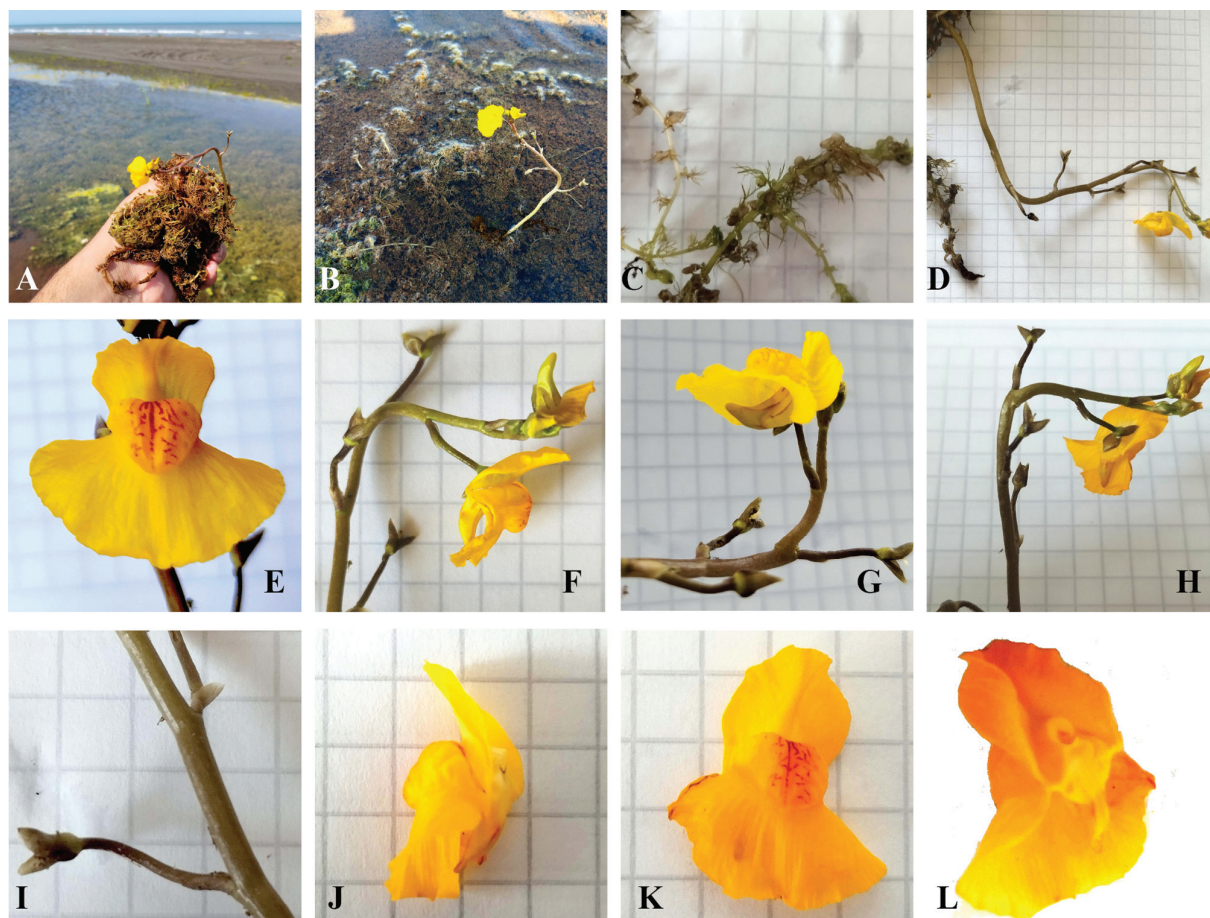


Fig. 1. Morphology of *Utricularia* $\times$ *neglecta* found in Azerbaijan. A–B – view of the habitat, C – general view of the species, D – view of the underwater, E – front view of the terminal part of inflorescence with flower, F – lateral view of the terminal part of inflorescence with flower, G – view from below of the terminal part of inflorescence with flower, H – view from above and back of the terminal part of inflorescence with flower, I – view of the branches, J – lateral view of the flower, K – front view of the flower, L – back view of the flower. Photographs by Y. Abiyev.

EUNIS habitat classification, this corresponds to two habitat types: permanent oligotrophic lakes, ponds and pools (C1.2) and littoral zone of inland surface waters (C2.3). According to the Ramsar classification, these habitats belong to the “permanent ponds” (Tp) and “permanent freshwater lakes” (O) categories. Moderate anthropogenic impact on these habitats, primarily from tourism and land use, was observed. Flowering specimens were collected in July and August; no fruiting was observed, which is consistent with the sterility of the hybrid.

Distribution. The record from Azerbaijan represents one of the most southeastern confirmed occurrences of *Utricularia* $\times$ *neglecta* in Eurasia, considerably extending its known range. Previous records of *Utricularia australis* or ambiguous ‘*Utricularia*

vulgaris’ from the North Caucasus (Efremov, 2021; Schischkin et al., 2000) and Dagestan (Popovich et al., 2022) have also been reassigned to *Utricularia* $\times$ *neglecta* based on recent morphological reassessment (Bobrov et al., 2022; Orlov et al., 2021). Similar reinterpretation has occurred in Ukraine, the Balkans, and Central Europe, indicating that the species is more widely distributed but was often overlooked or misidentified. The presence of *Utricularia* $\times$ *neglecta* in Azerbaijan fills a major gap in the distribution of the genus. It highlights the region as a potential hybridisation zone for *Utricularia vulgaris* and *Utricularia tenuicaulis* (Fig. 2).

Conservation status and recommendations. The IUCN Red List assessment (Champion, 2014)

Table 1. Diagnostic characteristics of *Utricularia vulgaris*, *Utricularia tenuicaulis*, and their hybrid, *Utricularia* × *neglecta* (adapted from Bobrov et al., 2022)

Characters	<i>Utricularia vulgaris</i>	<i>Utricularia tenuicaulis</i>	<i>Utricularia</i> × <i>neglecta</i>
Growth form	Robust (20–100 cm)	Slender (15–45 cm)	Intermediate
Stem and leaf structure	Leaves repeatedly pinnate, with thick linear segments; all leaves bear large bladders	Leaves pinnately divided; bladders present on both leaves and stems	Similar to <i>Utricularia tenuicaulis</i> , but with intermediate traits
Lateral setulae	Arising from the margin without teeth, one per prominence	Arising from the apex of short acute teeth, 1–2 per tooth	Arising from the apex of short acute teeth, 1–2 per tooth
Inflorescence	With 6–12 flowers, 15–30 cm tall; pedicels 0.6–1.2 cm, reddish, erect at anthesis, decurved in fruit	With 2–6 flowers, up to 15 cm tall; pedicels 1–1.5 cm, green, erect at anthesis, decurved in fruit	With 4–10 flowers, 15–25 cm tall; pedicels 1.5–2(3) cm, reddish, erect at anthesis, spreading post-anthesis
Lower lip of the corolla	Deflexed lateral margins	Flat, lateral margins not deflexed	Flat, lateral margins not deflexed
Corolla spur	Shorter than the lower lip, straight, broad conical base, narrowly conical upper part, apex obtuse, covered dorsally with glands	Broadly conical to cylindrical, slightly curved, apex obtuse, sometimes with a beak-like appendix, covered entirely with glands	Broadly conical, slightly curved, apex obtuse, covered entirely with glands
Habitat	Nutrient-rich waters (lakes, ponds, canals, base-rich water)	Nutrient-poor waters (lakes, ponds, ditches, base-poor water)	Found in habitats characteristic of both parental species
Central lacuna in the peduncle cross-section	Present, large (half or more of the cross-section)	Absent	Present, small (one-fifth to one-quarter of cross-section)

refers to *Utricularia australis* sensu lato, which encompasses Eurasian material previously identified under this name. If these Eurasian populations are considered to be the hybrid *Utricularia* × *neglecta*, then there is currently no separate IUCN category for this nothotaxon. Nevertheless, regional conservation assessments classify it as Critically Endangered (CR) in Bulgaria (Biserkov, 2015) and Vulnerable (VU) in Ukraine (Orlow et al., 2021). It is also generally considered to be threatened or in decline across Central Europe due to habitat loss, wetland drainage and eutrophication.

The species is confined to shallow, oligotrophic freshwater habitats and is highly sensitive to hydrological changes, pollution, and overgrowth by other aquatic plants. As sterile hybrids, their populations are typically small, localised, and vulnerable to extinction.

In the South Caucasus, *Utricularia* × *neglecta* has only recently been confirmed and was not yet included in national Red Lists. Because of the rarity of suitable habitats and the ongoing threats to wetlands in the region, we recommend the following:

1. Prioritising targeted field surveys and population monitoring;
2. Integrating *Utricularia* species into national conservation and wetland management plans;
3. Preserving and restoring shallow aquatic habitats;
4. Supporting molecular and ecological research to clarify the population status and dynamics of the hybrid.

Regional collaboration and inclusion in conservation frameworks are essential to prevent further decline of *Utricularia* × *neglecta* at the southeastern edge of its range.

In addition to *Utricularia* × *neglecta*, three other species (*Utricularia vulgaris*, *Utricularia minor*, and *Utricularia intermedia*) have historically been recorded in the South Caucasus. However, recent evidence suggests that their taxonomic identities and current distributions in Azerbaijan need to be critically reassessed.

Utricularia vulgaris has been frequently cited in older floristic works as being widespread in lowland freshwater habitats such as lakes, ponds, and ditches across Azerbaijan, Georgia, Armenia, and the North Caucasus (Schischkin et al., 2000). Recent taxonomic revisions, however, indicate that many of these records likely represent misidentified *Utricularia* ×

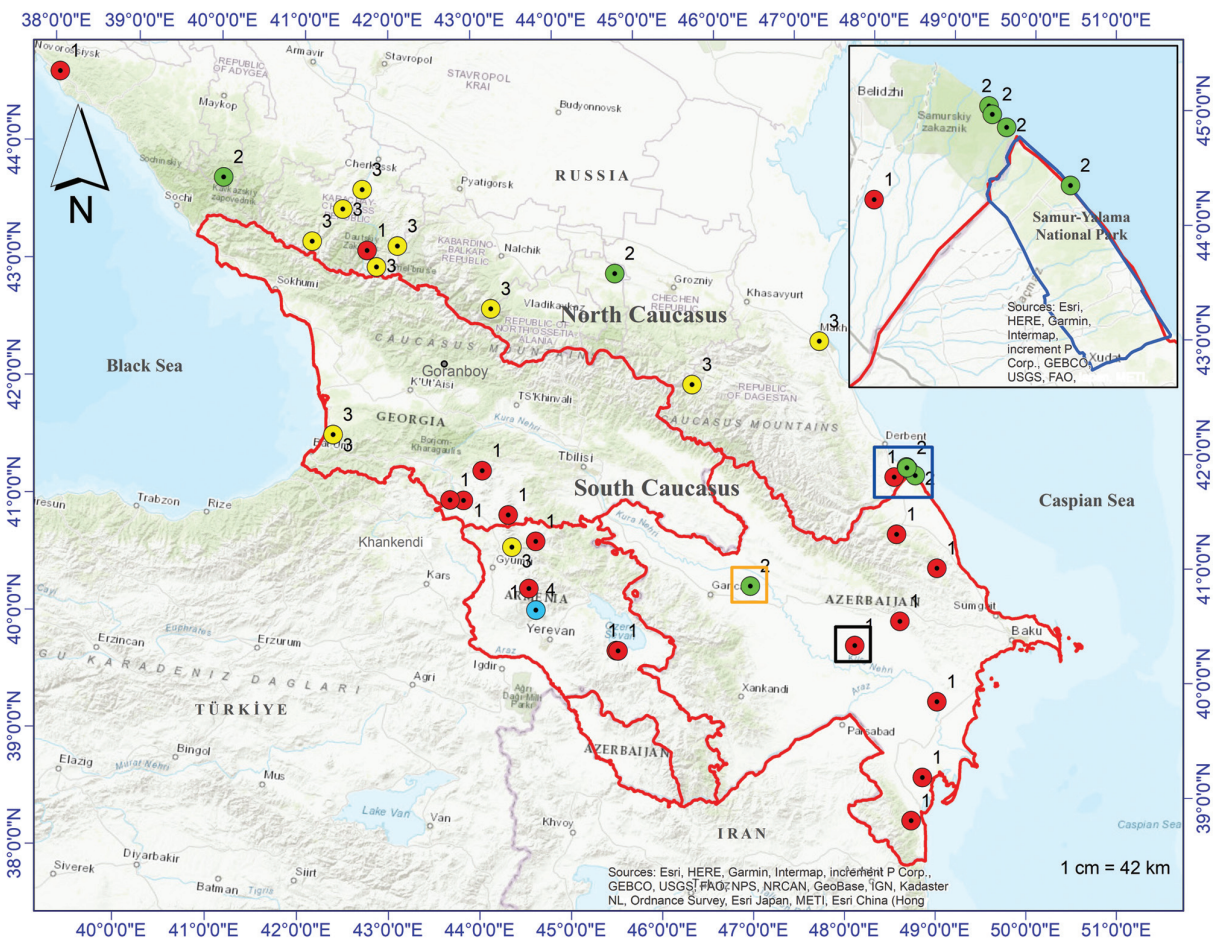


Fig. 2. Distribution of *Utricularia* species in the Caucasus. 1 – *Utricularia vulgaris*, 2 – *Utricularia × neglecta*, 3 – *Utricularia minor*, 4 – *Utricularia intermedia*. Black frame: Previously collected as *Utricularia minor* (Collector: Gurvitz; 13 May 1945; BAK76485), later identified as *Utricularia vulgaris* (Herbarium of the Institute of Botany, BAK). Orange frame: Previously identified as *Utricularia vulgaris*, re-identified as *Utricularia × neglecta* (Seregin, 2025; MW0717111 and MW0717112).

neglecta (Bobrov et al., 2022). In Georgia, *Utricularia vulgaris* has currently been assessed as Critically Endangered due to habitat loss and eutrophication (Tarkhnishvili, 2025). Verified populations in Georgia and Armenia are found in mesotrophic to slightly eutrophic permanent waters below 800 m above sea level, typically with substrates of mud or silt and dense beds of *Potamogeton* L., *Najas* L., *Lemna* L., and *Ceratophyllum* L. (EUNIS C1.21, C2.31; Ramsar O, Tp).

Utricularia minor prefers oligotrophic, often acidic wetlands at higher elevations, most commonly shallow bogs and marshes above 900–1000 m. While historical reports list the species for Azerbaijan (Meusel et al., 1965), no recent material with confirmed identity is available. Verified populations are known

from the Caspian coast of Dagestan (Tikhomirov et al., 2024), the Javakheti plateau of Georgia (Tedoradze et al., 2023), and alpine marshes in Armenia (Jenderedjian, 2005). These habitats are characterised by stable water levels, low nutrient content, and dominance of *Sphagnum* L., *Carex* L., and *Juncus* L. species (EUNIS D1.21, D2.2; Ramsar Xp, U).

Utricularia intermedia is the rarest species of the genus in the region, confined to cold peatlands and mountain fens at elevations of 1500–1700 m above sea level, especially in northern Armenia (Lake Arpi National Park). In Armenia, the species is assessed as Endangered (EN) due to its narrow ecological amplitude, small population size, and ongoing threats from wetland drainage and climate change (Adamec, 2020). These habitats are characterised by water-

logged *Sphagnum* peat and are associated with *Menyanthes trifoliata* L. and *Nymphaea alba* L. (EUNIS D2.3, D1.21; Ramsar Xp, U). To date, there are no confirmed records of *Utricularia intermedia* from Azerbaijan or Georgia.

Across the South Caucasus, the phenology of *Utricularia* species generally follows a pattern of vegetative growth beginning in late spring, with flowering occurring from June (occasionally from May) to August and fruiting in late summer. Flowering times are delayed at higher elevations and in cooler habitats, reflecting adaptations to the short growing season of mountain wetlands and the dynamic hydrology of lowland sites.

Given the persistent taxonomic ambiguity and frequent historical misidentifications in regional herbaria, further field surveys and reassessments, both morphological and molecular, are urgently needed to clarify the actual presence, ecological requirements, and conservation needs of *Utricularia* species in Azerbaijan and adjacent areas. As a result, a dichotomous key for the *Utricularia* genus was created based on the following sources: Casper & Krausch (1981), Taylor (1989), Tzvelev (1996), Wu et al. (2011) and Bobrov et al. (2022).

A dichotomous key for identifying *Utricularia* species recorded in the South Caucasus

1. Margins of lower corolla lip deflexed; palate hairy; bracts ovate ***Utricularia vulgaris***
 - Margins of lower corolla lip flat or not deflexed; palate not hairy **2**
2. Palate of lower corolla lip with a prominent, rounded basal swelling; rhizoids present and filiform ***Utricularia intermedia***
 - Palate of lower corolla lip without a prominent swelling; rhizoids absent **3**
3. Palate markedly elongate with a raised marginal rim; spur saccate to broadly obtuse-conic, about half as long as lower corolla lip ***Utricularia minor***
 - Lower corolla lip flat, lateral margins not deflexed; spur shorter than (or rarely equal to) lower lip, broadly conical, slightly curved, glandular inside; ultimate leaf segments with 1–2 lateral setulae per tooth; inflorescence straight to flexuous ***Utricularia* × *neglecta***

This study verified the occurrence of *Utricularia* × *neglecta* in Azerbaijan and the South Caucasus, resolving previous taxonomic confusion with *Utricularia vulgaris* through a detailed morphological reassessment of herbarium samples and freshly collected material. These results update knowledge of the distribution of Eurasian aquatic *Utricularia* species and emphasise the importance of future molecular studies and targeted field surveys to clarify species boundaries and support effective conservation planning in the region.

Author contributions. YA collected and identified specimens, analysed data, wrote draft text; AA conducted field research, reviewed and edited draft; MEG reviewed and edited text, supervised the study. All authors have read and approved the final version of the article.

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