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Silene schizopetala (Caryophyllaceae), a new record for the flora of Turkiye

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Keywords: Caryophyllaceae, *schizopetala*, new areal, rare species, sect. *Fimbriatae, Silene,* taxonomy, Anatolia

Ključne besede: Caryophyllaceae, *schizopetala,* novo območje razširjenosti, redka vrsta, sect. *Fimbriatae, Silene,* taksonomija, Anatolija

Abstract

During the floristic surveys conducted in the northern parts of Diyarbakır and Mardin provinces, located in southeastern Turkiye, two small populations of *Silene schizopetala* Bornm. (Caryophyllaceae) were discovered. Previously known as an endemic species native to northern Iraq, this species is identified as a new record for the flora of Turkiye. *Silene schizopetala* shows morphological similarities with *S. simsii* F. Jafari, Rabeler & Oxelman, *S. physalodes* Boiss. and *S. lacera* (Steven) Sims, which all are included in sect. *Fimbriatae*. A dichotomous key is presented for the identification of these closely related species. Additionally, a detailed description, diagnostic comparisons to morphologically similar taxa, and a general distribution map are provided.

Izvleček

Med floristčnimi raziskavami v severnih delih provinc Diyarbakır in Mardin na jugovzhodu Turčije sta bili odkriti dve manjši populaciji vrste *Silene schizopetala* Bornm. (družina Caryophyllaceae). Ta vrsta, ki je bila doslej znana kot endemit severnega Iraka, je zdaj prvič zabeležena v flori Turčije. *Silene schizopetala* kaže morfološke podobnosti z vrstami *S. simsii* F. Jafari, Rabeler & Oxelman, *S. physalodes* Boiss. in *S. lacera* (Steven) Sims, ki vse spadajo v sekcijo *Fimbriatae*. Za določanje teh tesno sorodnih vrst je predstavljen dihotomni ključ, podani pa so še podroben opis, diagnostična primerjava z morfološko podobnimi taksoni ter zemljevid splošne razširjenosti.

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Introduction

Caryophyllaceae is a large family comprising approximately 100 genera and 3,000 species, distributed throughout the world's temperate regions from the Arctic to Antarctica, predominantly in the Northern Hemisphere. The family is generally widespread in the Mediterranean and neighboring regions of Europe, as well as Western, Central and Southwestern Asia. The Eastern Mediterranean and Irano-Turanian regions, where family members are densely concentrated, are centers of diversity (Bittrich, 1993; Oxelman & Liden, 1995; Oxelman et al., 2001; Heywood et al., 2007; Takhtajan, 2009; Hernández-Ledesma et al., 2015).

Silene L., a large and polymorphic genus, comprises approximately 870 species and has a cosmopolitan distribution, but it is mostly absent from tropical regions. The Mediterranean region is the main center of diversity, hosting more than half of its taxa and 40% of its total species, which are endemic. Members of the genus generally prefer relatively dry habitats such as rocky areas, steppes and deserts (Coode & Cullen, 1967; Melzheimer, 1988; Greuter, 1997; Heywood et al., 2007; Hernández-Ledesma et al., 2015; Jafari et al., 2020; Moiloa et al., 2021; Naciri et al., 2022; Toprak, 2025).

Based on the latest revision by Yıldız (2025), the genus *Silene* comprises 145 taxa in Turkiye, approximately half of which (63 taxa, 43%) are endemic. With the inclusion of *S. schizopetala*, this number has reached 146.

A thorough taxonomic examination of white-flowered *Silene* specimens collected from northern Diyarbakır and northern Mardin confirmed their identity as *S. schizopetala.* Originally described by Bornmüller (1899) and previously considered endemic to northern and northeastern Iraq, this species is documented here as a new record for the flora of Turkiye.

Materials and methods

During the floristic surveys, noteworthy specimens of the genus *Silene* were collected from Diyarbakır-Dicle, and Mardin-Savur districts. Morphological examination using relevant literature (Boissier, 1867; Rohrbach, 1868; Coode & Cullen, 1967; Melzheimer, 1988; Davis et al., 1988; Tan & Vural, 2000; Yıldız, 2025) confirmed their identity as *Silene schizopetala,* a species not previously recorded in Turkiye. This identification was further validated by examining digital specimens obtained from the Botanic Garden and Botanical Museum Berlin (B), Royal Botanic Garden Edinburgh (E), Royal Botanic Garden Kew (K), and Moscow University Herbarium (MW) [herbarium acronyms follow Thiers (n.d.)]. The newly collected specimens are deposited at the Dicle University Herbarium (DUF).

For detailed taxonomic evaluation, morphological characters were measured with a standard millimeter ruler. Specimens were examined and dissected using a binocular stereo microscope (TT TECHNIC; EseTek Elektronik, Turkiye), while floral and vegetative structures, as well as general habit, were photographed with a Canon EOS 500D digital camera. Locality and distribution data for the evaluated taxa were extracted directly from the examined herbarium sheets except for *Silene physalodes,* whose distribution details were retrieved from Danin & Fragman-Sapir (2016).

Results

Sect. *Fimbriatae* (Boiss.) Bornm.

Silene schizopetala Bornm., Bull. Herb. Boissier 7: 114 (1899) (Figure 1)

Description. Biennial or perennial herb. Stem solitary, ascending-erect, 45–70 cm tall, branched in the upper part; scabrous-pubescent, with longer glandular trichomes intermixed, becoming densely glandular-pubescent towards the upper part. Lower leaves broadly ovate, 45–80 × 22–40 mm, 3–5-veined, margins undulate, base cuneate, apex shortly acuminate, sparsely glandular-pubescent; shortly petiolate to sessile, petioles 8–16 mm long and broadened; middle leaves similar to the lower leaves but smaller, ovate, 30–55 × 15–28 mm, densely glandular-pubescent, sessile; upper leaves smaller, broadly ovate-cordate, 12–25 × 7–14 mm, densely glandular-pubescent, apex caudate, cordate at the base, semiamplexicaule and sessile. Inflorescence a compound dichasium. Pedicels 2–5 mm long in flower, elongating to 15–30 mm and becoming deflexed in fruit, densely glandular-pubescent. Bracts ovate-lanceolate, 3–8 mm long, densely glandular-pubescent, one approximately twice as long as the others. Calyx bottle-tubular, 12–15 × 3–5 mm, greenish or purplish, striate, densely glandular-pubescent; teeth 3 mm long, triangular-ovate, with scarious margins; becoming conspicuously inflated in fruit, broadly ovate to ovoid-oblong, 18–22 × 12–16 mm, membranous. Petals white, 22–24 mm long; limb 6–7 mm long, deeply laciniate, with 10 linear segments and two coronal scales; claw 16–18 mm long. Anthers brown; filaments white. Capsule broadly ovate to subglobose, 8–10 × 7–9 mm, glabrous, enclosed within the calyx. Anthophore glabrous, 3–4 mm long.

Type. —Iraq. Erbil, Dschebel-Sefin, in faucibus subalpinis supra pagum Schaklava; 1600 m, 1.V.1893 (Bornm. iter Persico-turcicum 1892–93, n° 951).

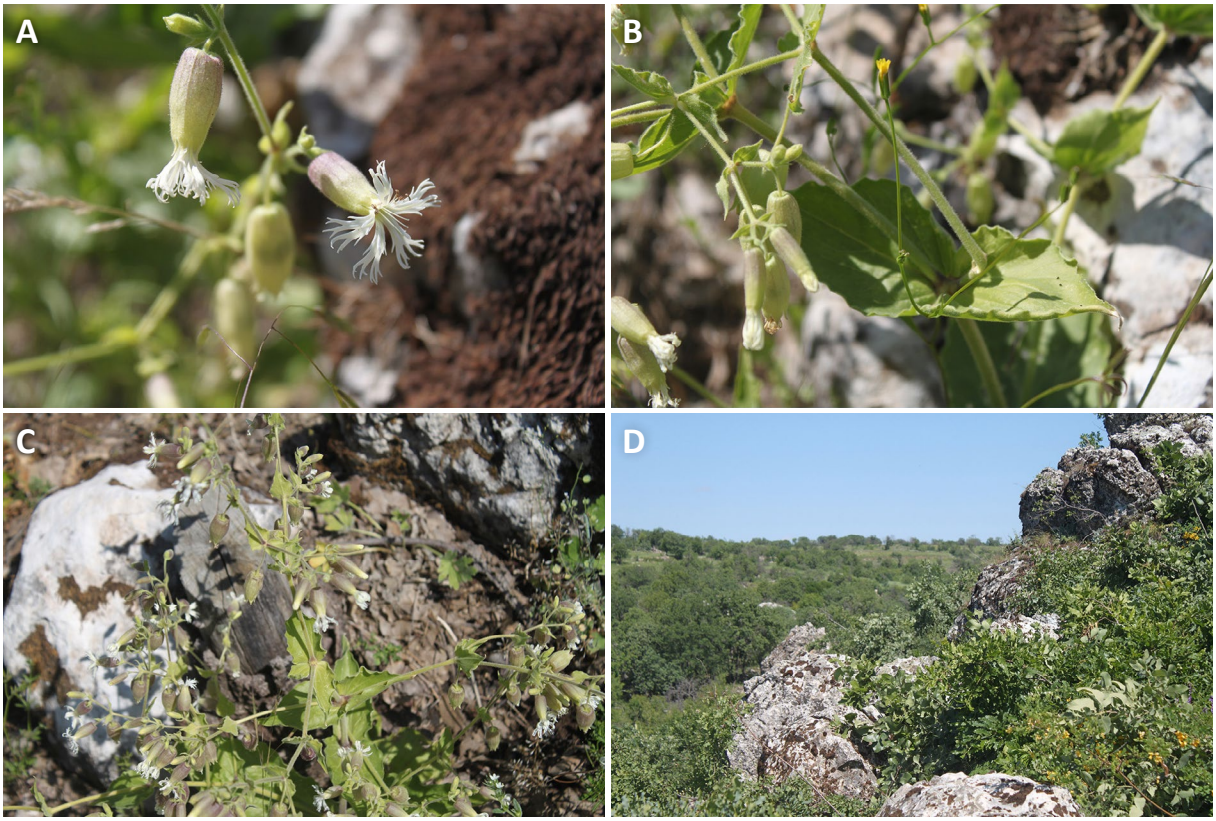


Figure 1: *Silene schizopetala* Bornm. A – flower, B – leaf, C – habitus, D – habitat (photos: A. S. Ertekin).
Slika 1: *Silene schizopetala* Bornm. A – cvet, B – list, C – habitus, D – habitat (fotografije: A. S. Ertekin).

Examined specimens

The examined specimens are listed below, with available information presented in the following order: taxon name, country, locality and habitat details, collection date, collector, field number (or s.n.), and herbarium code with sheet ID.

Silene schizopetala Bornm.

—Iraq. Mosul liwa, Zaho district, Bakirma, 9.V.1947, *A. Rawi 8575* (K005014263); Kopi Karadagh, 15.VI.1957, *R. Wheeler-Haines s.n.* (E00987222); Kopi Karadagh, 22.VI.1957, *R. Wheeler-Haines W1078* (K005014264); Kopi Karadagh, 22.VI.1957, *R. Wheeler-Haines 1078* (E00987223); **Turkiye.** Diyarbakır, Dicle, Taşağıl (Haçek) village, rocky slopes in *Quercus woodland,* 1010–1050 m a.s.l., 22.V.2022, *Ertekin 2022-18* (DUF); ibid., 05.VI.2026, *Ertekin 2026-85* (DUF); Mardin, Savur, Yaylayanı (Memikan) village, 2 km south of the village, in *Quercus woodland,* 1020 m a.s.l., 10.VI.2026, *Ertekin 2026-118* (DUF);

Silene physalodes Boiss.

—Palaestine. Near Banias, 1846, *P.E. Boissier s.n.* (K000728657);

Silene lacera (Steven) Sims

—Azerbaijan. Main Caucasus Range, pebble banks of the Damir-Oparan River near the village of Michikh, 17.VIII.1932, *L. Chilikina s.n.* (MW0666236); Meadow on the moraine of the alp. belt, S. Kurush, Dagestan, 16.VII.1940, *R. Eleniewski s.n.* (MW0666226); **Georgia.** Seams, right slope of the Chesne River, 8.VIII.1940, *V. Zakharova s.n. (MW0666232);* **Russia.** Dagestan, in the Avar Koysu valley, between the villages of Kakhib and Tlyarata, 18.VII.1961, *A. Dogadova & A. Bobrov s.n.* (MW0666230); North Ossetian Nature Reserve, on the moraine of the Tsei Glacier, 24.VI.1977, *N. Shvedchikova 1127* (MW0666215); Vedeno District, western shore of Lake Kazenoy-Am, forb subalpine meadow, 14.VII.2013, *A. S. Zernov 8142* (MW0666205);

Silene simsii F. Jafari, Rabeler & Oxelman

—Armenia. Caucasus, vicinity of Lake Gokcha, Delizhan, 15.VII.1929, *P. Smirnov 396* (MW0666354); Kotayk Province, Abovian district, 28.VI.2002, *G. Fayvush et al. 2266* (B100469983); **Georgia.** Caucasus, Georgia, 19.VIII.1989, *A. P. Khokhriakov s.n.* (MW1006442); Lagodekhi Met Hut, 13.VIII.2009, *J. Mitchell et al. 135* (E00360918); **Russia.** Caucasus, South Ossetia, 20.VII.1948, *E. Gogina s.n.* (MW0666349); Kabardino-Balkaria, Baksansky district, Muhogaps tract, 11.VII.1966, *G. Kondratyeva s.n.* (MW0666323); Caucasus, Stavropol Territory, vicinity of the village of Yutsa, 28.VI.1976, *M. G. Pimenov et al. 52* (MW0666321); Caucasus, North Ossetia, Ardon River basin, 14.VII.1982, *V. V. Shcherbakov & N. D. Filonov s.n.* (MW0666326); Caucasus, Teberda State Nature Reserve, Alibek River Valley, 26.VI.1991, *V. Kodzhebash s.n.* (MW0666313); Caucasus, Karachay-Cherkessia, Karachayevsky district, 4.VIII.2006, *A. S. Zernov & I. I. Shidakov 5305* (MW0666311); **Turkiye.** Giresun, Giresun to Şebinkarahisar, 2 km towards Tamdere, 23.VII.2011, *K. Yıldız et al. 371-1* (E00623580);

Habitat and Ecology

Silene schizopetala is a species with a limited geographical range in northeastern Iraq and southeastern Turkiye. In Turkiye, the species is known only from two localized populations in the Southeastern Anatolia, growing at an altitude of 1000–1050 m a.s.l. within sparsely covered oak formations dominated by *Quercus brantii* Lindl. and *Quercus infectoria* Oliv. subsp. *veneris* (A.Kern.) Meikle. The habitat of the species is floristically rich. Associated taxa recorded in the habitat include *Allium paniculatum* L., *Allium scorodoprasum* L., *Anthriscus nemorosus* (M.Bieb.) Spreng., *Arum rupicola* Boiss. var. *rupicola*, *Astragalus cephalotes* Banks & Sol., *Astragalus echinops* Aucher ex Boiss., *Astragalus tigridis* Boiss., *Avena sterilis* L., *Bromus tectorum* L., *Bryonia multiflora* Boiss. & Heldr., *Celtis glabrata* Steven ex Planch., *Centaurea kurdica* Reichardt, *Cephalaria setosa* Boiss. & Hohen., *Chaerophyllum nodosum* (L.) Crantz, *Chrysojasminum fruticans* (L.) Banfi, *Colutea cilicica* Boiss. & Balansa, *Cota tinctoria* (L.) J.Gay, *Crataegus monogyna* Jacq., *Crataegus orientalis* Pall. ex M.Bieb. subsp. *orientalis*, *Dracocephalum ibericum* M.Bieb., *Euphorbia cheiradenia* Boiss. & Hohen., *Galium aparine* L., *Heptaptera anatolica* (Boiss.) Tutin, *Hordeum bulbosum* L., *Hypericum retusum* Aucher ex Jaub. & Spach, *Iris gatesii* Foster, *Lapsana communis* L. subsp. *grandiflora* (M.Bieb.) P.D.Sell, *Lathyrus aphaca* L., *Lathyrus oleraceus* Lam., *Lecokia cretica* (Lam.) DC., *Legousia pentagonia* (L.) Thell., *Nepeta trachonitica* Post, *Ornithogalum narbonense* L., *Phlomis kurdica* Rech.f., *Pistacia khinjuk* Stocks, *Poa bulbosa* L., *Rumex cristatus* DC., *Salvia syriaca* L., *Silene crassipes* Fenzl, *Smyrnium cordifolium* Boiss., *Symphytum brachycalyx* Boiss., *Trifolium dasyurum* C.Presl, *Triticum turgidum* L. subsp. *dicoccoides* (Asch. & Graebn.) Thell., *Turgenia latifolia* (L.) Hoffm., and *Vicia cracca* L., and *Zosima absinthiifolia* (Vent.) Link. This floristic composition reflects the adaptation of *S. schizopetala* to the ecological conditions at the edge zones of oak formations located in the transitional range between the Mediterranean and Irano–Turanian phytogeographic regions.

Conservation

Field observations and literature records indicate that *Silene schizopetala* is known from a total of five populations: two in southeastern Turkiye and three in northern Iraq (see Figure 2). While current, detailed field data are available for the Turkish populations, data regarding the extant population size and habitat conditions in Iraq remain limited. However, a recent observation in the Qopi Qaradagh region of northern Iraq (GBIF, 2026) confirmed the presence of the species in this area.

Based on the existing literature and verified records, the estimated extent of occurrence (EOO) of *Silene schizopetala* is approximately 18.000 km². However, reliable data on the area of occupancy (AOO) are only available for the populations in Turkiye. In the Diyarbakır population, the species occupies a very small area (approximately 0.15 km²) and comprises only 15–20 individuals. Similarly, the second population recorded in Mardin province spans just 0.08 km² and contains 10–15 individuals. Meanwhile, current numbers for Iraqi populations remain unknown, underscoring a major data gap in understanding the species' regional size and dynamics.

Silene schizopetala exhibits a highly restricted geographic distribution characterized by small, fragmented, and spatially isolated populations. The limited number of localities, the isolation among populations, and particularly the persistence of the Turkish populations within a very narrow area with low abundance indicate a high vulnerability to environmental change and habitat degradation. Because all five known localities (Figure 2), including those in northern Iraq, cover extremely restricted areas, local human activity or stochastic environmental events could rapidly threaten the entire species.

According to IUCN (2024) criteria, *Silene schizopetala* meets criterion D2 because its AOO is less than 20 km² and it is found in a limited number of localities. Although no verified continuous population decline has been reported, potential threats could quickly raise the species' conservation status to a higher risk category. Therefore, *S. schizopetala* should be assessed as Vulnerable [VU D2].

Discussion

The most recent global revision of the genus recognized 33 sections within *Silene*, grouped into three subgenera: *Silene* subg. *Silene*, *Silene* subg. *Behenantha* (Otth) Endl., and *Silene* subg. *Lychnis* (L.) Greuter (*Jafari et al., 2020*).

Sect. *Fimbriatae* (Boiss.) Bornm., within *S.* subg. *Behenantha*, is characterized by conspicuously large ovate leaves, which are occasionally smaller and lanceolate, inflated calyces at the fruiting stage, and deeply laciniate white petals. This section comprises four species distributed in Western Asia (Figure 2): *Silene simsii* F. Jafari, Rabeler & Oxelman, *S. lacera* (Steven) Sims, *S. physalodes* Boiss., and *S. schizopetala* Bornm. (Boissier, 1867; Rohrbach, 1868; Shishkin, 1936; Coode & Cullen, 1967; Melzheimer, 1988; Jafari et al., 2019).

Silene simsii is widely distributed in northeastern and eastern Turkiye, the Caucasus, and northwestern Iran (Melzheimer, 1988; Lazkov 2003; Jafari et al., 2019; Yıldız 2025). This taxon is recognised by very large, long-petiolate leaves, a campanulate calyx at anthesis, and numerous, deeply dissected petal limbs. *Silene lacera* is a species restricted to the northern Caucasus and Transcaucasia (Shishkin, 1936). Morphologically and geographically, it is closely allied to *S. simsii*; however, it can be readily distinguished by its smaller, ovate, long-petiolate lower leaves, and occasionally lanceolate stem leaves. In contrast, *S. physalodes*, a narrow endemic of Israel (Boissier, 1867; Rohrbach, 1868), can be recognized by leaves with entire margins, a tubular calyx at anthesis, and weakly laciniate petals. On the other hand, *S. schizopetala*, previously thought to be endemic to northern and northeastern Iraq (Melzheimer, 1988), differs from other related taxa by its sessile to shortly petiolate, undulate leaves and petal characteristics (Table 1).

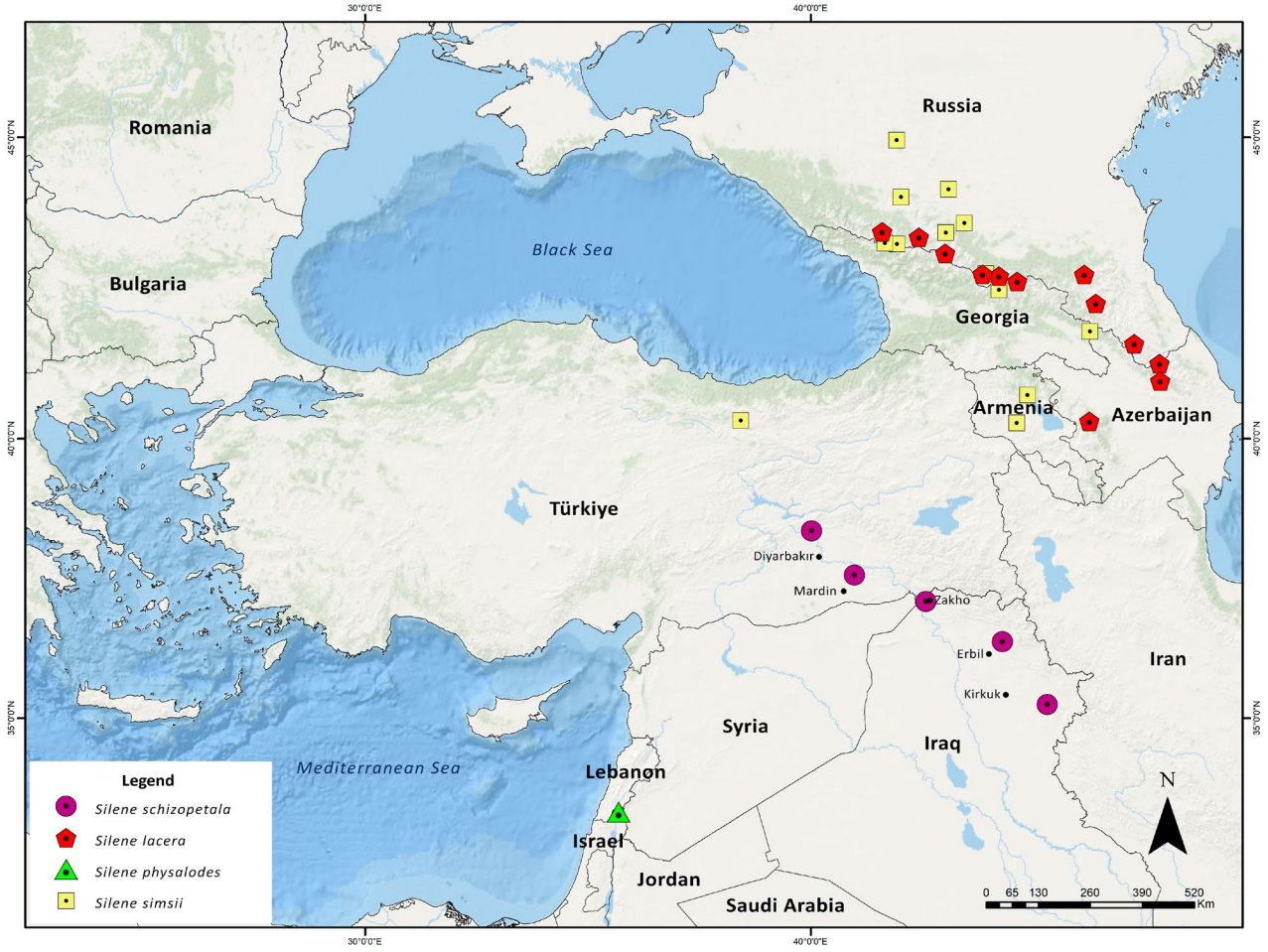


Figure 2: Geographical distribution of *Silene simsii, S. lacera, S. physalodes* and *S. schizopetala.* The map is based on the data obtained from the examined herbarium sheets.

Slika 2: Geografska razširjenost vrst *Silene simsii, S. lacera, S. physalodes* in *S. schizopetala.* Zemljevid je narejen na osnovi podatkov s pregledanih herbarijskih pol.

Table 1: Comparison of morphological features of the species of *Silene* sect. *Fimbriatae*.
Tabela 1: Primerjava morfoloških značilnosti vrst iz sekcije *Silene* sect. *Fimbriatae*.

Characters	*S. schizopetala*	*S. physalodes*	*S. lacera*	*S. simsii*
Lower leaves	45–80 × 22–40 mm, margins undulate; petiole 8–16 mm long, 1/6–1/4 as long as lamina	100–120 × 75 mm, glabrous or shortly hairy; margins plane; petiole length not determined	30–85 × 5–20 mm, margins plane or sometimes undulate; petiole 20–55 mm long, 1–3 times as long as the lamina	65–180 × 35–100 mm, margins plane; petiole 20–60 mm long, 1/6 to as long as the lamina
Calyx (length and shape at anthesis)	12–15 mm, bottle-tubular	12–17 mm, tubular	13–16 mm, campanulate	14–22 mm, campanulate
Petal limbs	6–7 mm long, laciniate, with ca. 10 linear lobes	3–4 mm long, biauriculate, with 4–6 linear lobes	5-6 mm long, irregularly divided into ca. 14 oblong-linear lobes, apically emarginate	7 mm long, deeply laciniate, with 16–18 linear lobes
Coronal scales	linear	laciniate	laciniate	absent

Key to the species of *Silene* sect. *Fimbriatae*

The dichotomous key presented below was compiled based on morphological characters and taxonomic information from Boissier (1867), Rohrbach (1868), Shishkin (1936), Coode & Cullen (1967), Melzheimer (1988), Jafari et al. (2019) and Yıldız (2025), combined with examination of physical and digital herbarium material.

1 Calyx campanulate at anthesis; petal limbs deeply laciniate with 14–18 linear lobes 2
1 Calyx tubular at anthesis; petal limbs biauriculate or laciniate with 4–10 linear lobes 3
2 Plants 50–100 cm tall; lower leaves 65–180 × 35–100 mm; petiole 20–60 mm long, 1/6 to as long as the lamina . . *S. simsii*
2 Plants 15–30 cm tall; lower leaves 30–85 × 5–20 mm; petiole 20–55 mm long, 1-3 times as long as the lamina . . . . *S. lacera*
3 Lower leaves 100–120 × ca. 75 mm margins plane; petal limbs biauriculate with 4–6 linear lobes . . . . . *S. physalodes*
3 Lower leaves 45–80 × 22–40 mm, margins undulate; petal limbs laciniate with ca. 10 linear lobes . . . . . *S. schizopetala*

Based on the results, *Silene schizopetala* appears to be morphologically and geographically most closely related to *S. physalodes*. However, *S. physalodes* is characterized by petiolate, larger, entire-margined lower leaves and shorter petal limbs that are weakly laciniate and biauriculate, which clearly distinguish it from *S. schizopetala*. These traits represent the principal morphological differences between the two species.

In the examined specimens of *Silene schizopetala* from Turkiye, the lower leaves were consistently undulate, the calyx at anthesis was distinctly tubular, and a pair of linear coronal scales was present. These diagnostic features of the species were not reported in Flora Iranica (Melzheimer, 1988).

From a geographical perspective, this study contributes to a more comprehensive understanding of the distribution range of *Silene schizopetala* by documenting its presence in southeastern Turkiye, with populations recorded in Diyarbakır and Mardin. This finding not only extends the known range of the taxon, previously considered restricted to northern and northeastern Iraq, but also provides new insights into the biogeographical connections between the

floras of northern Mesopotamia and southeastern Anatolia, with important implications for both regional biodiversity assessments and conservation strategies. In conclusion, the present study provides the first confirmed record of *Silene schizopetala* in Turkiye, thereby refining the understanding of the species' distribution in Western Asia and highlighting the floristic connections between southeastern Turkiye and adjacent regions of Iraq. The examined material also reveals additional morphological traits such as undulate leaf margins, a tubular calyx, and linear coronal scales that further support its distinction from closely related taxa in sect. *Fimbriatae*.

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Author Contribution

Alaattin Selçuk Ertekin conducted the fieldwork. All authors designed the study, and contributed to the writing of the manuscript.

Conflict of Interest

The authors declare that there is no conflict of interest.

Research Data Availability

The research data used in this study are included in the published article.

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