

## SILENE BACCIFERA (CARYOPHYLLACEAE), A NEW RECORD FOR THE FLORA OF IRAN

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*Silene* (Caryophyllaceae, Sileneae), the most diverse taxon of the pink family, is the fourth-largest genus of the flora of Iran. The current study reports *S. baccifera* of the monotypic *Silene* sect. *Cucubalus*, as a new record for the flora of Iran. Ascending habit, pseudoberry fruits, and deflexed saucer-shaped calyxes are the striking characteristics of *S. baccifera*, by which the species could be unmistakably distinguished among other congeneric taxa. The number of species and sections of *Silene* known for Iran by taking *S. baccifera* into account increases to 121 and 17, respectively. A complete description of *S. baccifera* along with its distribution map and conservation status herein is presented.

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**Silene baccifera**, یک گونه رکورد جالب برای فلور ایران

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جنس *Silene* (Caryophyllaceae, Sileneae)، متنوع ترین جنس تیره میخکیان و چهارمین جنس بزرگ فلور ایران است. مطالعه پیش رو، *S. baccifera* از بخش منوتیبیک *Silene* sect. *Cucubalus* را به عنوان رکورد جدید برای فلور ایران گزارش می کند. این گونه با دارا بودن صفات ریخت شناختی جالب توجهی از جمله فرم رویشی بالارونده، میوه های سته کاذب و همچنین کاسه های نعلبکی شکل برگشته به راحتی از بقیه گونه های جنس قابل تشخیص است. با احتساب *S. baccifera* تعداد بخش های شناخته شده این جنس در ایران به ۱۷ و تعداد گونه ها نیز به ۱۲۱ افزایش می یابد. گونه مذکور بصورت کامل شرح داده شده و نقشه پراکنش به همراه سطح حفاظتی آن ارائه شده است.

### INTRODUCTION

*Silene* L. (Caryophyllaceae Juss., Sileneae DC. ex Ser.) is the genus with the largest number of species (800-900 spp.) in the cosmopolitan pink family (Hernández-Ledesma & al. 2015; Frajman & al. 2018). There exists a wide range of diversity in ecological,

morphological, and breeding system characteristics among *Silene* species (Bernasconi & al. 2009; Desfeux & Lejeune 1996). Although species of *Silene* occur natively in both the old and new worlds, the genus is predominantly distributed throughout the temperate zones of the Northern Hemisphere. The Mediterranean

basin, Middle East, and Central Asia are considered as the major diversity centers of the genus (Aydin & al. 2014; Eggens & al. 2007). Some species, such as *S. vulgaris* (Moench) Garcke and *S. latifolia* Poir. have also been reported as invasive weeds in their introduced regions (Bernasconi & al. 2009). The general morphological traits of *Silene* include a synsepalous calyx, 5 free petals, 3-5 styles, 10 stamens, and a capsule fruit (Rautenberg & al. 2012).

Among different folks, some species of the genus are traditionally consumed for therapeutic and nutritive purposes. Indeed, *Silene* should be paid attention to as an important source of nutraceuticals as is rich in chemicals, such as phytoecdysteroids, triterpene saponins, and phenolic compounds (Mahmoud & al. 2021; Zengin & al. 2018). *Silene baccifera* is both an edible green vegetable and a medicinal plant, which its crushed aerial parts are used as poultice to heal fractures and muscular injuries (Cavero & Calvo 2015; Ji & al. 2004; Končeková & al. 2020). It is also known for its curative properties in the treatment of pulmonary tuberculosis and scrofula (Cheng & al. 2002).

The taxonomic history of the tribe Sileneae and particularly the genus *Silene* has been debatable (Harbaugh & al. 2010; Hernández-Ledesma & al. 2015; Petri & Oxlelman 2011). Based on a recent study on its infrageneric classification, *Silene* includes 3 subgenera and 34 sections (Jafari & al. 2020). As the fourth-largest genus (Ghahremaninejad & Nejad Falatoury 2016), *Silene* is well represented in Iran. The taxonomical importance of anatomical, palynological, and indumentum characteristics among some *Silene* species of Iran have been investigated (Ghahremaninejad & al. 2014; Hosseini & al. 2016; Nejati & al. 2016). In the Flora Iranica account of the genus *Silene*, 99 species belonging to 21 sections have been reported (Melzheimer 1988). Later studies (e.g. Gholipour 2021; Jafari & al. 2019; Rikan & al. 2020) have also documented a considerable number of species as new or record for the flora of Iran. In total, about 120 species of 16 sections are currently known for Iran, of which near half occur in NW of the country (Gholipour & al. 2017). The present study reports *S. baccifera* (L.) Roth (berry catchfly) from the *Silene* sect. *Cucubalus* (L.) Greuter (Greuter 1995) as a new record for the flora of Iran from W Azerbaijan. The species is precisely described and its distribution map (Fig. 2) with its conservation status is presented.

## MATERIAL AND METHODS

During the floristic studies, another unrecorded eye-catching species was collected in W Azerbaijan province, Iran. The specimens were studied using related literature including Flora Iranica (Rechinger

1988), Flora of Turkey and Aegean Islands (Cullen 1967), and Flora of the USSR (Gorshkova 1936) and identified as *S. baccifera* (*Cucubalus baccifer* L.). The voucher specimens are preserved at the herbarium of the research Institute of forests and rangelands (TARI-103906).

## RESULTS AND DISCUSSION

*Silene baccifera* (L.) Roth, In: Tent. Fl. Germ. 2 (1): 491. (1789). Type, Herb. LINN 582.1 (Fig. 1)

Perennial scrambler; Stem 50-200 cm long, flaccid, ascending or decumbent, much-branched, branches spreading, tomentulose; Leaves elliptic, ovate, ovate-lanceolate or lanceolate, apex broadly acute, entire, 1.5-7 × 0.5-3 cm, papery, base cuneate, rounded or attenuate, venation arcuate, papillose, irregularly ciliate along margin, petiole short, 3-5 mm; Flowers nodding, solitary, in open, leafy and few-flowered dichasia, flowering pedicels 4-6, fruiting ones 10-16 mm; Calyx yellowish-green, purplish when ripen, broadly campanulate, ±inflated and saucer-shaped at maturity, 8-12 mm, herbaceous, with 5 ovate-triangular teeth, almost equaling the tube, downward-bent at fruiting; Petals 5, exceeding the calyx, coronal scales bifid, greenish-white, c. 15-16 mm, limb bifid, 8-9 mm, lobes linear, claw 7-8 mm, anthophore c. 1.5-2 mm, styles 3, stamens 10; Fruit a many-seeded pseudo-berry, slightly 5-veined, blackish, ±globose, 6-8 mm across, indehiscent, almost fleshy, not hidden by the calyx, seeds shiny, reniform, black, 1.5 × 1.2 mm.

### Specimens examined

Iran, W Azerbaijan, 30 km S of Urmia, Qasemlu valley, 37°17'56" N, 45°7'20" E, 1500 m, 29 August 2021, Bahadori & Jarchi 103906, (TARI).

**Habitat and ecology:** *Silene baccifera* inhabits riverbanks or moist habitats among shady woods in association with some hygrophyte species, such as *Scutellaria galericulata* L., *Lycopus europaeus* L., *Scrophularia umbrosa* Dumort., *Althaea officinalis* L., *Sium sisarum* L., *Lythrum salicaria* L., *Cirsium canum* (L.) All., *Inula Britannica* L., *Rubus caesius* L., *Solanum dulcamara* L., etc., usually under the shade of trees or shrubs, including *Fraxinus excelsior* L., *Salix alba* L., *Frangula alnus* Mill., etc., in the recorded area. Depending on the environmental conditions, *S. baccifera* forms a decumbent or ascending habit, as near the natural supports or hedgerows it could climb up to about 2 m, whereas in open locales exhibits a short, dense and matted appearance.

**Phenology:** The flowering and fruiting seasons of *S. baccifera* are almost concurrent, from May to September.



Fig. 1: *Silene baccifera*. A & B, habit; C & D, flower; E & F, pseudoberry fruit; G & H, seeds.

**Conservation status:** *Silene baccifera* is both a widespread and an abundant species throughout its distributional range and doesn't qualify for any threat category. Therefore, it could globally be considered as a Least Concern (LC) taxon. However, in Iran, it has been observed only in a single location with no more than 250 mature individuals, continuously scattered along the river and its tributaries for a few kilometers long, with estimated EOO and AOO both within the range of Critically Endangered (CR) category, but referring its distribution towards the farms and climbing on hedges and having regeneration, we define its status as endangered (EN). The species is also facing

habitat loss in the region and may tend to be subject to a decline in population size in the future; accordingly, at the regional level, we classify *S. baccifera* as Endangered (EN) based on the following criteria B1ab (iii)+B2ab (iii)+D (IUCN 2019).

The widespread taxa evaluated as LC at their global level, e. g. *Salvia candidissima* Vahl., may be found exposed to extinction risk when evaluated at a regional level (Bahadori & al. 2016), such outcomes are mainly owing to the fact that widely spread species are represented in edges of their distribution ranges with small population sizes, with narrow ecological niches.

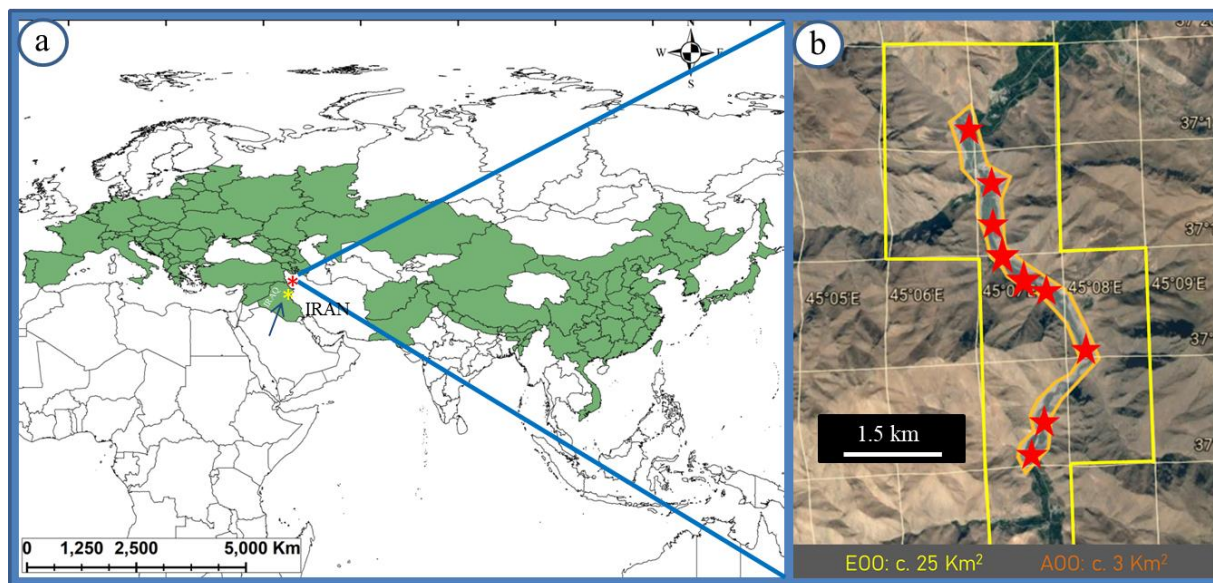


Fig. 2. Distribution of *Silene baccifera* in the world (a), and in Iran (b). The red star is the location of the species in Iran magnified at right and the yellow one is the location in Panjwin, Iraq, discussed in the text.

**General distribution:** Europe, NW Africa, temperate Asia (from Anatolia to Japan).

**Notes:** In the Flora Iranica (Rechinger 1988) and other adjacent floras, *S. baccifera* has been accounted as *Cucubalus baccifer* L. (e. g. Cullen 1967). The synonymized monotypic genus *Cucubalus* could be easily distinguished from the genus *Silene* by its few distinct features, namely, ascending habit, berry-like fruits, and deflexed calyxes, whereas related evolutionary studies have verified its phylogenetic belongingness to *Silene* (Oxelmann & Lidén 1995; Desfeux & Lejeune 1996). In addition, pollen grains of *S. baccifera* exhibit the general palynological characteristics of the genus *Silene* (Wan & al. 2018). Greuter (1995) relegated the taxonomic status of *Cucubalus* and classified it in a section of its own under the genus *Silene*. Therefore, as mentioned above, the ascending habit, deflexed calyx, and pseudoberry fruit are the diagnostic characteristics of both *Silene* sect. *Cucubalus* and *S. baccifera*. By taking *S. baccifera* and *Silene* sect. *Cucubalus* into account, 121 species and 17 sections of *Silene* occur in Iran, of which 37 are endemic.

Lastly, in the Flora Orientalis supplementum, a specimen of *S. baccifera* (*Cucubalus bacciferus*) collected by Haussknecht has been accounted (Boissier 1888), whose locality is addressed as Iranian Kurdistan, Panjwin. Subsequently, other related or adjacent floras

(Gorshkova 1936; Parsa 1951) referring to the same location and specimen have included Iran within the distributional range of *S. baccifera*. It seems naming Iran as the collection location must have been an oversight because Panjwin is politically located in Iraq (Fig. 2), but in the meantime, Rechinger (1988) has given the address correctly as N Iraq, Panjwin. However, as far as is known no specimen corresponding to *S. baccifera* has been collected from Iran before.

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