

A newly recorded alien plant, *Silene fissipetala* (Caryophyllaceae) from Korea

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Contribution to Environmental Biology

- The report on the newly recorded *Silene fissipetala* in Korea provides a valuable baseline for future studies on the ecology of this species and its habitat.

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Abstract: *Silene fissipetala* Turcz., which is native to Continental China and Taiwan, was newly found in Chungcheongnam-do, Korea. *S. fissipetala* is similar to the related taxa *S. antirrhina* L., *S. armeria* L., and *S. koreana* Kom. in that it has glutinous zones. However, *S. fissipetala* is distinguished from the congeneric species by the presence of lacinate at the petals. The species grows on slopes and roadsides, suggesting that it is likely to have been introduced through the installation of green sites and road construction. A precise description, photographs, voucher specimens and a key to related taxa are provided.

Keywords: alien plant, newly recorded, *Silene fissipetala*, Caryophyllaceae

1. INTRODUCTION

Caryophyllaceae Juss., the pink or carnation family, is a family of flowering plants (Harbaugh *et al.* 2010). It is included in the dicotyledon order Caryophyllales in the APG IV system, alongside 33 other families, including Aizoaceae, Amaranthaceae, Cactaceae, and Polygonaceae (Christenhusz and Byng 2016; The Angiosperm Phylogeny Group *et al.* 2016). Caryophyllaceae is a large family, include approximately 2,625 species in about 81 genera (Christenhusz and Byng 2016), with the majority of plants in the family being found across the Northern Hemisphere (Bittrich 1993). Its presence in the tropics and the Southern Hemisphere is limited and mostly confined to higher elevations (Bittrich 1993; Rabeler and Hartman 2005; Greenberg and Donoghue 2011). In Korea, 66–91 species of 17 genera are recogni-

zed, including alien plants (Hong and Choi 2018; NIBR 2019; Jin *et al.* 2023).

Silene L. is one of these large genera, comprising around 850 species of annual, biennial, and perennial plants, which are widely distributed in temperate regions of the Northern Hemisphere (Hernández-Ledesma *et al.* 2015). The center of its diversity is in Western Asia and the Mediterranean area, but areas of Central Asia are also highly diverse (Jafari *et al.* 2020). Many *Silene* species possess medicinal uses, and some species are of economic importance (Veldkamp 2008; Chandra and Rawat 2015). In Korea, 15–21 species are recognized, including alien plants (Bak *et al.* 2011; Hong 2018; NIBR 2019).

During a plant diversity field survey in Korean Peninsula, an unrecorded alien plant, *Silene fissipetala* was found in abandoned fields and roadsides in Chung-



Fig. 1. Voucher specimen of *Silene fissipetala* Turcz. in the National Institute of Biological Resources (KB), Korea.

cheongnam-do, Korea.

We here formally report the first occurrence of the *Silene fissipetala* in Korea (Figs. 1–4). The Korean name

is ‘Sul-kkeun-kkeun-i-jang-gu-chae’, based on the shape of a petals edge. We provide a description, illustrations, a taxonomic key to related taxa as well as habitat details.



Fig. 2. Photographs of *Silene fissipetala* Turcz. A. Habit, B. Root, C. Stem, D. Cauline leaves (adaxial and abaxial views), E. Inflorescences, F. Flower, G. Glutinous zone, H. Capsule, I. Seeds.

2. MATERIALS AND METHODS

The newly found *Silene fissipetala* from Korea was exhaustively compared against the type specimen [China, Tchu san, 1845, *Fortune* 36 (holotype, KW!)] and high-definition images of Global Plants (JSTOR Global Plants 2023) were also checked online. Descriptions and taxonomic key of this species were checked in Flora of China (Zhou *et al.* 2001). Geographical distribution data for the *S. fissipetala* were obtained from literature sources (Zhou *et al.* 2001), and the Global Biodiversity Information Facility (GBIF 2023), and Plants of the World Online (POWO 2023). Photographs in the field were captured by using a digital camera (Body: Nikon D750, Tokyo, Japan; Lens: Nikon 60 mm f/2.8D, Tokyo, Japan). Measurements of the morphological characters

were performed by using digital Vernier calipers (Mitutoyo, CD-20AX, Sakado, Japan), and data derived from field notes. All voucher specimens were deposited at the herbarium of National Institute of Biological Resources (KB).

3. TAXONOMIC TREATMENT

Silene fissipetala Turcz., Bull. Soc. Imp. Nat. Moscou 27:371, 1854 (Figs. 1–4). TYPE: CHINA. Tchu san, 1845, *Fortune* 36 (holotype: KW!).

Silene fortunei Vis., Sem. Hort. Patav. Coll. 1847:4, 1847, nom. inval.; *Silene fortunei* Vis. ex Schtdl., Linnaea 24:181, 1851, nom. inval.; *Silene fortunei* Vis. ex Rohrb., Monogr. Silene 222, 1868; Linnaea 36:688,

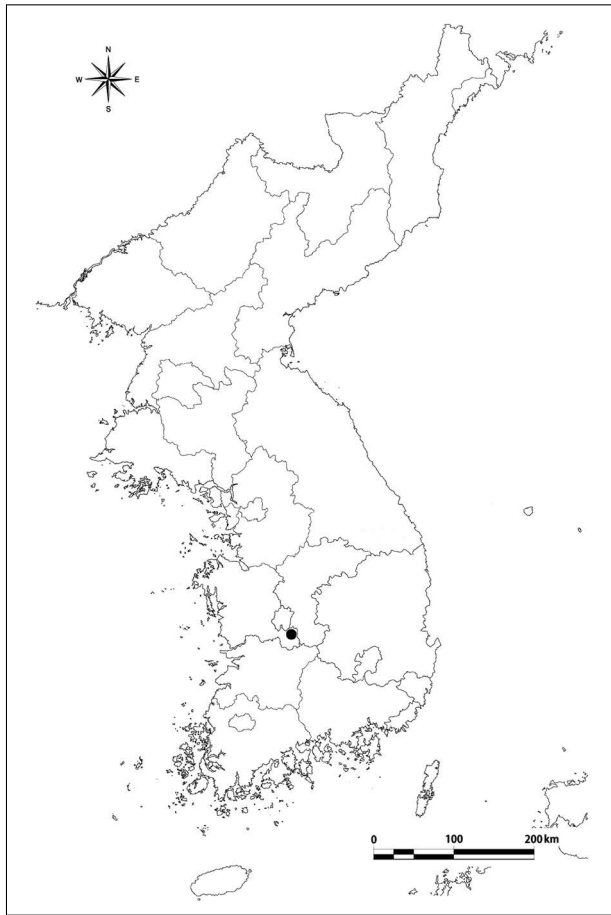


Fig. 3. Distribution of *Silene fissipetala* Turcz. in Korea.

1870, nom. illeg., non. Regel (1863), nom. superfl.
Silene kiiruninsularis Masam., J. Soc. Trop. Agric. 6:570, 1934; *Silene fortunei* var. *kiiruninsularis* (Masam.) S. S. Ying, in Coloured III. Fl. Taiwan 1:128, 1980; *Silene fissipetala* var. *kiiruninsularis* (Masam.) Veldkamp, Taiwania 53:412, 2008. TYPE: TAIWAN. Keelung, 18 Jul 1934, Masamune s.n. (holotype: TII!).

Description. Herbs, perennial, hermaphroditic, 50–80(–100) cm tall. Roots robust, lignified. Stems clustered, erect or ascending, much branched, shortly villous, apically viscid. Basal leaves withered at anthesis; blade oblanceolate or lanceolate, 3–8 cm × 7–10(–15) mm, apex acuminate, base attenuate into short petiole, margins ciliate, both surfaces glabrous or villous when young, midvein prominent. Cauline leaves few, similar to basal leaves but smaller. Inflorescences terminal or axillary, thyrses, racemiform; cymules opposite, usually

1–3-flowered; bracts linear, 5–10 mm long, ciliate; pedicels erect, 5–10(–15) mm long, slender, subglabrous, viscid. Flowers bisexual; calyx narrowly tubular, 2.5–3 cm long, glabrous, inflated above and clavate in fruit, longitudinal veins green or violet; teeth 1.5–2 mm long; petals pale red, 1–1.5 cm long; claw oblanceolate, glabrous; limb obovate, 2-fid to middle or more; lobes lacinate; coronal scales ligulate; androgynophore 1–1.5 mm long, glabrous; stamens 10, slightly exserted; styles 3, slightly exserted. Capsules ovoid, 1.2–1.5 cm long, shorter than calyx. Seeds dark brown, orbicular-reniform, ca. 1 mm long, slightly flattened.

Korean name. Sul-kkeun-kkeun-i-jang-gu-chaе (솔큰큰이장구채).

Flowering. July to September.

Fruiting. September to October.

Distribution. Korea, China, and Taiwan.

Specimens examined. KOREA. Chungcheongnam-do: Geumsan-gun, Gunbuk-myeon, Dudu-ri, 14 Aug 2020, Yang-Hoon Cho & Seok-Soon Kim CN200143, CN200144 (KB); San-an-ri, 11 Sep 2021, Yang-Hoon Cho & Seok-Soon Kim WR20210911-005, WR20210911-006, WR20210911-007 (KB); same locality, 1 Sep 2022, Jung-Hyun Kim KIMJH22102, KIMJH22103 (2 sheets), KIMJH22104 (3 sheets) (KB); same locality, 28 Sep 2022, Jung-Hyun Kim KIMJH22105, KIMJH22106, KIMJH22107 (2 sheets) (KB).

Key to taxa of Korean *Silene* modified from Bak et al. (2011) and Hong (2018)

1. Leaves mostly ovate to ovate-lanceolate; stems viscid *S. armeria* 끈끈이대나물
1. Leaves mostly narrowly oblanceolate or lanceolate to linear-lanceolate; stems and pedicels viscid.
 2. Stamens and styles included in petals; seeds bumpy *S. antirrhina* 가는끈끈이장구채
 2. Stamens and styles exserted from petals; seeds flattened.
 3. Plants annual or biennial; petals white
 *S. koreana* 끈끈이장구채
 3. Plants perennial; petals pale red
 *S. fissipetala* 솔큰큰이장구채

Note. *Silene fissipetala* is native in Continental China and Taiwan. It is a perennial and grows primarily in the temperate biome (Veldkamp 2008). This species is the

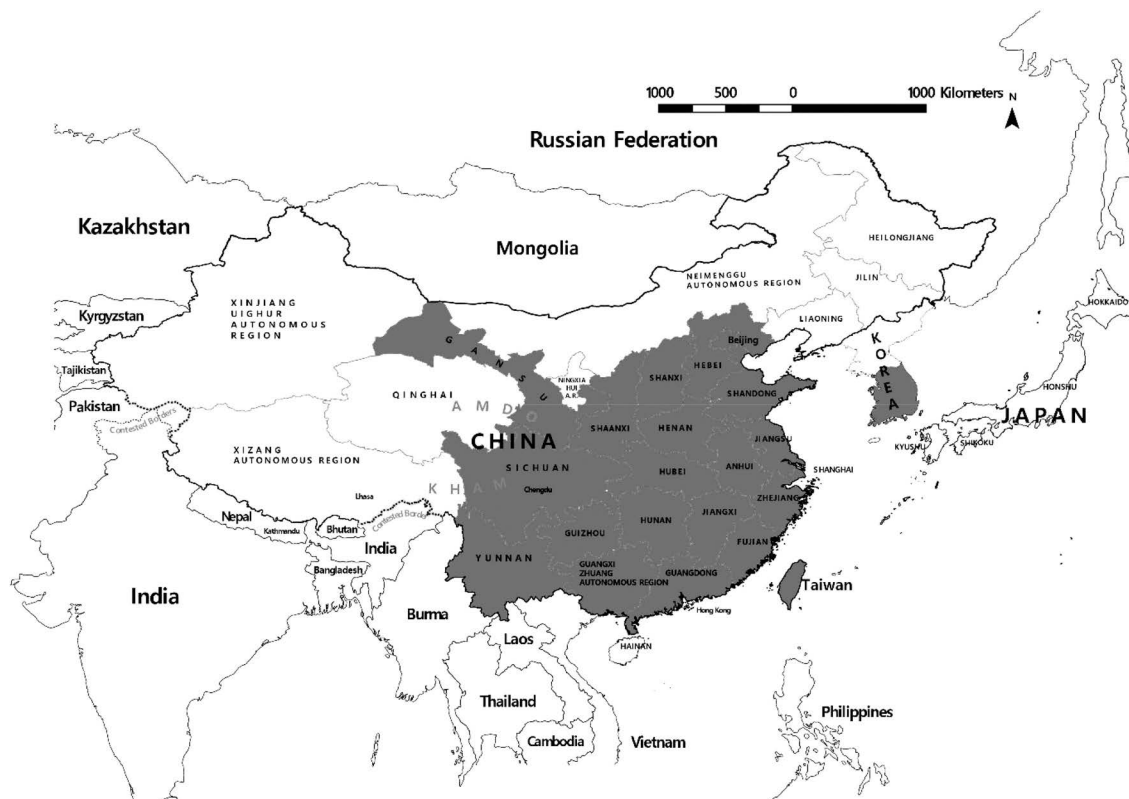


Fig. 4. Distribution of *Silene fissipetala* Turcz. in the world.

correct name for what generally is known as *S. fortunei* Vis. (Zhou *et al.* 2001; Veldkamp 2008). *S. fortunei*, a species was originally invalidly published (Visiani 1847) and subsequently validated (Rohrbach 1868), but then was a later homonym of *S. fortunei* Hort. ex Regel (Regel 1863). It was also superfluous for *S. fissipetala* as their holotypes are isotypes of each other (McNeill *et al.* 2006).

We first found *S. fissipetala* on roadsides in Geum-san-gun, Chungcheongnam-do, in Korea in 2020 and confirmed its presence during the flowering and fruiting seasons of 2021 and 2022. According to continuous observation of the population, the number of individuals is being maintained. Two populations were composed ca. 100 individuals within an area of 15 × 5 m². *S. fissipetala* now grow at high density in the area where it was found. Therefore, it is supposed the species might have adapted themselves to the local environment and the population would probably be expanded in the future. Because the investigation and excavation of vascular plants are still ongoing research (Bae *et al.* 2021; Kim and Park 2022).

This species is mainly distributed on the roadside slope of northeast with elevation of 300–400 m a.s.l. Most of the soil texture of the investigated area was silty loam, and an average annual temperature of 12.3°C. They grow together with *Humulus japonicus* Siebold & Zucc., *Boehmeria japonica* (L. f.) Miq., *Amaranthus hybridus* L., *Corchoropsis tomentosa* (Thunb.) Makino, *Rubus crataegifolius* Bunge, *Albizia julibrissin* Durazz., *Robinia pseudoacacia* L., *Oenothera biennis* L., *Solanum nigrum* L., *Isodon inflexus* (Thunb.) Kudô, *Leonurus japonicus* Houtt., *Patrinia villosa* (Thunb.) Juss., *Artemisia indica* Willd., *A. japonica* Thunb., *Aster pilosus* Willd., *Conyza canadensis* (L.) Cronquist, *Crepidias-trum denticulatum* (Houtt.) Pak & Kawano, *Erigeron annuus* (L.) Pers., *Eupatorium makinoi* var. *oppositifolium* (Koidz.) Kawah. & Yahara, *Lactuca indica* L., *Commelina communis* L., *Arundinella hirta* var. *ciliata* (Thunb.) Koidz., *Calamagrostis arundinacea* (L.) Roth, *Festuca heterophylla* Lam., *Setaria faberi* R. A. W. Herrm., and the dominant species of this area is *Lespedeza cyrtobotrya* Miq.

Further research is needed to determine its popula-

tion size, distribution, and threats, as well as identify appropriate locations for conservation collection of germplasm.

CRediT authorship contribution statement

JH Kim: Investigation, Data curation, Writing-Reviewing and editing. YH Cho: Investigation. SS Kim: Investigation. S Sim: Resources. MH Kim: Project administration.

Declaration of Competing Interest

The authors declare no conflicts of interest.

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