The Genus *Sagina* (Caryophyllaceae) from Mt. Hehuan of Taiwan

合歡山地區漆姑草屬(石竹科)植物之分類

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Abstract

The genus *Sagina* (Caryophyllacea) comprises 25 species worldwide, of which two have been recorded from Taiwan. They are *S. japonica* (Sw.) Ohwi, a common weed found from low to high elevations throughout the island, and *S. maxima* A.Gray found from medium to low elevations as well as in coastal regions in the northern and central parts of the island. We conducted a field survey on *Sagina* at Mt. Hehuan of Taiwan at elevations between 2,500 m and 3,000 m. Two weedy species were found, namely *S. japonica* (Sw.) Ohwi, and *S. procumbens* L., the latter of which was recently naturalized in Taiwan. This paper is a briefly description of the two species with a key to the species and their photographs to aid identification.

摘 要

漆姑草屬植物爲石竹科的一個屬共有 25 種。台灣植物誌第二版記載了 2 種，分別爲漆姑草(*Sagina japonica* (Sw.) Ohwi)與大漆姑草(*S. maxima* A.Gray)。本研究報導合歡山區海拔 2,500～3,000 m 的漆姑草屬植物，共記錄有 2 種，分別爲漆姑草與仰臥漆姑草(*S. procumbens* L.)，其中仰臥漆姑草爲台灣新歸化種。本文提供台灣產漆姑草屬的檢索表，合歡山區所產 2 種的描述、分布及彩色照片。

Key words: Caryophyllaceae, naturalized plant, *Sagina*, *Sagina japonica*, *Sagina procumbens*, Taiwan

關鍵詞：石竹科、歸化植物、漆姑草屬、漆姑草、仰臥漆姑草、台灣

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Introduction

The family Caryophyllaceae comprise 86 genera and about 2,200 species worldwide (Bittrich 1993). Most of them are found in the temperate regions of the northern hemisphere with center in the Mediterranean and Iran-Turanean regions (Bittrich 1993).

Sagina L. was first described based on the *type* of *S. procumbens* in *Linnaeus*' *Genera Plantarum* (1737) and later in *Species Plantarum* (Linnaeus 1753). *Sagina* comprises approximately 25 herbaceous species in northern temperate regions, arctic, and mountains from S to E Africa, Himalayas, New Guinea, and the Andes (Bittrich 1993).

In Taiwan two *Sagina* species have been reported (Ying 1996). They are *S. japonica* (Sw.) Ohwi and *S. maxima* A.Gray. We conducted a field survey of *Sagina* at Mt. Hehuan at elevations of 2,500 m to 3,000 m. Two weedy species were found, namely *S. japonica* (Sw.) Ohwi and *S. procumbens* L., the latter of which was recently naturalized in Taiwan. This paper is a brief taxonomic account of the species *Sagina* from Mt. Hehuan, and provides a key to the species and color field photographs to aid identification.

Taxonomic Treatment

Sagina L. 漆姑草屬

Sagina L., Sp. Pl 1: 128. 1753.

Type: *Sagina procumbens* L.

key to the species of the genus Sagina of Taiwan

1a. Flowers 4-merous; seeds grooved, not tuberculate ..... *S. procumbens*

1b. Flowers 5-merous; seeds not grooved

2a. Seeds sharply tuberculate ..... *S. japonica*

2b. Seeds with linear striae, not tuberculate ..... *S. maxima* (Fig. 3: C)

1. *Sagina japonica* (Sw.) Ohwi, J. Jap. Bot. 13: 438. 1937; Crow, Rhodora 80: 82. *f.28*. 1978; Ying, Fl. Taiwan, ed. 2. 2: 362. *pl.168*. 1996. 漆姑草(瓜槌草) Fig. 1.

Spergula japonica Sw., Ges. Naturf. Freunde Berlin Neue Schriften 3: 164-167. *t.1:f. 2*. 1801.

Sagina echinosperma Hayata, Icon. Pl. Formosan. 3: 39. 1913.

Description: Small herbs, perennial, plants ca 9 cm tall. Stems cylindric, ca. 1.6 mm across, green, glabrous. Leaves simple, opposite, sessile, exstipulate. Blades linear, 4-12 mm long, ca. 1mm wide, green on both surfaces, glabrous, apex acute, base of leaf pairs fused and amplexicaul; margin entire, veins inconspicuous. Inflorescence axillary, solitary. Pedicels cylindric, green, slender, ca. 3-10 mm long, 0.4 mm across, the apical 1/3 white glandular hairy. Flower buds ovoid, green, ca. 2.3 mm long, 1.3 mm across. Flowers bisexual, rotate, white, ca. 2.5 mm across. Calyx cupulate, green, ca. 1mm high, 1 mm across, sparsely white glandular hairy; lobes 5, elongate-ovate, green, 2-2.5 mm long, ca. 1.2 mm wide. Petals 5, broadly elliptic, white, ca. 2.5 mm long, 0.8 mm wide. Stamens 10, epipetalous. Filaments white translucent, slender, ca. 1.2 mm long. Anthers 2-celled, light yellow, basifixed, longitudinally dehiscing. Ovary 1, hypogynous, ellipsoid, green, ca. 2 mm long, 1 mm across. Style sessile, stigma 5-forked, plumose. Ovules many, white, subglobose. Fruit solitary, axillary. Carpopodium cylindric, green, slender, ca. 11-17 mm long, lengthened gradually, the apical 1/2 white glandular hairy. Capsule ca. 3 mm long, 2.5 mm across; apically 5-lobed, lobes reflexed at maturity; calyx persistent, stamens and petals persistent. Seeds many, subglobose, ca. 0.4 mm across, blackish brown, shining, densely tuberculate on surface (Fig. 3: A, B).

Specimen examined:

TAIWAN. Nantou County: Renai Township, Mt. Hehuan, skiing field, 11 July 2012, *T. W. Hsu 17545* (TAIE); Hualien County: Hsiulin Township, Mt. Hehuan, 6 August 2006, *C. H. Chen 7385* (TNM).

Distribution and notes: East Asia. A common weed from low to high elevations throughout the island (Ying 1996).

2. *Sagina procumbens* L., Sp. Pl. 1: 128. 1753; Mizushima, J. Jap. Bot. 35: 193. 1960; Crow, Rhodora 80: 42. *f. 11*. 1978.仰臥漆姑草 Fig. 2.
Alsine procumbens (L.) Crantz, Inst. Rei Herb. 2: 404. 1766.

Description: Small herbs, perennial, plants ca. 7 cm tall. Stems ascending or procumbent, cylindric, green, slender and glabrous. Leaves simple, opposite, sessile, estipulate. Blades linear, ca. 5-7 mm long, ca. 0.8 mm wide, green and glabrous on both surfaces, apex acute, base amplexicaul, margin entire, nerves inconspicuous. Inflorescences solitary, terminal or axillary. Pedicels cylindric, ca. 7 mm long, green, slender, glabrous, ebracteate. Flower buds ellipsoid, green, ca. 1.6 mm long, 0.9 mm across. Flowers bisexual, cruciform. Calyx 4-lobed, lobes elliptic, green, ca. 1.6 mm long, 0.9 mm wide. Petals absent or 1-3, elliptic, minute, white translucent, ca. 0.5 mm long, 0.3 mm wide. Stamens 4. Filaments white translucent, slender, ca. 0.7 mm long. Anthers 2-celled, whitish, longitudinally dehiscing, basifixed. Pedicel recurved after anthesis, erect in fruit, slender. Ovary 1, globose, hypogynous. Style sessile. Stigma 4-forked, plumose. Placentation free-central, Ovules numerous. Capsules ovoid, ca. 2 mm high, 1.6 mm across; calyx, stamens and stigma persistent. Carpopodium cylindric, green, glabrous, slender. Seeds numerous, irregularly, blackish brown, ca. 4 mm long, 3 mm across, irregularly reticulately rivulose (Fig. 3: D-F).

Specimen examined:

TAIWAN. Nantou County: Renai Township, Mt. Hehuan, Provincial Road 14A, 36.5 Km, 11 July 2012, *T. W. Hsu 17552* (TAIE).

Distribution and notes: Nearly cosmopolitan; entire Europe northwards reaching the northernmost Norway and Iceland east to the central Siberia and the Himalayas, north Africa, North America, south Greeland (Mizushima 1960); widely introduced in the southern hemisphere, eastern Asia (Crow 1978), and in north Japan (Mizushima 1960). It has become naturalised in temperate regions and is invasive in some sub-Antarctic islands. It forms dense mats, threatening the integrity of terrestrial ecosystems. Once it becomes established it can be difficult to eradicate due to its persistence in the seed bank (Global Invasive Species Database 2008). In Mt. Hehuan it was found around parking areas. The finding of the species represents a new addition to the naturalized plant list in Taiwan.

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Fig. 1. *Sagina japonica* (Sw.) Ohwi (A, habit; B, branches and flower; C, seeds).

Fig. 2. *Sagina procumbens* L. (A, habit; B, branches; C, flower).

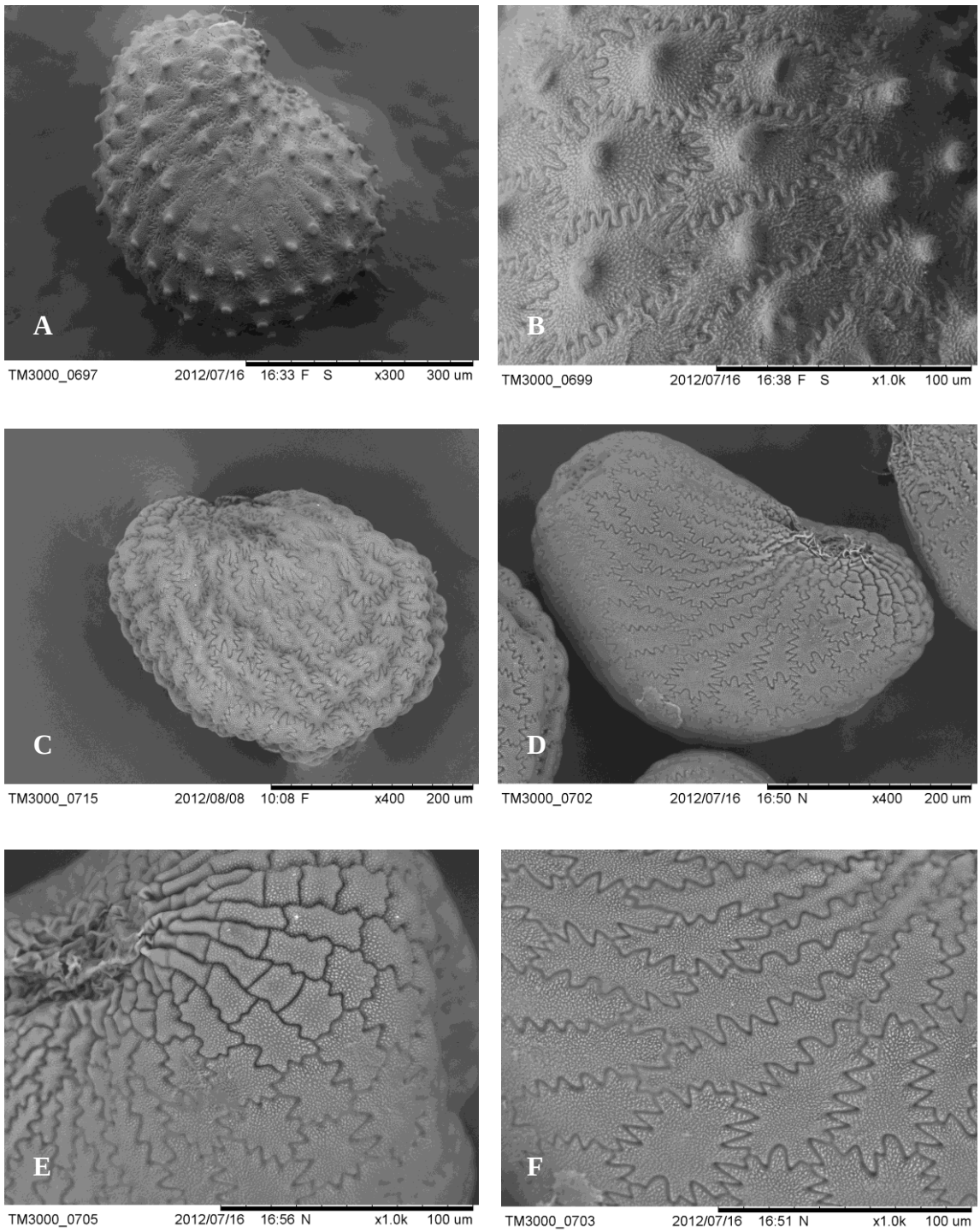

Fig. 3. SEM photographs of *Sagina* seeds. (A, B, *S. japonica* (Sw.) Ohwi; C, *S. maxima* A.Gray; D, E, F, *S. procumbens* L.).