

Geranium dissectum L. (Geraniaceae), a Newly Naturalized Plant in Taiwan

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Abstract. *Geranium dissectum* L., an annual or biennial herb native to eastern Mediterranean areas, was recently discovered to have been naturalized in Taiwan. We found this weed from low-elevation areas to high-mountain regions. This species is most similar to *G. carolinianum*, but differs from the latter by its narrower leaf-lobes of the upper leaves, petals purplish-red (vs. light-pink), and glandular hairs (vs. hairs) on the fruit. This study provides a taxonomic description and illustrations. Photographs and a key to the Taiwanese taxa are also provided in this study.

Key words: Geraniaceae, *Geranium dissectum*, naturalized plant, Taiwan.

INTRODUCTION

Geranium L. is a cosmopolitan genus, consisting of ca. 420 species (Aedo *et al.* 1998a). Five native and one naturalized species were recorded in the *Flora of Taiwan*, 2nd edition (Peng 1978; Huang 1993), and two naturalized species were recorded in the past decade (Chen and Wang 2005; 2007). Recently, in our botanical exploration of the Central Mountain Range, a newly recorded species of *Geranium* was recognized, *Geranium dissectum* L., a naturalized herb distributed from low- to high-montane regions of Taiwan.

Geranium dissectum belongs to the section *Dissecta* (Aedo 1998b; Aedo *et al.* 2005) of the subgenus *Geranium* (Yeo 1984). This species is distributed in eastern Mediterranean areas and their surroundings, including Europe, West and Central Asia, Macaronesia, and North Africa. This species was introduced to North America, the Caribbean, South America, southern Africa, Australia, Hawaii, and East Asia as a weed, and can be found at 0~2000 m in elevation (Aedo *et*

al. 2005).

Materials used in the studies were collected from the field in Taiwan, and were pressed and dried as voucher specimens in the herbarium of the National Museum of Natural Science (TNM). Seeds for scanning electron microscopy (SEM) were from fresh capsules of *C. H. Chen 11661* (TNM), and these were coated with gold and examined with a Hitachi S300N instrument (Hitachi, Tokyo, Japan).

Systematic Treatment

Geranium dissectum L., Centuria Pl. 1: 21. 1755; Lectotype: Linn. 858.82 (LINN), by Carolin, Proc. Linn. Soc. New South Wales 89: 336. 1965. 刻葉老鶴草 (Figs. 1, 2)

Annual or biennial herb, erect or creeping, 15~50 cm tall; stem pilose, not rooting at nodes, sometimes many branched, somewhat reddish with glandular hairs. Leaves round or reniform-orbicular with deeply palmate lobes, surface pubescent, petioles 3~15 cm; lower part of blades of stem deeply 5-lobed, with 5~10 finger-shaped segments per lobe, 3~5 cm broad; upper leaves of

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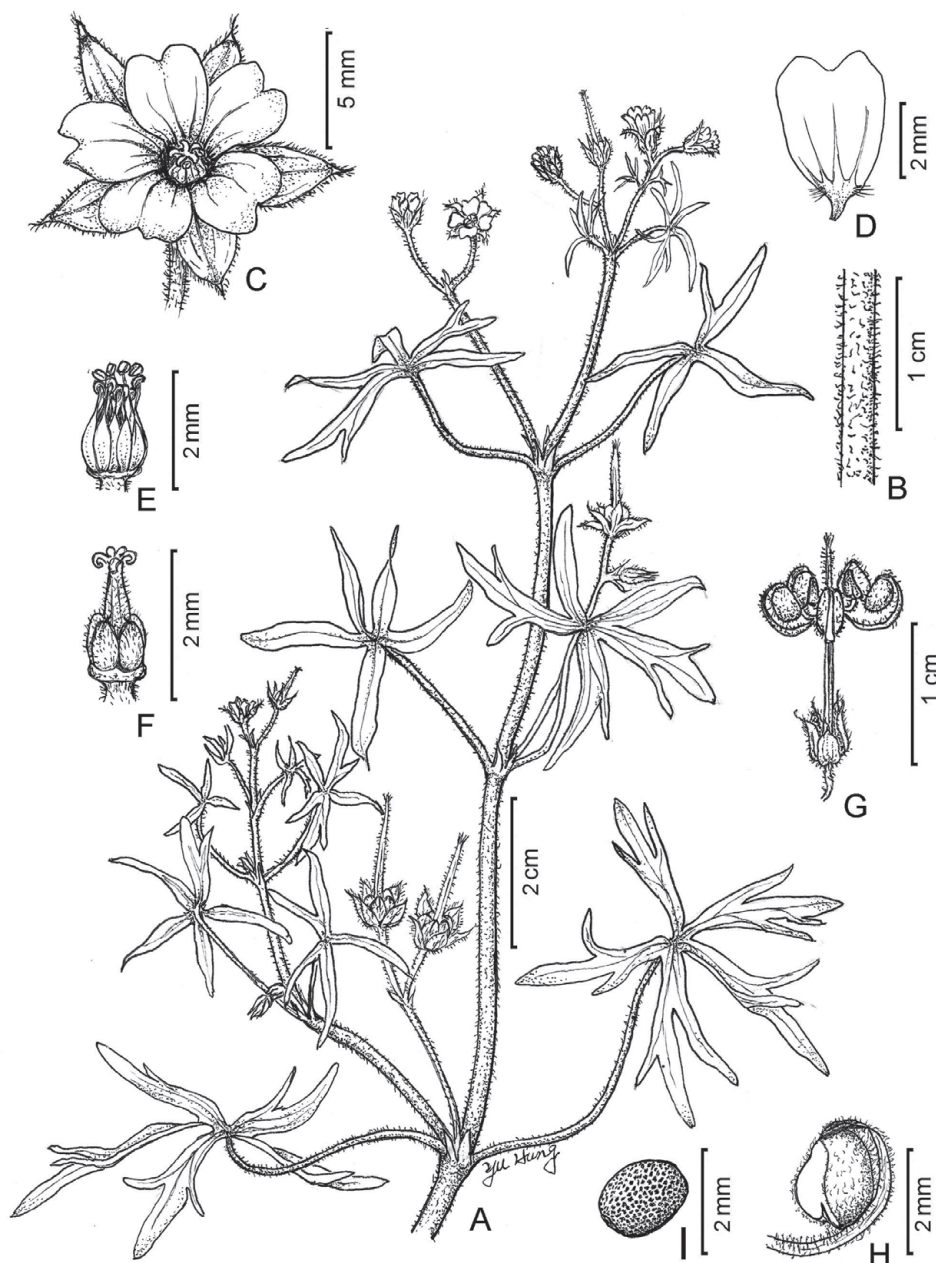


Fig. 1. *Geranium dissectum* L. A. Habit; B. stem; C. flower; D. petal; E. stamens; F. pistils; G. fruit; H. capsule; I. seed.

stem with 5 linear lobes, deeply divided almost to base, 1~3(5) lanceolate segment per lobe, 3~6 cm broad; stipules lanceolate to subulate, 4 at each node. Flowers 2, in compact cluster, axillary or subterminal, actinomorphic, 8~15 mm in diameter; peduncles somewhat reddish, pilose 1~2 cm long; pedicels pilose, 0.5~1 cm; bracts lanceolate, 2; sepals 5, ovate, pilose on outside, margin basally ciliate, 4~6 mm, mucro 1~2 mm; petals 5, bilobed, purplish-red, apex rounded or slightly notched, 4~6 mm long. Staminal filaments lanceolate with an abruptly narrowed

apex, ca. 1.5 mm long; anthers 10, ellipsoid, yellow to dark-purple, ca. 0.4~0.6 mm long. Stigma 5, pinkish or dark-pink, 1~1.5 mm long. Capsules light-brown to dark-brown, rugose, 1.5~1.8 cm long. Seeds oblong, light-brown, 1.7~1.9 mm long, reticulate-foveate.

Distribution: Native to eastern Mediterranean areas. Introduced to North America where it is known as the “cutleaf geranium”, and also can be found in East Asia.

Specimens examined: Keelung City, Chitu

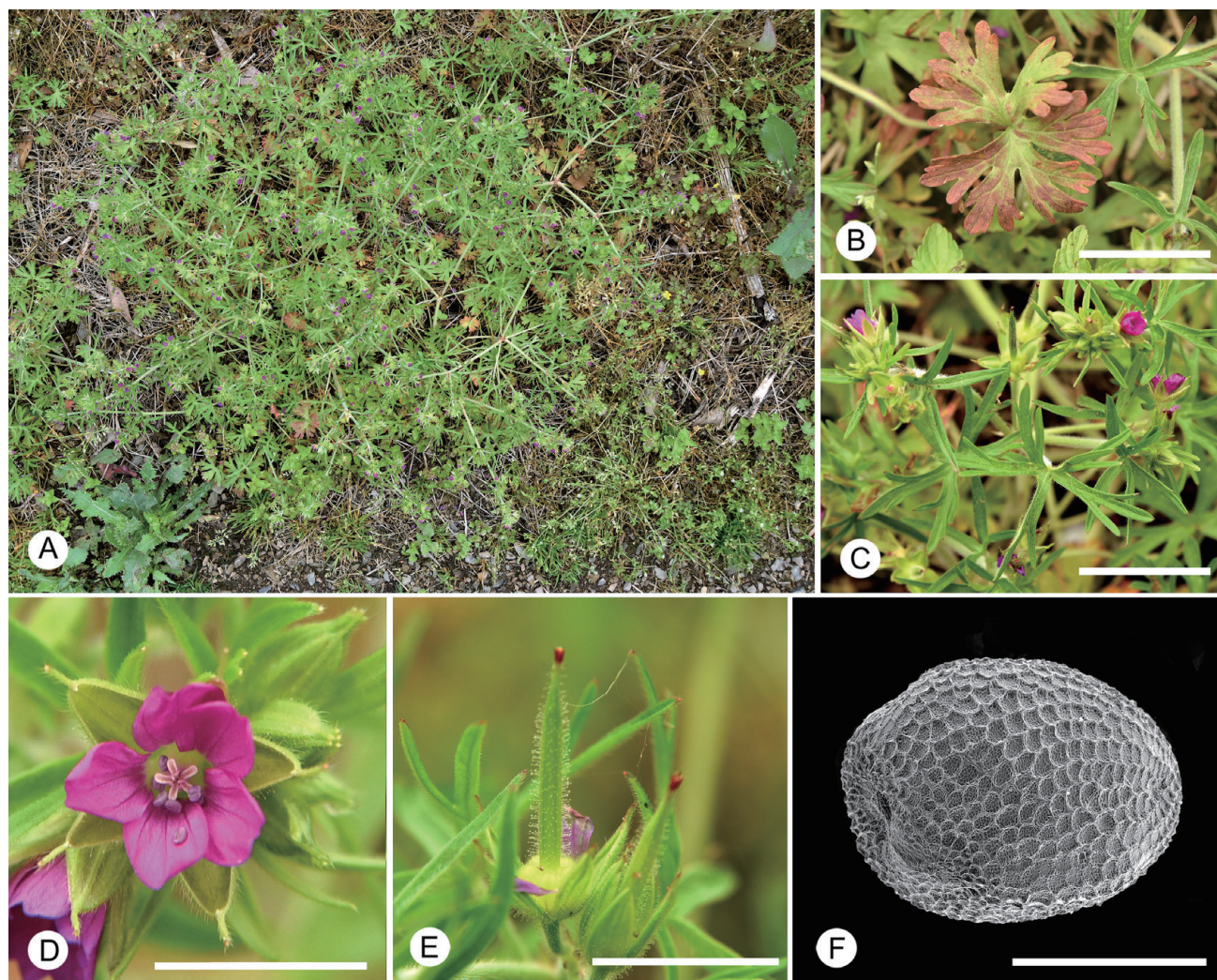


Fig. 2. *Geranium dissectum* L. A. Habit; B. lower leaf; C. upper leaf; D. flowers; E. fruit; F. seed. Scale bar = 2 cm (B, C); 1 cm (D, E); 1 mm (F).

District: Tunan Village. *C.M. Wang 16206* (TNM); New Taipei City, Hsintien District: Homeishan. *C.M. Wang 15976* (TNM); Taoyuan Co., Fuhsing Township: Fufushan. *C.H. Chen 11642* (TNM); Hualien Co., Hsiulin Township: Hohuanshan. *C.M. Wang* (TNM); same loc., *C.H. Chen 11661* (TNM).

Notes: This species is found in exposed areas, and seems to prefer thinly grassed places, with recently disturbed soil, and in various kinds of wastelands. In the neighboring region, there is a recent intrusion record of this plant in southern China (Kang 2015). It is necessary to pay attention to this invasive plant, because some countries have listed this species as a harmful weed (Dennehy *et al.* 2011; Lee *et al.* 2018). In Taiwan, this species can be seen in bloom in early March at low elevations and at the end of September at high elevations.

Key to Taiwanese taxa of *Geranium*

1. Capsules with seed discharged from stalk when mature 2
1. Seeds directly ejected from capsules when mature 4
2. Leaves ternately divided *G. robertianum*
2. Leaves simple, 5~7 divided 3
3. Flowers <7 mm in diameter, capsule surface scabrous *G. pusillum*
3. Flowers >8 mm in diameter, capsule surface rugose *G. molle*
4. Flower solitary; bracts 2 5
4. Flowers 2; bracts 4 6
5. Stipules 4 at each node; flowers yellow
.....*G. suzukii*
5. Stipules 2 at each node; flowers pink to purple
..... *G. hayatanum*
6. Pedicels <1 cm long; flowers in a compact cluster7

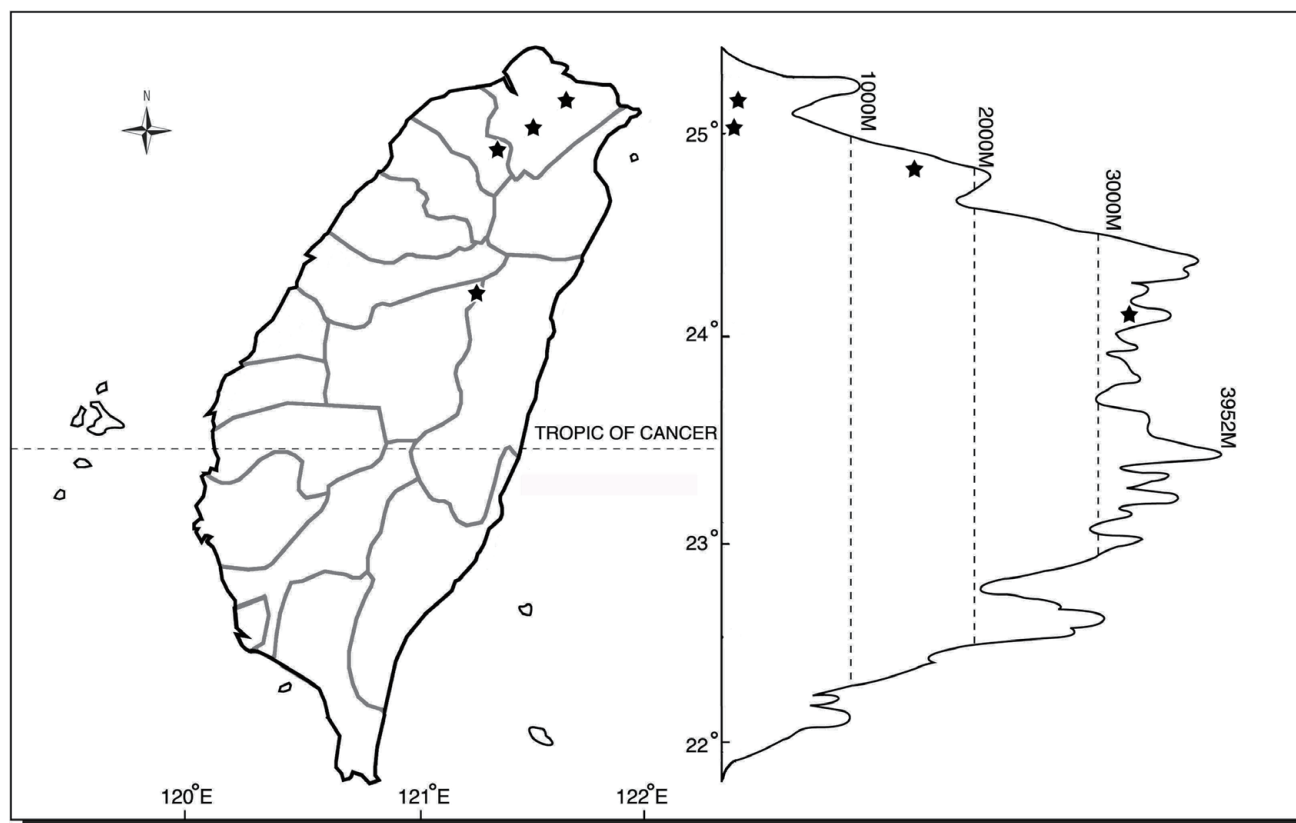


Fig. 3. Distribution map of *Geranium dissectum* L. in Taiwan (star).

- 6. Pedicels >1 cm long; flowers in a loose cluster 8
- 7. Petals purplish-red *G. dissectum*
- 7. Petals light-pink *G. carolinianum*
- 8. Stem hairy with glandular hairs; petals purple ..
..... *G. nepalense* ssp. *thunbergii*
- 8. Stem glabrous or tomentose on upper portion;
petals white *G. wilfordii*

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臺灣新歸化牻牛兒苗科植物—刻葉老鸛草

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主要原產於歐洲牻牛兒苗科植物—刻葉老鸛草 (*Geranium dissectum* L.)，新歸化於臺灣中部以北的低海拔至高海拔山區。與另一原本就歸化於台灣山區的野老鸛草 (*G. carolinianum* L.) 之型態類似，但本新紀錄植物具上半部葉裂片較窄、紫紅色的花瓣，以及果實上具腺毛的特徵可與之區分。本文提供分類特徵描述，手繪圖，照片與檢索表以利鑑定。

關鍵詞：牻牛兒苗科、刻葉老鸛草、歸化植物、臺灣。