

Bidens frondosa L. (Asteraceae), a newly naturalized plant in Taiwan

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Abstract

A newly naturalized plant, *Bidens frondosa* L. (Asteraceae), which is native to North America, was found in a disturbed field in northern Taiwan. This species is distinctive from *Bidens tripartita* L. by having petiolate leaves and two bristled achenes. A description of the species with photographs is provided for identification.

Key words: Asteraceae, *Bidens*, *Bidens frondosa*, Naturalized plant, Taiwan.

臺灣新歸化菊科植物—大狼把草

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摘要

大狼把草(*Bidens frondosa* L.)是原產於北美洲的一種菊科新歸化植物，出現在台灣北部的一個受干擾地。本種與狼把草(*Bidens tripartita* L.)最主要的不同是本種葉具柄以及瘦果具 2 枚剛毛。這裡提供本種的描述與照片有助於鑑定。

關鍵字：菊科、鬼針草屬、大狼把草、歸化植物、臺灣。

INTRODUCTION

The family Asteraceae comprises approximately 1,623 genera and 24,700 species that are widely distributed in the world (Christenhusz and Byng 2016), and it is also one of the most common naturalized and invasive families. Asteraceae is one of the largest families and comprises approximately 84 genera and over 200 species in Taiwan (Peng *et al.* 1998), in which 22 species of the 51 naturalized Asteraceae species are classified as invasive and a high proportion of these species were introduced accidentally (Wu and Wang 2005). Recently, some naturalized plants of Asteraceae were reported in Taiwan, including *Flaveria linearis* Lag. (Tseng *et al.* 2012), *Melanthera nivea* (L.) Small (Chen *et al.* 2017), *Praxelis pauciflora* (Kunth) R. M. King & H. Rob. (Jung and Kao 2013), and *Thymophylla tenuiloba* var. *tenuiloba* (Chao *et al.* 2017).

The genus *Bidens* L. comprises approximately 150–250 species that are widely spread in subtropical, tropical, and warm-temperate North and South America (Chen and Hind 2011). Four species and two varieties are found in Taiwan, including *B. bipinnata* L., *B. biternata* (Lour.) Merr. & Sherff, *B. pilosa* L. var. *pilosa*, *B. pilosa* L. var. *minor* (Blume) Sherff, *B. pilosa* L. var. *radiata* Sch., and *B. tripartita* L. (Peng *et al.* 1998). Recently, a newly naturalized plant *Bidens frondosa* L., which is native in North America, was found in wetland of northern Taiwan (Coşkunçelebi *et al.* 2007).

To obtain more evidences for comparison, the plant parts of *B. frondosa* were photographed,

and quantitative anatomical traits, such as male and female disk florets, and achene, were determined using Image-J software (Ferreira and Rasband 2011). All specimens were deposited in the herbarium of Taiwan Forestry Research Institute (TAIF) for subsequent identification. A morphological description and a key to the congeners are provided to aid identification.

TAXONOMIC TREATMENTS

Bidens frondosa L., Sp. Pl. 2: 832. 1753. (Fig. 1)

Annuals, 20–100 cm tall. Stems with ribs, younger stem pubescent, older stem glabrous. Leaves opposite, pinnate, petiole 1.5–7 cm; leaflets 1–2 pairs, 3 or 5 foliolates (Fig. 1C), petiolate, lanceolate, margins serrate or ciliate, with 4–11 sharp teeth on each side, acuminate at apex, cuneate and unequal at base, both surfaces glabrous or pubescent, terminal leaflet 4–11 × 1.5–3 cm, lateral leaflets 2–9 × 0.8–2.5 cm. Inflorescences terminal (Fig. 1B); capitula 5–8 mm in diameter, erect, usually solitary (Fig. 1A, B); peduncles 2–4.5 cm; outer involucral bracts 8–11, spatulate or oblanceolate, 10–30 × 2–5 mm, margins ciliate (Fig. 1D, E); inner involucral bracts 8–10, oblong or ovate-lanceolate, 4–5 × 1.5–2 mm, with ciliate (Fig. 1E); disk florets 20–40, corolla 2 mm long, yellow at apex, white-green at base; stigma 2-lobed (Fig. 1F); anthers 1 mm long (Fig. 1G). Achenes compressed (Fig. 1H, I), cuneate, blackish to brown, 5–7 × 1.5–2 mm, pappus 2, erect to spreading, retrorsely barbed awns 2 mm (Fig. 1I).

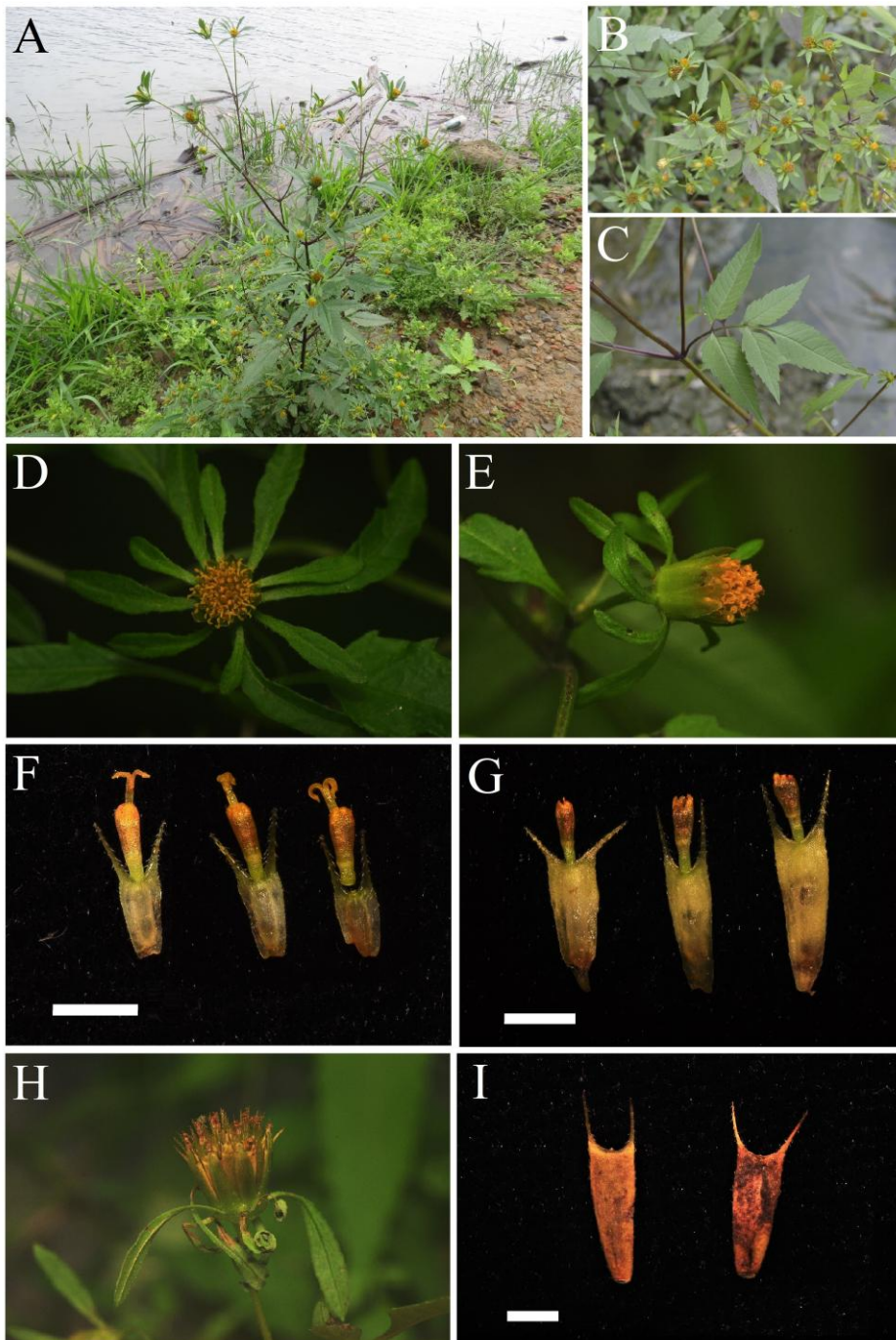


Fig. 1 *Bidens frondosa* L. (Asteraceae) A. Habit, growing along riversides; B. Capitula solitary, top view; C. Leaves opposite, pinnate, 5-leaflets; D-E. Capitula, top and lateral views, with 7-8 reflexed involucre bracts; F-G. Disk florets in female and male stage; H. Mature capitula; I. Achenes, with 2-retroscedly barbed awns at apex. Scale bars: F, G, I = 2 mm.

Location and phenology

The species *B. frondosa* grows in flooded marshes, wetlands, swamps, riversides (Fig. 1A), and ditches in northern Taiwan. The following associated plants were represented in the same habitat together with *B. frondosa*: *Centipeda minima* (L.) A. Br. & Asch., *Conyza bonariensis*

(L.) Cronq., *Cyperus imbricatus* Retz., *Pluchea sagittalis* (Lam.) Cabera, *Salvia plebeia* R. Br. Flowering and fruiting periods range from May to September.

Specimens examined: TAIWAN. Taoyuan City, Daxi District, P. H. Chen, 1363, 1364, 1365 (TAIF); same loc. P. H. Chen & H. Fan 1441 (TAIF).

Key to the taxa of *Bidens* in Taiwan

The diagnostic characters of the seven taxa, provided below, are contrasted to construct a key to the genus *Bidens* based on the characteristics of vegetative and floral plant parts.

1. Achenes broad.....2
 - 1. Achenes linear.....3
2. Leaves petiolate; achenes with 2 pappus.....*B. frondosa*
 - 2. Leaves sessile; achenes usually with 3 pappus*B. tripartita*
3. Outer involucre bracts linear.....4
 - 3. Outer involucre bracts spatulate.....5
4. Leaves 2- or 3-pinnatisect; terminal leaflets narrow.....*B. bipinnata*
 - 4. Leaves subpinnately divided; terminal leaflets ovate.....*B. biternata*
5. Ray florets absent*B. pilosa* var. *pilosa*
 - 5. Ray florets present.....6
6. Ray florets < 1 cm long..... *B. pilosa* var. *minor*
 - 6. Ray florets > 1 cm long.....*B. pilosa* var. *radiata*

Discussion

According to previous reports, the species *B. frondosa* is naturalized in different regions, e.g. Europe (Tutin 1976), Bulgaria (Šumberová et al. 2004), Turkey (Coşkunçelebi et al. 2007),

China (Chen and Hind 2011), and Russia (Gladunova et al. 2016). This species is scattered in one location of northern Taiwan, thus monitoring its dispersion range is needed in the near future. *B. frondosa* found in this study adds to the inventory of flora of Taiwan.

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