

A Newly Naturalized Plant to Taiwan: *Plantago heterophylla* Nutt. (Plantaginaceae)

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Abstract

A newly naturalized herb species, *Plantago heterophylla* Nutt. (Plantaginaceae), is reported in this paper. It is native to the southeastern United State, but is now well-established and naturalized in northern Taiwan. In this paper, we provide its taxonomical description, line drawing, photographs, distribution map and a key to the other plantains in Taiwan to aid in its identification.

Key words: naturalized plant, Plantaginaceae, *Plantago heterophylla*, Taiwan.

臺灣車前草科新歸化植物—線葉車前

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摘要

本文報導一種車前草科新歸化的草本植物—線葉車前 (*Plantago heterophylla* Nutt.)，原產於美國東南部，最近於臺灣北部地區發現。本種的葉子纖細呈線狀，極易與臺灣同屬的其他種類區分。本文提供其分類特徵描述、手繪圖、生態照、在臺灣的分布地點，以及與臺灣同屬的其他種類的檢索表以供辨識。

關鍵詞: 歸化植物、車前草科、線葉車前、臺灣

Introduction

Plantago L. (Plantaginaceae) is a cosmopolitan genus comprising over 200 species concentrated in temperate and high-elevation tropical regions (Rønsted *et al.* 2002, Li *et al.* 2011, Hassemer *et al.* 2015, Hassemer 2018). Members of the *Plantago* have been known as common weeds of the native flora or naturalized plantains in Taiwan. In Flora of Taiwan, the second edition, two naturalized plants, *P. lanceolata* L., and *P. virginica* L., have been recorded (Chen and Wu 1998). Until now, the genus in Taiwan is represented by four species containing two native species (*P. asiatica* L. and *P. major* L.) and two naturalized species

(*P. lanceolata*, and *P. virginica*) (Li *et al.* 2011). Recently, in our botanical inventory, a strange herb was found on waste fields in northern Taiwan. After examining the inflorescence and flowers, we confirm that it resembles *Plantago* sp. but differs from all known species in Taiwan by its linear leaves. Based on further compared with literatures (ex. Small 1913, Huisinga and Ayers 1999, Hassemer *et al.* 2015), it is confirmed that this strange species is *P. heterophylla* Nutt. which is native to southeast United State. Here, morphological description of this newly naturalized plantain and a taxonomic key to species of *Plantago* L. in Taiwan are provided to aid identification.

Taxonomic Treatment

Plantago heterophylla Nutt. Trans. Amer. Philos. Soc., n.s. 5: 177. 1837. …線葉車前

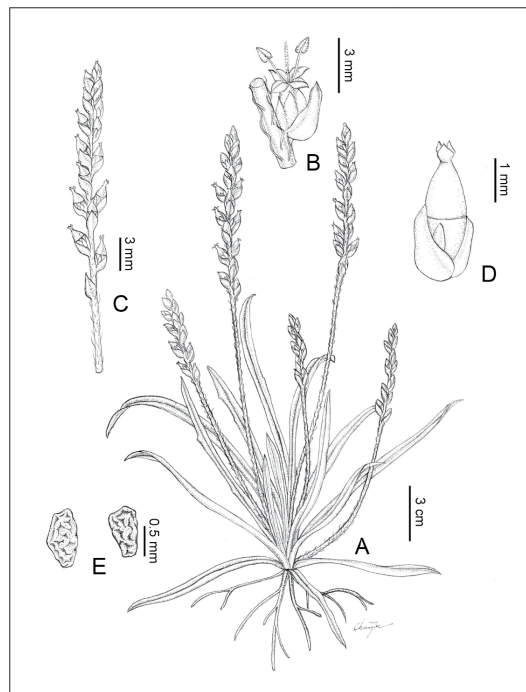


Fig. 1. *Plantago heterophylla* Nutt. A, habitat; B, flower; C, inflorescence; D, mature fruit; E, seeds. Illustration by Chang-Tse Lu.

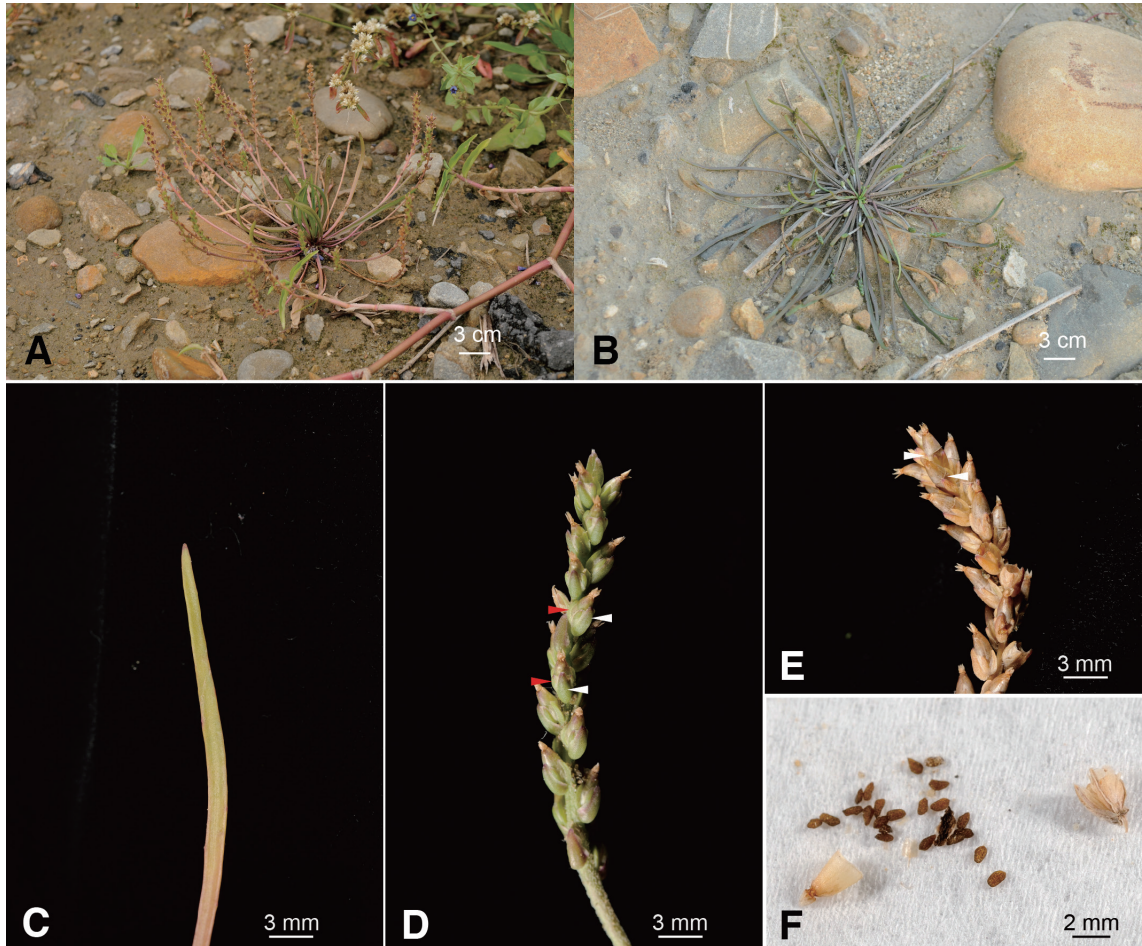


Fig. 2. Photographs of *Plantago heterophylla* Nutt. A, habitat; B, plant with young inflorescence; C, part of leaf; D, young fruit, white arrows show the bracts and red arrows show the sepals; E, mature fruit, white arrows show the position of fruit dehisced; F, seeds. Photographed by Wei-Yu Wang.

TYPE: USA: Territory of Arkansas: on the banks of the Mississippi and Arkansas (rivers), 1819, *Nuttall s.n.*

Annual herbs, slender well-developed taproot. Plants glabrous or sparingly puberulent, decumbent to erect. Leaves all basal, linear, entire or with lobed short-tooth, smooth or slightly hairy, 1–3-veined; petioles flat at base, without distinction between petiole and blade; blade linear or filiform, 5–18 cm \times 1.1–2.0 mm, entire or remotely short-dentate on margins with 1 to several tiny teeth each side, acute at apex. Inflorescence few to many, axillary to basal leaf, usually pubescent with appressed hairs, spike slender, loosely flowered, 3.5–9.0 cm long. Flowers bisexual, radial, 0.6–0.7 mm in diameter, bracteate; bracts ovate, 2.7–2.9 mm long, with a wide scarious margin, slightly longer than the calyx; calyx 4-lobed, lobes cupped-ovate, ca. 2 mm long, glabrous, persistent; corolla 4-lobed, minute, scarious, less than 1 mm; stamens 2, alternate with corolla lobes, fused to midpoint of corolla tube; pistil 1, ca. 1.5 mm long; ovary superior, subspheroid to ovoid, 2 locules; style becoming exerted, ascending papillate-hairy except at base. Capsules slenderly ovoid, circumscissile just below the middle, ca. 3.4 \times 1.4 mm. Seeds ca. 20 (-25), dark brown, irregularly and coarsely pitted, slightly ellipsoid in outline, ca. 0.85 \times 0.4 mm.

Specimen examined:

Taoyuan City, Guanyin District, Baishatun, 12 Apr. 2018, *W.-Y. Wang* 2419 (TAIF); same locality, 26 May. 2018, *W.-Y. Wang* 2420 (TAIF).

Distribution and ecology:

Plantago heterophylla is native to the southeastern United State, and it has now been recorded introducing to Mexico, Southern American (Argentina, Paraguay, Uruguay) and Japan (GBIF 2017, The Catalogue of Life Partnership 2018). Herein, we have recorded it as naturalized in northern Taiwan (Fig. 3). This plant can be found mostly in moist sandy and silty soils, frequently weedy in cultivated, pasture, and waste fields (Bassett 1966). In Taiwan, we only found it growing in waste fields. Flowering and fruiting were observed from March to May.

Notes:

Plantago heterophylla Nutt. belongs to *Plantago* section *Micropsyllium* Decne (Pilger, 1937). All species within this section, including *P. heterophylla*, *P. polysperma* Kar., *P. pusilla* Nutt., *P. bigelovii* A. Gray, *P. elongata* Pursh, and *P. teuniflora* Waldst., are easy to distinguish from other plantains by its linear leaves. On the other hand, it is difficult to distinguish it from the other species of the same section. After consulting relative literatures (ex. Morris 1909, Small 1913, Pilger 1937, Bassett 1966, Hassemer *et al.* 2015), we concluded that the number and shape of seeds can be used to separate these species, though they are similar in appearance. *Plantago heterophylla* can be distinguished from the others by seeds 10–25, and seed shape irregular in outline.

Compared to the known plantain species in Taiwan, *P. heterophylla* is easily distinguished from them by its linear leaves. The following key is provided to aid identification of the *Plantago* species in Taiwan.

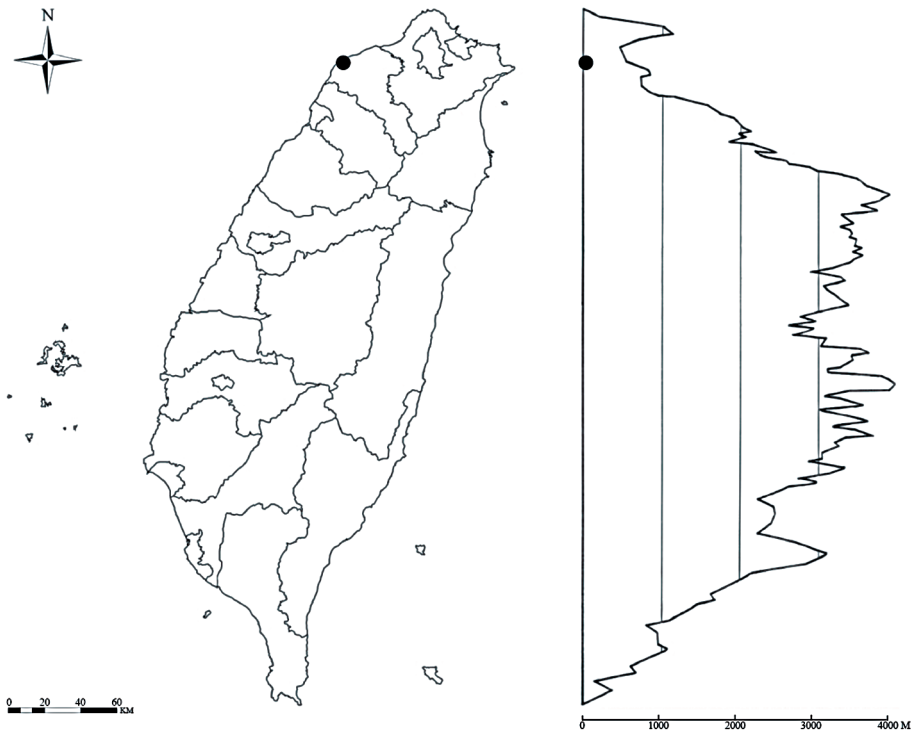


Fig. 3. Collection location of *Plantago heterophylla* Nutt. in Taiwan.

Key to species of *Plantago* L. in Taiwan

- 1. Leaf blade linear, 1–3-veined. *P. heterophylla*
- 1a. Leaf blade lanceolate, ovate, obovate, or elliptic, 3–7-veined. 2
- 2. Plants glabrous or pubescent; blade broadly ovate to broadly elliptic; stamens 4; seeds more than 5. 3
- 2a. Plants strongly villose; blade obovate, elliptic, lanceolate; stamens 2; seeds 2. 4
- 3. Flower shortly pedicellate; capsule circumscissile near base. *P. asiatica*
- 3a. Flower sessile; capsule circumscissile at middle. *P. major*
- 4. Spikes long-cylindric; bracts hairy; sepals 4, distinct. *P. virginica*
- 4a. Spikes conic or short-cylindric; bracts glabrous; sepals 3, lower sepal connate to near apex. *P. lanceolata*

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