

Three newly naturalized grasses (Poaceae) in Taiwan

三種臺灣新歸化禾草

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Abstract

Three new-naturalized Poaceae species, *Eragrostis tef* (Zuccagni) Trotter, *Megathyrus trichocladus* (Hack. ex K. Schum.) Salariato & Zuloaga, and *Phalaris angusta* Nees ex Trin. in Taiwan are described herein. Line drawings, photos, and brief keys to these genera in Taiwan are provided to facilitate identification.

Key words: New-naturalized, Poaceae

摘要

本文描述三種臺灣新歸化禾本科植物：苔麩 (*Eragrostis tef* (Zuccagni) Trotter)、蔓生大黍 (*Megathyrsus trichocladus* (Hack. ex K. Schum.) Salariato & Zuloaga) 與尖鵲草 (*Phalaris angusta* Nees ex Trin.)，並提供線描圖、照片與臺灣產同屬植物檢索表以利鑑定。

關鍵詞：新歸化、禾本科

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Introduction

A checklist of the naturalized flora in Taiwan has been catalogued by Wu *et al.* (2004) and updated steadily, and 695 alien species belonging to 95 families have been listed by Chang-Yang *et al.* (2022). In the latest checklist by Chang-Yang *et al.* (2022), Poaceae comprises 95 species, with the main component of the Taiwanese naturalized flora. Chen *et al.*

(2011) listed nineteen species of the genus *Eragrostis* Wolf. Among them, only two species, *E. ciliaris* (L.) R. Br. and *E. curvula* (Schrad.) Nees, are listed as alien species (Chang-Yang *et al.* 2022). Based on the vouchers and results of my surveys, I confirmed that *E. tef* (Zuccagni) Trotter has been naturalized in the plains in Taiwan (Fig. 1).

Megathyrsus species in Taiwan had been revised by Jung (2023), and

two species with one variety were listed as naturalized weeds in the plains and low elevations in Taiwan. Based on the vouchers and results of my surveys, I confirmed that *M. trichocladus* (Hack. ex K. Schum.) Salariato & Zuloaga has been naturalized at plains in Kinmen (Fig. 3), Lanyu, and Taiwan (Fig. 4).

In addition, Chen *et al.* (2011) recorded that three *Phalaris* spp. in Taiwan are aliens and locally naturalized in Taiwan. Herein, I report that *P. angusta* Nees ex Trin has been locally naturalized in the plains of northern Taiwan. The description, line drawing of these three weedy grasses, and brief keys to their genera in Taiwan are also attached below for identification.

Taxonomic treatment

1. *Eragrostis tef* (Zuccagni) Trotter, *Boll. Soc. Bot. Ital.* 1918: 62, 1918. Boulos, *Fl. Egypt* 4: 256, 2005; Quattrocchi, *CRC World Dictionary of Grasses*: 862, 2006; Peterson, In:

Barkworth *et al.* *Fl. North Amer.* 24: 85, 2007. 苔麩 Fig. 1 & 2

Poa tef Zuccagni. *Diss. Ditef* 1775.

TYPE: RUSSIA, Astrachan, *Dolanker*, *s.n.* (K, MO 2967228, photo)

Annual. Culms erect; 20–90 cm long; nodes swollen, to 2 mm wide. Ligule a fringe of hairs, to 0.5 mm long; collar dominant, margin hairy, hairs 3–4 mm long. Leaf-blades 10–30 cm long; 2–4 mm wide. Inflorescence anapical spreading panicle, outline ovate, 10–40 cm long; lowermost panicle branches whorled at lower nodes, panicle branches flexuous, glabrous in axil, bearded near the pulvini (swollen bases) of branches near axils, hairs to 4 mm long. Spikelets are solitary and pedicelled, comprising 4–12 fertile florets, with diminished florets at the apex. Spikelets oblong in outline, laterally compressed, 5.5–9 mm long; 1.5–2 mm wide. Lower glume lanceolate; ca. 0.3 mm long, 1-keeled, 0-veined, apex acuminate. Upper glume

lanceolate, ca. 1 mm long, 1-veined, apex acuminate. Lemma elliptic, 1.5 mm long, membranous, keeled, 3-veined, apex acute, falling when caryopsis mature. Palea elliptic, 2-keeled, upper parts of keels scaberulous, apex truncate. Anthers 3, elliptic, ca. 0.2 mm long. Caryopsis oblong, ca. 0.5 mm long, dark brown.

Specimens examined: TAIWAN. Taipei City, Bei-Tou District, Ruan-Qiao, 18 Jun 2022, *M.-J. Jung 6592* (TAIF); Taichung City, Ho-Li District, Yue-Mei, 10 Nov 2021, *M.-J. Jung 6569* (TAIF); Chuan-Hua County, Tien-Chung Hsiang, Er-Shui, 31 Aug 2020, *M.-J. Jung 6255* (TAIF), 14 Sep 2021, *M.-J. Jung 6533* (TAIF); Yulin County, Da-Pi Hsiang, Da-Pi, 7 Jun 2022, *M.-J. Jung 6588* (TAIF), Lin-Nei Hsiang, Lin-Nei, 5 Jul 2021, *M.-J. Jung 6514* (TAIF); Nantou County, Chu-Shan Township, Ching-Shui-Shi, 5 Jul 2021, *M.-J. Jung 6516* (TAIF), Chi-Chi Township, Chi-Chi, 21 Aug 2023, *Ming-Jer Jung 6695* (TAIF); Kaohsiung City, Da-Sher District, Da-Sher, 17 Oct

2020, *M.-J. Jung 6339* (TAIF); Pingtung County, Gaushu Township, Gaushu, 25 Jan 2023, *Ming-Jer Jung 6613* (TAIF), Nei-Pu Hsiang, Nei-Pu, 17 Jun 2022, *M.-J. Jung 6590* (TAIF), Pingtung City, Pingtung, 7 Oct 2021, *M.-J. Jung 6559* (TAIF), Taiwu Township, Wuan-an, 10 Nov 2022, *Ming-Jer Jung 6602* (TAIF), Wuan-Dan Hsiang, Wuan-Dan, 27 Sep 2021, *M.-J. Jung 6549* (TAIF), Wuan-Luan Hsiang, Wu-Gou-Shui, 27 Sep 2021, *M.-J. Jung 6548* (TAIF).

Notes: The vernacular name of *Eragrostis tef* (Zuccagni) Trotter is tef (Peterson 2007). It is native to West Asia, central and eastern Africa, and naturalized to temperate and tropical Asia, Australia, Europe, South America, and southwestern Pacific islands (Peterson 2007; Quattrocchi 2006; POWO 2024). In Taiwan, this grass grows at roadsides and waste places, low elevations (Fig.1). Although it is an annual weed, I consider this alien grass has been naturalized in western Taiwan based on the vouchers

that I collected steadily in recent years.

Key to the *Eragrostis* species in Taiwan

1. Florets articulate from above downward, falling together with rachilla-joints.

2. Inflorescence a spike-like contracted panicle *E. ciliaris*

2. Inflorescence a more or less open panicle.

3. Cilia of lemma 1/2 as long as lemma; pulvini present
..... *E. tenella*

3. Cilia of lemma very short, scabrous, pulvini wanted
..... *E. japonica*

1. Florets falling off from below upwards, but leaving a continuous rachilla.

4. Plants glandular on the culms, leaf sheaths, and panicle.

5. Perennials; culm up to 110 cm; spikelet blackish purple
..... *E. ferruginea*

5. Annuals; culm 20–60 cm tall;

spikelet green or dark green.

6. Spikelet 1.5–2 mm wide; lemmas 1.5–2 mm long *E. minor*

6. Spikelet 2–3 mm wide; lemmas 2–2.8 mm long
.....*E. cilianensis*

4. Plants eglandular.

7. Panicle contracted and spikelike.

8. Spikelet 1–2 mm broad; lower panicle branches 3–8 cm
..... *E. nutans*

8. Spikelet 2–3 mm broad; lower panicle branches 0.5–2.5 cm.

9. Palea apex acute, the keels ciliolate but not winged; panicle 2–8 cm, pilose in axils
..... *E. cylindrica*

9. Palea apex toothed, the keels winged, ciliolate along the wings; panicle 10–15 cm, glabrous in axils *E. nevinii*

7. Panicle open and spreading.

10. Leaf blades long pilose on both surfaces *E. pilosissima*

10. Leaf blades glabrous, pubescent,

- or pilose in part.
11. Anthers longer than 0.7 mm.
12. Palea deciduous.....
..... *E. atrovirens*
12. Palea persistent.
13. Branchlets and pedicels distinctly or obscurely glandular; leaf blades flat, 2-6 mm wide; leaf sheath compressed *E. ferruginea*
13. Branchlets and pedicels eglandular; leaf blades involute, 1–2 mm wide, leaf sheath not compressed *E. curvula*
11. Anthers shorter than 0.5 mm.
14. Tips of lemmas widely divergent, giving a serrate appearance to the spikelet
..... *E. tenuifolia*
14. Tips of lemmas slightly divergent or appressed to the lemmas above.
15. Spikelet ovoid, more than 2–4 mm wide.....
..... *E. unioloides*
15. Spikelet lanceolate to linear, less than 2 mm wide.
16. Spikelet less than 1.5 mm wide; annuals.
17. Axils of panicle branches and mouth of sheath pilose *E. pilosa*
17. Axils of panicle and mouth of sheath not pilose.
18. Lowermost branches glabrous near their pulvini *E. multicaulis*
18. Lowermost branches bearded near its pulvini *E. tef*
16. Spikelet 2–2.5 mm wide; annuals or perennials.
19. Plant robust, up to 90 cm tall *E. fauriei*
19. Plant slender, up to 60 cm tall.
20. Keels of palea ciliate; anther 0.3–0.4 mm long; leaf *E. brownii*

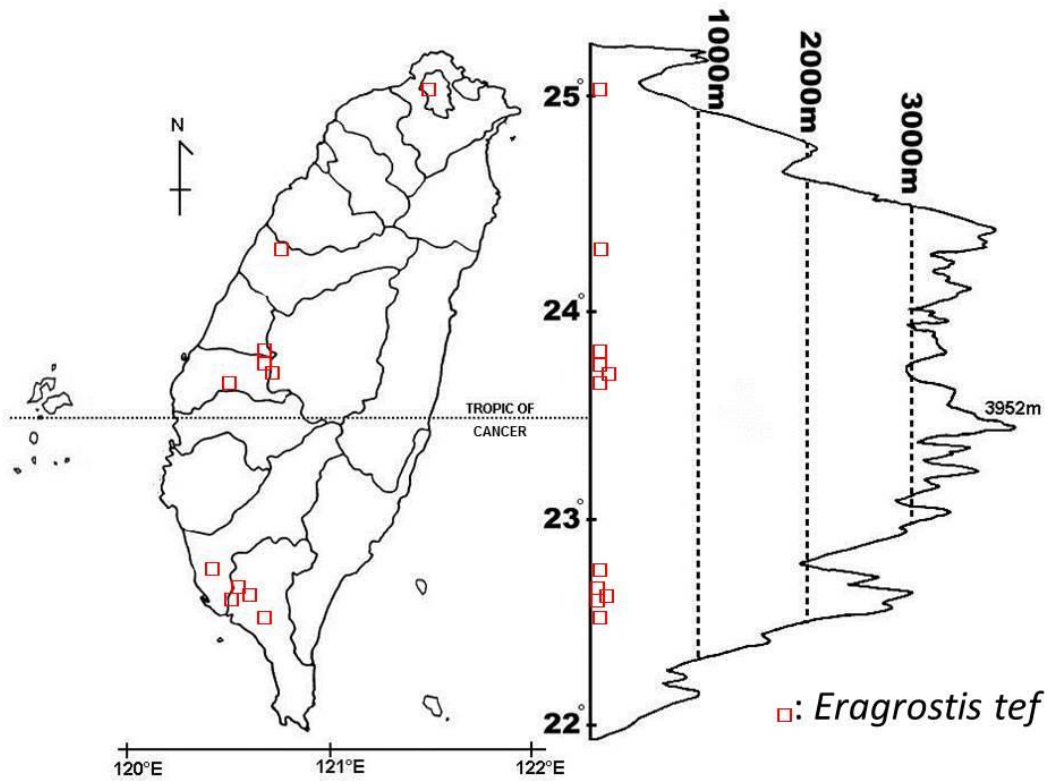


Fig. 1 Distribution map of *Eragrostis tef* (Zuccagni) Trotter in Taiwan.

圖 1 苔藓 (*Eragrostis tef* (Zuccagni) Trotter) 在臺灣的分布圖。

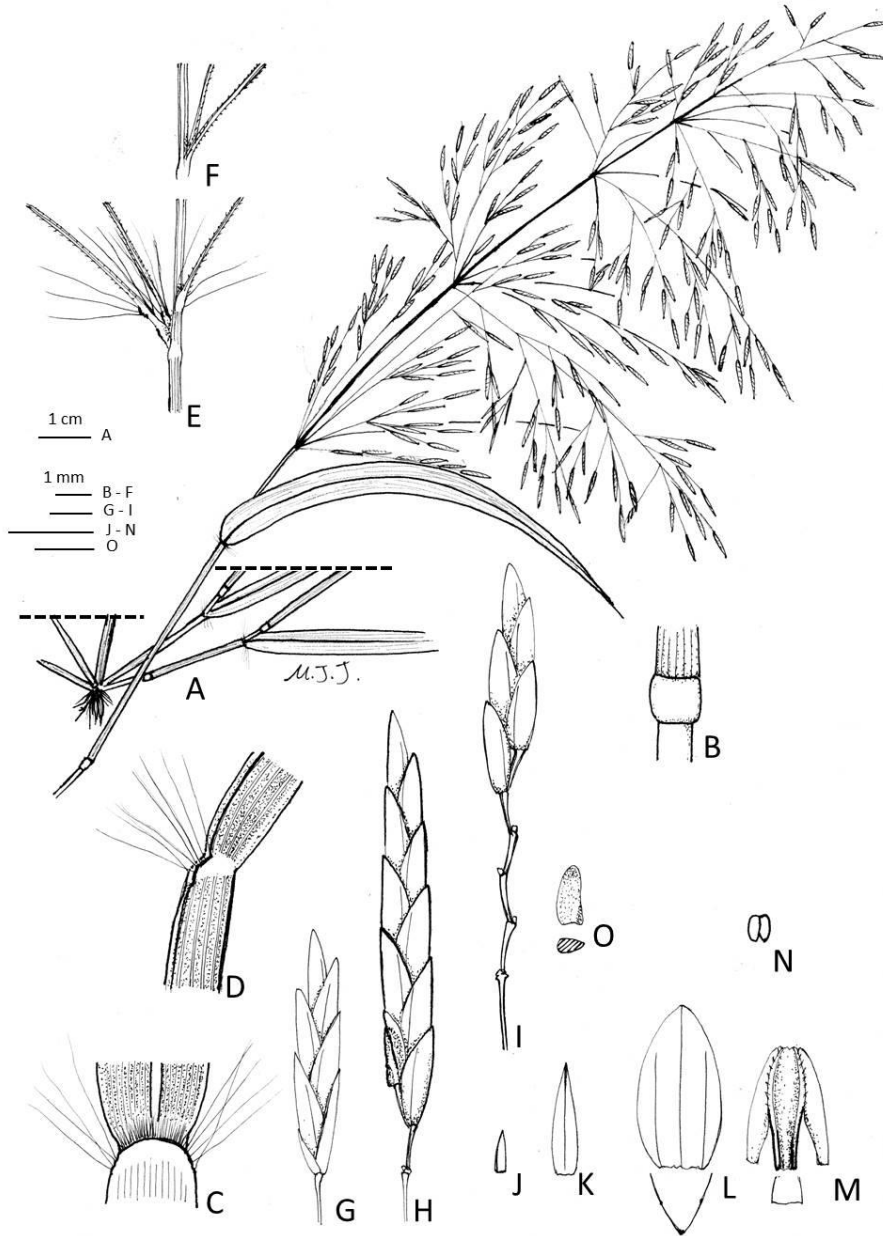


Fig. 2 *Eragrostis tef* (Zuccagni) Trotter. A: Habit. B: Node. C: Leaf blade base and ligule. D: Leaf collar and blade base, lateral view. E & F: Part of the panicle axis, showing the bearded pulvini and glabrous axils. G-I: Spikelets. J: Lower glume. K: Upper glume. L: Lemma. M: Palea. N: Anther. O: Caryopsis.

圖 2 苔麩 (*Eragrostis tef* (Zuccagni) Trotter)。A: 植株。B: 節。C: 葉片基部與葉舌。D: 葉襟與葉片基部，側面觀。E & F: 圓錐花序腋處，分支基部具膨大且主軸光滑。G-I: 小穗。J: 外穎。K: 內穎。L: 外稃。M: 內稃。N: 花藥。O: 穎果。

20. Keels of palea hispidulous; anther 0.1-0.2 mm long; leaf base sparsely..... *E. cumingii*

2. *Megathyrsus trichocladus* (Hack. ex K. Schum.) Salariato & Zuloaga, Plants 12(399): 11, 2003. 蔓生大黍 Figs. 3–5
Panicum trichocladum Hack. ex K. Schum., Pflanzenw. Ost-Afrikas 5c: 103, 1895.

TYPE: TANZANIA. Kilimanjaro, *H. Meyer 140* (B, photo).

A perennial grass, habit 0.2–1 m tall, with short rhizomes, culms much-branched, rambling, 20–230 cm long, and rooting from the lower nodes. Leaf sheath compressed, keeled, pilose or glabrous; ligule a ciliate membrane, ovate, to 2 mm long, adaxial surface pilose, margins scabrous; blades narrowly lanceolate to lanceolate, 5–30 cm long, 4–18 mm wide, rounded at the base, apex acuminate. Panicle open, ovate in out-

line, 6–20 cm long, moderately branched, glabrous or sparsely long-ciliate on the distal branches and pedicels, and densely hairy on the main axis around and immediately below the lowest branches, rarely glabrous; panicle branches pilose or glabrous. Spikelets 2.5–3 mm long, lower glume round to ovate, 1-3-veined, surface glabrous, apex round. Upper glume ellipse, 5-veined, surface glabrous, apex acute. Lower floret sterile, lower lemma similar to upper glume, outline ellipse, 5-veined, apex round; lower palea narrowly elliptic, 2-veined, scabrous on veins, apex truncate. Upper floret fertile, upper lemma elliptic in outline, 2.5–4 mm long, surface rugose, margins involute and enclosed at the basal part, 5-veined, apex acute and pointed. Upper palea ellipse in outline, margins with two involute lobes, rugose at intercostal region; lodicules 2, to 0.2 mm long, apex truncate; anthers 3, 1 mm long; ovary fusiform, to 0.4 mm long; caryopses obovoid, embryo and hilum

to 1/2 length of caryopses, apex truncate.

Specimens examined: TAIWAN. New Taipei City, Hsinchuang District, Hsinchuang, 5 Sep 2024, *Ming-Jer Jung 7051* (TAIF), Youth Park, 23 Jan 2021, *Ming-Jer Jung 6403* (TAIF); Taichung City, Beitun District, Dakung, 20 Jul 2024, *Ming-Jer Jung 6998* (TAIF); Nantou County, Minchien Township, Songbuokeng, 21 Aug 2024, *Ming-Jer Jung 7032* (TAIF); Tainan City, East District, Tungning Road, 29 Aug 2002, *Ming-Jer Jung 361* (TAIF); Hualien County, Shoufong Township, Shuhu, 4 Sep 2024, *Ming-Jer Jung 7047* (TAIF); Taitung County, Lanyu Township, Tungching, 27 Mar 2008, *Ming-Jer Jung 2614* (TAIF); Kinmen County, Jinning Township, Shuanli, 17 Jul 2024, *Ming-Jer Jung 6994* (TAIF), Kinsha Township, Mt. Wuhu, 16 Jul 2024, *Ming-Jer Jung 6984* (TAIF).

Notes: *Megathyrsus trichocladus* (Hack. ex K. Schum.) Salariato & Zuloaga is native to tropical Africa, and naturalized in Malaysia and South America (POWO

2024). In Kinmen and Taiwan, this grass is naturalized at roadsides or waste lands around forests (Figs. 3 and 4). In the past, I misapplied the vouchers cited in the previous as *Megathyrsus maximus* (Jacq.) B. K. Simon & S. W. L. Jacobs, but it could be determined by using the following key to the *Megathyrsus* species in Taiwan.

Key to the *Megathyrsus* species in Taiwan

1. Culms much-branched and rambling, lower nodes rooting
..... *M. trichocladus*
1. Culm usually solitary and erect, lower nodes not rooting..... 2
2. Rachis scabrous and sparsely pilose *M. infestus*
2. Rachis glabrous or scabrous..... 3
3. Intercostal regions of lower lemma glabrous
..... *M. maximus*
3. Intercostal regions of lower lemma hairy
..... *M. maximus* var. *pubiglumis*
3. *Phalaris angusta* Nees ex Trin. Sp.

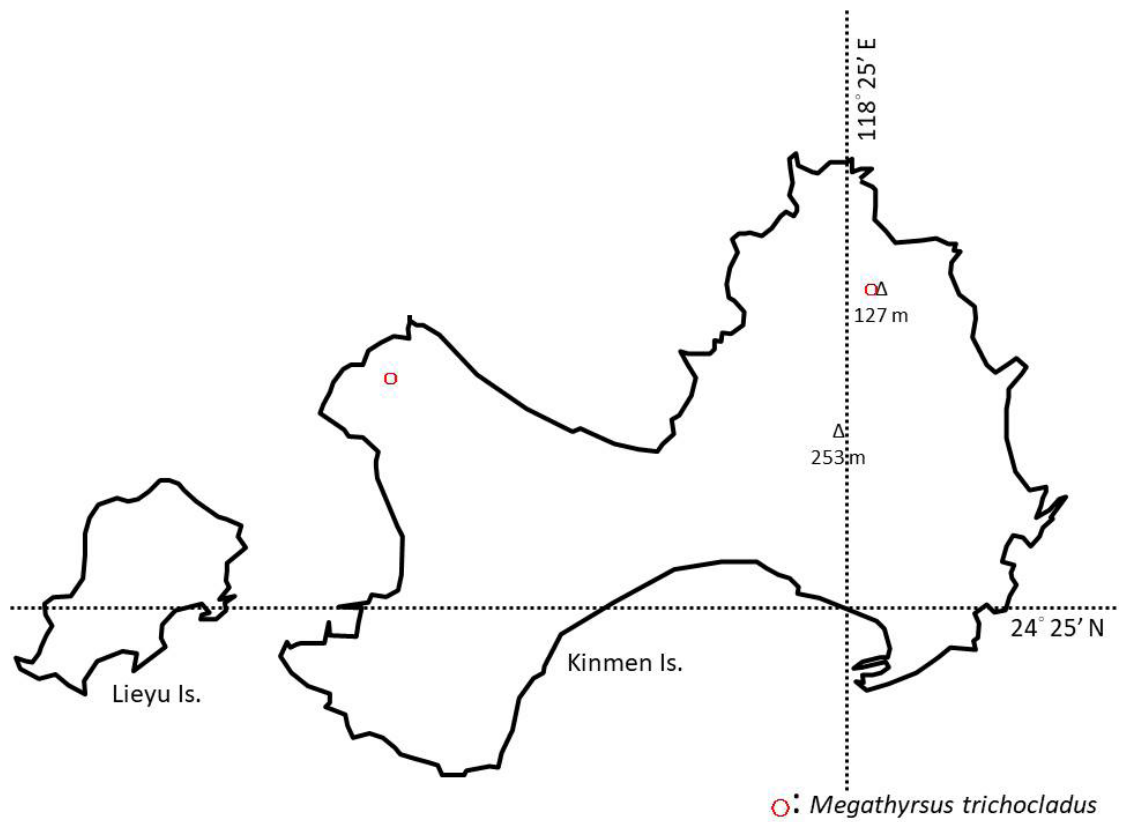


Fig. 3 Distribution map of *Megathyrus trichocladus* (Hack. ex K. Schum.) Salariato & Zuloaga in Kinmen.

圖3 蔓生大黍 (*Megathyrus trichocladus* (Hack. ex K. Schum.) Salariato & Zuloaga) 在金門的分布圖。

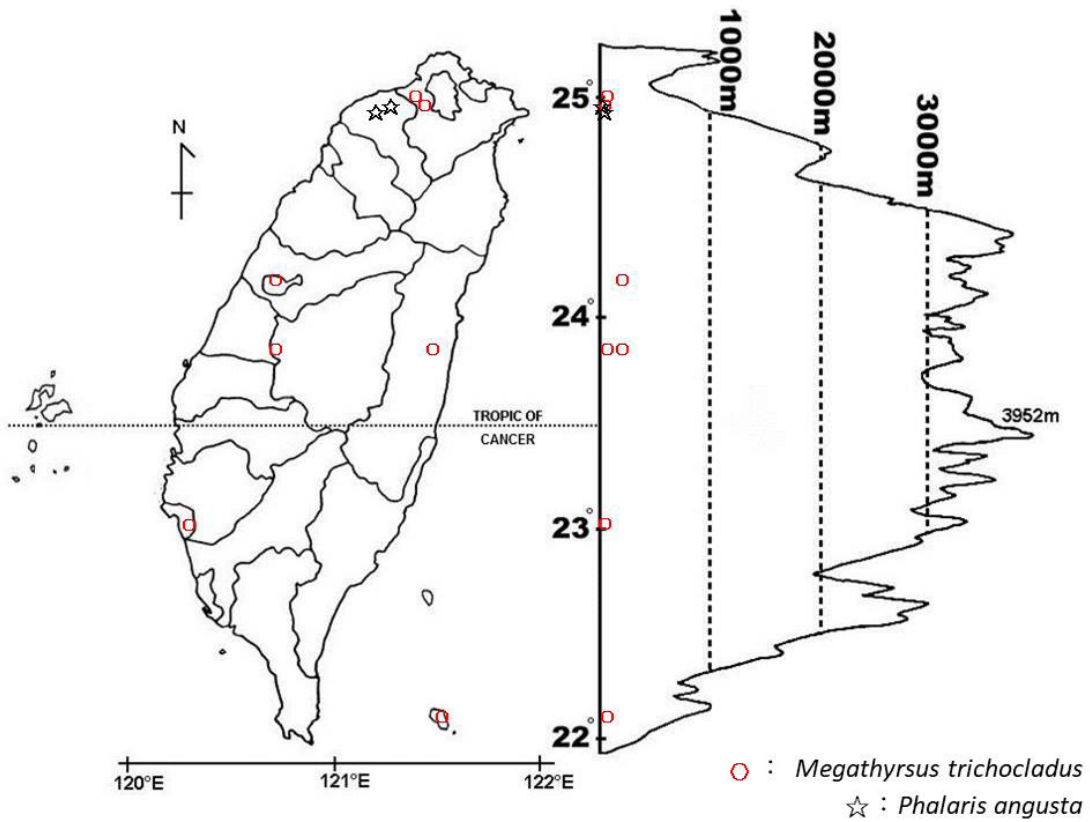


Fig. 4 Distribution map of *Megathyrsus trichocladius* (Hack. ex K. Schum.) Salariato & Zuloaga and *Phalaris angusta* Nees ex Trin. in Taiwan.

圖4 蔓生大黍 (*Megathyrsus trichocladius* (Hack. ex K. Schum.) Salariato & Zuloaga) 與尖鵲草 (*Phalaris angusta* Nees ex Trin.) 在臺灣的分布圖。

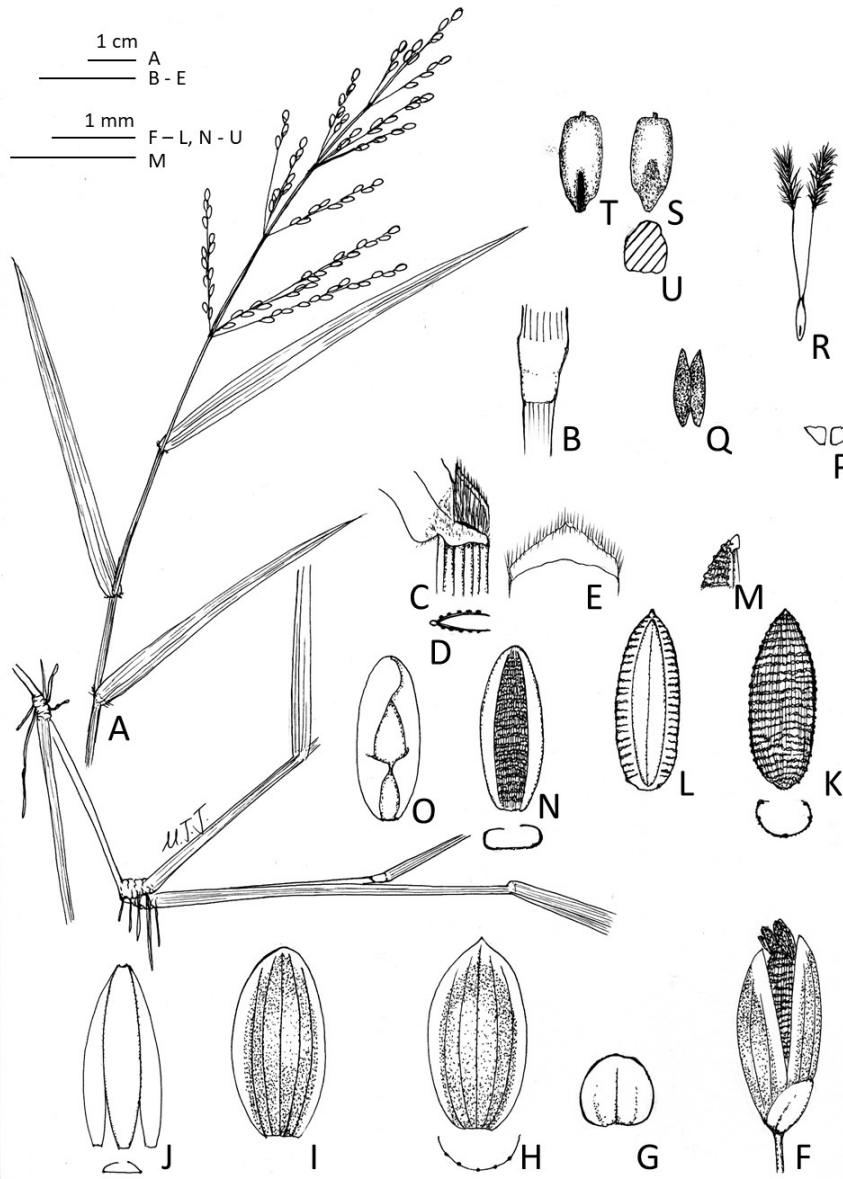


Fig. 5 *Megathyrsus trichocladus* (Hack. ex K. Schum.) Salariato & Zuloaga. A: Habit. B: Node. C: Leaf base, lateral view. D: Cross-section of leaf sheath. E: Ligule. F: Spikelet, lateral view. G: Lower glume. H: Upper glume. I: Lower lemma. J: Lower palea. K & L: Upper lemmas, K: abaxial view, L: adaxial view. M: Enlargement of upper lemma apex, lateral view. N & O: Upper palea, N: abaxial view, O: adaxial view. P: Lodicules. Q: Anther. R: Pistil. S-U: Caryopses, S: embryo side, T: hilum side, U: cross-section.

圖 5 蔓生大黍 (*Megathyrsus trichocladus* (Hack. ex K. Schum.) Salariato & Zuloaga) 。A : 植株。B : 節。C : 葉片基部，側面觀。D : 葉鞘剖面。E : 葉舌。F : 小穗，側面觀。G : 外穎。H : 內穎。I : 第一小花外稃。J : 第一小花內稃。K & L : 外稃，K : 背側觀，L : 腹側觀。M : 第二小花外稃先端放大側面觀。N & O : 第二小花內稃，N : 背面觀，O : 腹面觀。P : 鱗被。Q : 花藥。R : 雌蕊。S-U : 穎果，S : 胚側觀，T : 臍側觀，U : 剖面觀。

Gram. 1(7): t. 78. 1827. Barkworth, In: Barkworth *et al.* (eds.) Fl. N. Amer., vol. 24. electronic version, 2020. 尖鵲草 Figs. 4 and 6

TYPE: Sp. Gram. 1(7): t. 78, 1827.

Annuals, culms to 150 cm tall; nodes enlarged, glabrous, leaf sheath glabrous, ligule ovate, membranous; blades 10–20 cm long, to 1 cm wide. Inflorescence an apical constricted panicle, outline linear, 2.5–17 cm long, 0.6–1.5 cm wide; spikelets and branches antrorse-appressed. Spikelets elliptic to narrowly ovate in outline, laterally appressed, solitary, comprising 2 basal sterile florets and an apical fertile floret; without rhachilla extension. Lower glume elliptic, 2.9–3.5 mm long, shorter than upper glume, 3-veined, intercostal regions glabrous, laterally compressed, keeled and winged on central vein, wing margin scabrous, apex acute to acuminate. Upper glume elliptic, 3–5.5 mm long, longer than lower glume; chartaceous, 3-veined, intercostal regions glabrous, keeled and

winged on central vein, wing margin scabrous, apex obtuse. Basal florets 2, sterile, lemmas linear, 0.7–1.5 mm long, margins sparsely hairy. Third floret fertile, lemma laterally compressed, ovate, 2.2–3.8 mm long, cartilaginous, keeled, inconspicuously 5-veined, intercostal regions appressed hairy, apex acute; palea narrowly ovate, membranous, 2-veined, apex acute; anther 3, to 0.7 mm long.

Specimens examined: TAIWAN. Taoyuan City, Dayuan District, Dayuan, 2 Apr 2023, *Ming-Jer Jung 6622* (TAIF), Luchu District, Luchu, 11 Apr 2020, *Ming-Jer Jung 6228* (TAIF).

Notes: The vernacular name of *Phalaris angusta* Nees ex Trin. is narrow canarygrass (Barkworth *et al.* 2020). It is native to North and South America, and naturalized in Australia, Germany, Madagascar, and South Africa (Barkworth *et al.* 2020, POWO 2024). In Taiwan, this grass is naturalized at roadsides and resting farms in low elevation, northwestern Taiwan (Fig. 4).

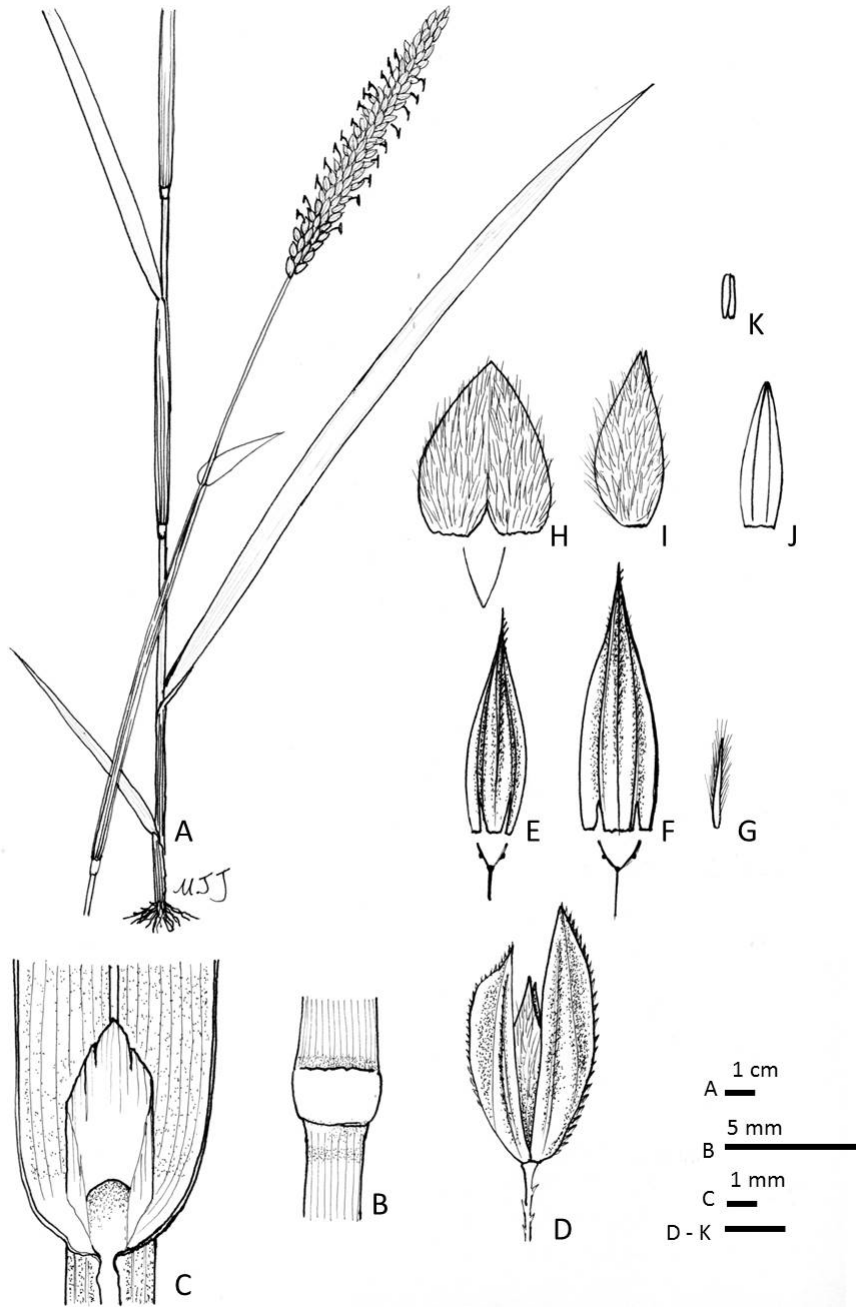


Fig. 6 *Phalaris angusta* Nees ex Trin. A: Habit. B: Node. C: Leaf base and ligule. D: Spikelet, lateral view. E: Lower glume. F: Upper glume. G: Lemma of sterile floret. H & I: Lemma of fertile floret, I: lateral view. J: Palea of fertile floret. K: Anther.

圖 6 尖鵲草 (*Phalaris angusta* Nees ex Trin.)。A：植株。B：節。C：葉片基部與葉舌。D：小穗，側面觀。E：外穎。F：內穎。G：不稔小花外稃。H& I：可稔小花外稃，I：側面觀。J：可稔小花內稃。K：花藥。

Key to the *Phalaris* species in Taiwan

1. Panicle spreading, lowest branches longer than 1.5 cm.....
..... *P. arundinacea*
1. Panicle constricted, lowest branches shorter than 1 cm.
2. Panicle outline linear..... *P. angusta*
2. Panicle outline ovate to elliptic.
3. Margins of wings on glumes smooth
..... *P. canariensis*
4. Margins of wings on glumes toothed
..... *P. minor*

Literature Cited

- Barkworth, M. E. 2020. *Phalaris*. In: M. E. Barkworth, K. M. Capels, S. Long, M. B. Piep (eds.). Flora of North America, vol. 24. electronic version. Oxford University Press, New York. <http://floranorthamerica.org/Phalaris>
- Boulos L. 2005. Flora of Egypt, vol. 4. Al Hadara Publishing, Cairo, Egypt.
- Chang-Yang, C. H., M. H. Su, P. H. Chi-ang and C. F. Hsieh. 2022. Updating the checklist of the naturalized flora in Taiwan. *Taiwania* 67(1): 1–8.
- Chen, C. H., C. Y. Lin and C. S. Kuoh. 2011. Grass Flora of Taiwan, Bamboos Excluded vol. 1. Endemic Species Research Institute, Chichi.
- Jung, M. J. 2023. Supplements to the alien grasses (Poaceae) of Taiwan. *Quarterly Journal of Forest Research* 45(2): 173–188.
- Peterson, P. M. 2007. *Eragrostis*. In: M. E. Barkworth, K. M. Capels, S. Long, M. B. Piep (eds.) Flora of North America, vol. 24. electronic version. Oxford University Press, New York. <http://floranorthamerica.org/Eragrostis>
- POWO. 2024. Plants of the World Online. Facilitated by the Royal Botanic Gardens, Kew. Published on the Internet. Retrieved on 28 September 2024 from <http://www.plantsoftheworldonline.org/>
- Quattrocchi, U. 2006. CRC World Dictionary of Grasses CRC Press, Taylor & Francis Group.
- Wu, S. H., C. F. Hsieh and M. Rejmánek.

2004. Catalogue of the naturalized
flora of Taiwan. *Taiwania* 49 (1):
16–31.