

***Tripogon bimucronatus* (Poaceae: Chloridoideae: Tripogoninae), a new species from India**

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ABSTRACT. *Tripogon bimucronatus* Thoiba & Sunil, a new species of grass from the Nelliampathy Hills, Palakkad District of Kerala, South India is described and illustrated. It is morphologically similar to *Tripogon vellarianus* Pradeep but differs by having adaxially scabrid, linear-acuminate leaves; ligules a fringe of hairs to 2.5 mm long; spikelets with 6–8 closely packed florets; lower glume asymmetrical; upper glume awned; lemma awn scabrid; palea elliptic-lanceolate, apex bimucronate and notched at the centre.

Keywords. *Tripogon*, Poaceae, new species, Kerala, South India

Introduction

The genus *Tripogon* Roem. & Schult. belongs to subtribe Tripogoninae Stapf, tribe Cynodonteae Dumort, subfamily Chloridoideae Kunth ex Beilschm. in the family Poaceae Barnhart (Peterson et al., 2010, 2014; Soreng et al., 2012). The genus comprises 44 species distributed in Africa, America, Australia, Temperate and Tropical Asia (Clayton et al., 2006 onwards). It is known to have 22 species in India, which includes six recently described species (Murugesan & Balasubramaniam, 2008; Newmaster et al., 2008; Kabeer et al., 2009; Chorghé et al., 2013; Thoiba & Pradeep, 2014).

During an exploration along the Western Ghats of South India, an interesting specimen of *Tripogon* was collected from the hill slopes of the Nelliampathy, Palakkad District of Kerala, South India. Critical study revealed it to be quite distinct from the remaining species of the genus and hence is described here as a new species, bringing the total number of *Tripogon* species for India to 23. It is closely allied to *Tripogon vellarianus* Pradeep (Pradeep & Sunil, 1999) but can easily be distinguished (Table 1).

***Tripogon bimucronatus* Thoiba & Sunil, sp. nov.**

It is very similar to *Tripogon vellarianus* Pradeep but differs in having adaxially scabrid, linear-acuminate, ribbed leaves, ligules being hairy at the ends of leaf sheaths, with the hairs reaching up to 2.5 mm; spikelets with 6–8 closely packed flowers; the lower glume being asymmetrical, and the apex of upper glume awned; lemma 1-awned, scabrid, straight or geniculate; palea elliptic-lanceolate, apex bimucronate and notched

at the centre. – TYPE: India, Kerala, Palakkad District, Nelliampathy hill top, 1200 m elevation, 16 November 2010, *Sunil*, C.N. 4477 (holotype SING; isotypes BRIT, CALI, K). (Fig. 1, 2)

Tufted perennial herb. **Culms** 30–60 cm tall, erect; nodes glabrous. Leaf **blades** 30–60 cm long, 0.4–0.6 cm wide, linear, hispid towards base, apex acute-acuminate, scabrid adaxially, margins involute. **Sheaths** closely involute to the culm, almost rigid, sparsely hairy; **ligules** a fringe of hairs 2–2.5 mm long. **Racemes** 30–40 cm long, spikelets arranged along both sides, 45–65 spikelets per raceme; **peduncle** glabrous, terete, 10–15 cm long; rachis stout, minutely scaberulose, triangular. **Spikelets** linear-lanceolate, 1.3–1.8 cm long, 2–2.5 mm wide, 6–8-flowered; **callus** bearded. **Rachilla** not persistent, 1–2 mm long, slightly scabrid. **Lower glume** 3–3.5 × 0.5–1 mm, lanceolate, asymmetrical, notched on one-side below the middle, chartaceous, 1-nerved, apex acuminate. **Upper glume** 5–6 × 0.7–1 mm, elliptic-lanceolate, prominently 3-nerved, glabrous, apex with awns 0.5–1 mm long. **Lemma** 5–5.5 × 1.5–2 mm (excluding awn), 3-nerved, 1-awned, the awn arising between lateral lobes, median awn 5–5.5 mm long, scabrid, straight or geniculate, lateral awns absent. **Palea** 4–5 × 1–2 mm, hyaline, narrowly elliptic, keeled and winged, keels minutely puberulous, apex bimucronate, notched at the centre. **Lodicules** 2, c. 0.25 mm, quadrate, apex coarsely 3-toothed. **Stamens** 3, **anthers** 1–1.5 mm long, oblong, **filaments** 0.5–0.75 mm long, slender, glabrous. **Ovary** 0.25–0.5 mm long, obovate; **style** 2, slender, hyaline, 1 mm long; **stigma** feathery, 1–1.5 mm long. **Caryopsis** 1.1–1.3 × 0.4–0.5 mm, narrowly oblong-lanceolate, obtusely trigonous, pale brown, obtuse at apex, longitudinally ribbed abaxially.

Distribution & Ecology. *Tripogon bimucronatus* usually grows in the granitic grassy slopes of Nelliampathy Hills at an elevation of 1000–1200 m. It is found growing in association with *Arthraxon castratus* (Griff.) V. Naray. ex Bor, *Garnotia elata* (Arn. ex Miq.) Janowsky., *Cyanotis papilionacea* (Burm.f.) Schult. & Schult.f., *Swertia angustifolia* Buch.-Ham. ex D. Don., *Isachne bourneorum* C.E.C.Fisch., *Tripogon wightii* Hook.f., *Tephrosia pulchella* Hook.f., *Cymbopogon commutatus* (Steud.) Stapf, *Osbeckia* spp., *Parasopubia delphiniifolia* (L.) H.-P.Hofm. & Eb. Fisch., *Chrysopogon nodulibarbis* (Hochst. ex Steud.) Henrard, *Sopubia trifida* Buch.-Ham. ex D. Don., *Eulalia trispicata* (Schult.) Henrard, and various moss species. It also occurs along Meenuliyan Para Hills in Idukki District, Kerala at an elevation of 800 m.

Phenology. It flowers from early September to October. Fruit set is low with the seeds ripening by late October–November.

Etymology. The epithet ‘bimucronatus’ refers to the bimucronate palea apex.

Additional specimen examined. INDIA: **Kerala:** Idukki Dt., Meenuliyan Para, Vannappuram, 800 m elevation, 28 Nov 2014, *Sunil* 4910 (SNM College Herbarium, Kerala).

Table 1. Comparison between *Tripogon vellarianus* Pradeep and *Tripogon bimucronatus* Thoiba & Sunil.

<i>Tripogon vellarianus</i>	<i>Tripogon bimucronatus</i>
Leaf blades 8–15 mm wide, glabrous on both surfaces	Leaf blades 5–8 mm wide, ribbed, slightly scabrid adaxially
Leaf sheaths closely clasping, very rigid; ligules membranous	Leaf sheath closely involute, almost rigid; ligules ciliate, 2–2.5 mm long
Spikelets distantly arranged, 8–10-flowered	Spikelets closely packed, 6–8-flowered
Lower glumes 4–5 × 1.25 mm, symmetrical, unlobed, acuminate at the apex	Lower glumes 3–5 × 1mm, asymmetrical, slightly 1-lobed on one-side, acute-acuminate at the apex
Upper glumes 5–7.5 × 1.5 mm, acute at apex, unawned	Upper glumes 5–6 × 1mm, a small awn between the sinus at apex, awns 0.5–1 mm long
Lemmas 5–10 × 2 mm (excluding awn), lateral awns absent or up to 5mm long, median awn 3mm long, glabrous, straight	Lemma 5–5.5 × 1–2mm (excluding awn), 1-awned in between the lobes, awn 5–5.5 mm long, scabrid, straight or geniculate
Paleas c. 4 × 2 mm, elliptic, acute at apex	Paleas 4–5 × 1–1.2 mm, elliptic-lanceolate, bimucronate at apex with a notch at the centre

Key to the species of *Tripogon* in India
(with lemma entire or 2-cleft at apex)

- 1a. Lowest lemmas empty, dissimilar to other lemmas *T. wardii*
- 1b. Lowest lemmas bisexual, similar to all other lemmas 2
- 2a. Culms thickened below by the persistent leaf sheaths; leaf blades equitant, rigid, apex pungent *T. pungens*
- 2b. Culms not thickened below by the persistent leaf sheaths; leaf blades not equitant, not rigid or pungent 3

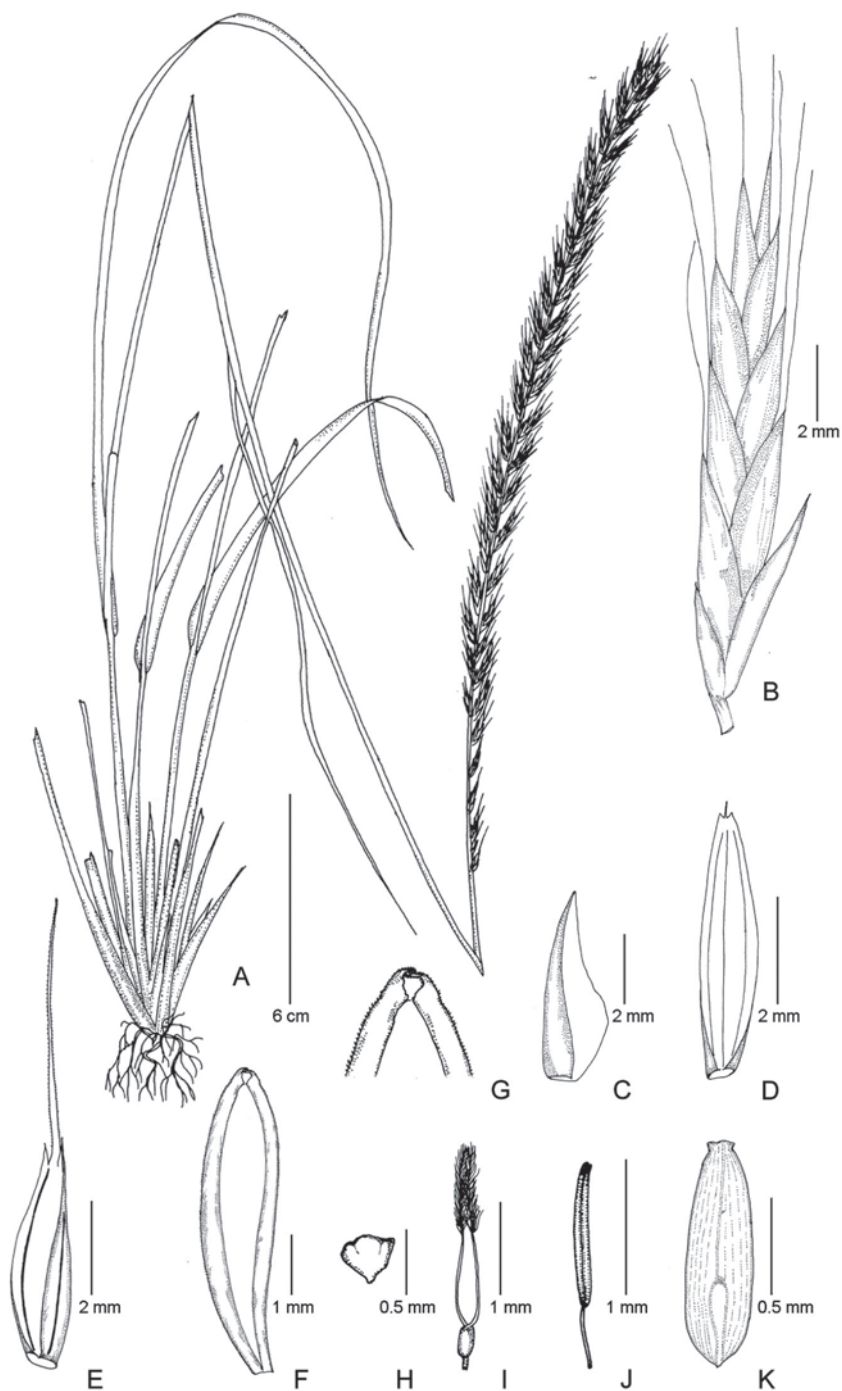


Fig. 1. *Tripogon bimucronatus* Thoiba & Sunil **A.** Habit; **B.** Spikelet; **C.** Lower glume; **D.** Upper glume; **E.** Lemma; **F.** Palea; **G.** Portion of palea enlarged; **H.** Lodicule; **I.** Pistil; **J.** Stamen; **K.** Caryopsis. (A–J drawn from the holotype, K from *Sunil 4910*, all drawn by Thoiba Kottekkattu)

- 3a. Central awns of the lemmas flexuous, capillary, several times as long as lemmas *T. capillatus*
- 3b. Central awns of the lemmas straight or curved, not more than twice as long as the lemmas 4
- 4a. Rachilla internodes 1 mm long; apices of lemmas 1-awned 5
- 4b. Rachilla internodes 2 mm long; apices of lemmas 3-awned *T. copei*
- 5a. Culms 15–25 cm high; leaf blades 5–20 cm long 6
- 5b. Culms 30–90 cm high; leaf blades 30–60 cm long 7
- 6a. Upper glumes 5.5–7 mm long; awns of the lemmas 6–8 mm long, straight or curved *T. wightii*
- 6b. Upper glumes 8–9.5 mm long; awns of the lemmas 10.5–12 mm long, always straight *T. velliangiriensis*
- 7a. Leaf blades and culms glaucous, involute, filiform; ligules very short and ciliate
..... *T. jacquemontii*
- 7b. Leaf blades and culms green, flat, sometimes rolled; ligules obsolete 8
- 8a. Leaf blades 3–6 mm wide; racemes 7–25 cm long; median awns shorter than lemmas *T. lisboae*
- 8b. Leaf blades 8–15 mm wide; racemes 30–40 cm long; median awn equal to or longer than lemmas 9
- 9a. Ligules membranous, a fringe of hairs at the ends of leaf sheath; paleas subulate at apex *T. malabaricus*
- 9b. Ligules ciliate, membranous or absent; paleas not subulate at apex 10
- 10a. Upper glumes 3–4 mm long; lemmas 2.5–3.5 mm long 11
- 10b. Upper glumes 4–7.5 mm long; lemmas 4–10 mm long 12
- 11a. Ligules glabrous; lemma base glabrous, median awns as long as or shorter than the lemmas; inflorescence 20–45 cm long; spikelets with 5–8 florets
..... *T. sivarajanii*
- 11b. Ligules ciliate at apex; lemma base bearded; median awns 1.5 times longer than lemma; inflorescence 15–20 cm long; spikelets with 9–10 florets ... *T. tirumalae*
- 12a. Ligules a fringe of hairs; upper glumes awned at sinus; apex of paleas bimucronate
..... *T. bimucronatus*
- 12b. Ligules glabrous; upper glumes acuminate at apex; apex of paleas acute
..... *T. vellarianus*

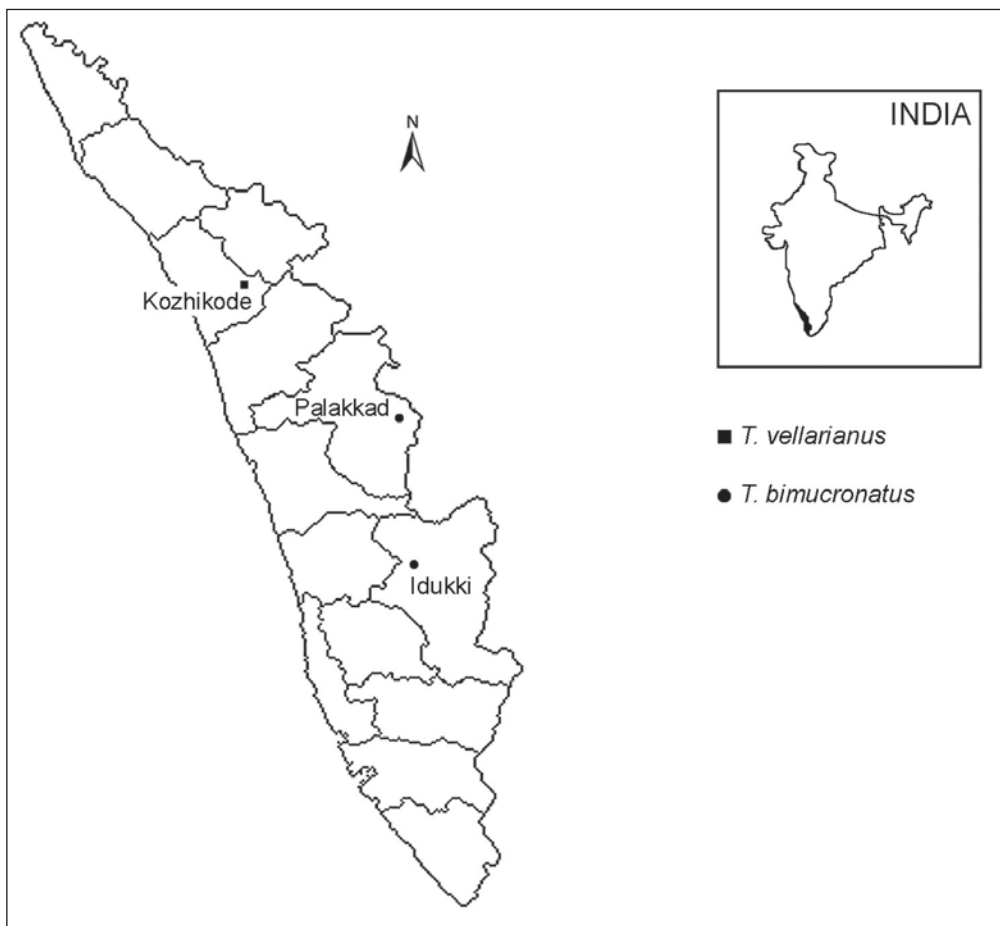


Fig. 2. Distribution map of *Tripogon vellarianus* Pradeep (■) and *Tripogon bimucronatus* Thoiba & Sunil (●) in Kerala

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References

- Chorghe, A., Rasingam, L., Prasanna, P.V. & Rao, M.S. (2013). *Tripogon tirumalae* (Poaceae), a new species from the Seshachalam Hills of Andhra Pradesh, India. *Phytotaxa* 131: 17–22.
- Clayton, W.D., Vorontsova, M.S., Harman, K.T. & Williamson, H. (2006 onwards). *GrassBase—the online world grass flora*. <http://www.kew.org/data/grass.db.html>. (accessed on 10 Aug. 2013).

- Kabeer, K.A.A., Nair, V.J. & Murthy, G.V.S. (2009). *Tripogon borii* – a grass species new to science from India. *Bull. Bot. Surv. India* 50: 115–118.
- Murugesan, M. & Balasubramaniam, V. (2008). *Tripogon velliangiriensis* (Poaceae) – a new species from Tamil Nadu, India. *Indian J. Forest.* 31: 109–111.
- Newmaster, S.G., Balasubramaniam, V., Murugesan, M. & Ragupathy, S. (2008). *Tripogon cope* (Poaceae: Chloridoideae), a new species supported by morphometric analysis and a synopsis of *Tripogon* in India. *Syst. Bot.* 33: 695–701.
- Peterson, P.M., Romaschenko, K., & Jhonson, G. (2010). A classification of the Chloridoideae (Poaceae) based on multi-gene phylogenetic trees. *Molec. Phylogenet. Evol.* 55: 580–598.
- Peterson, P.M., Romaschenko, K. & Herrera Arrieta, Y. (2014). A molecular phylogeny and classification of the Cteniinae, Farragininae, Gouiniinae, Gymnopogoninae, Perotidinae, and Trichoneurinae (Poaceae: Chloridoideae: Cynodonteae). *Taxon* 63:275–286. <http://dx.doi.org/10.12705/632.35>
- Pradeep, A.K. & Sunil, C.N. (1999). Two new species of *Tripogon* (Poaceae) from India. *Sida* 18: 809–814.
- Soreng, R.J., Davidse, G., Peterson, P.M., Zuloaga, F.O., Judziewicz, E.J., Filgueiras, T.S., Morrone, O., & Romaschenko, K. (2012). A world-wide phylogenetic classification of Poaceae (Graminae). <http://www.tropicos.org/projectwebportal.aspx?pagename=ClassificationNWG&projectid=10> (accessed on 10 Aug. 2013).
- Thoiba, K. & Pradeep, A.K. (2014). *Tripogon malabarica* (Poaceae: Chloridoideae: Tripogoninae), A new species from India, Kerala. *J. Bot. Res. Inst. Texas* 8: 525–529.

