

REVIEW ARTICLE

## The genus *Thrixspermum Loureiro* in Arunachal Pradesh and three new additions

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**Received:** 01.09.2022, Manuscript No.: mp-22- 75364 | **Editor Assigned:** 03.09.2022, Pre-QC No. mp-22- 75364 (PQ) | **Reviewed:** 05.09.2022, QC No. mp-22- 75364 (Q) | **Revised:** 17.09.2022, Manuscript No. mp-22- 75364 (R) | **Accepted:** 23.09.2022 | **Published:** 05.10.2022

### Abstract

Among the Orchid flora of Arunachal Pradesh, 9 species of *Thrixspermum* were recorded in an intensive field survey during 2014-2022 covering all the geographical areas of the state. *T. acuminatissimum*, *T. merguense* and *T. trichoglottis* are described and illustrated with detailed photos and line drawings; has been added to the orchid flora of Arunachal from Tirap district.

**Keywords:** Orchid species, Status, Diversity resources, Distribution.

### Introduction

The genus *Thrixspermum* is described by Joao de Loureiro (1790: 519) by its plant habit with lateral, axillary or racemose inflorescence, few to many flowered; floral bracts distichous; flowers half or fully opened, small to medium-sized, variable in size; sepals and petals sub equal; short column with a broad foot, a callus on the front of the sac on the lip and four unequal pollinia jointed by a stipe. It is represented by 191 (POWO 2022; K. Gogoi 2022) species in the world, distributed from the Himalayas to the Philippines and tropical Islands to S.W. Pacific (Govaert et al. 2022). This genus is represented by 17 (Maina et al. 1998; Misra 2019; Mao et al. 2011; Gogoi & Yonzone 2015; Vikas Kumar et al. 2017; Gogoi 2011, 2018a, 2018b, 2019a, 2019b, 2022) species in India and in Arunachal Pradesh it is represented by 6 species viz., *T. centipede* Loureiro (1790: 520); *T. changlangensis* K. Gogoi (2019: 167); *Thrixspermum japonicum* (Miquel) Reichenbach f. (1878: 75); *T. musciflorum* A.S. Rao & J. Joseph; *T. patkaiensis* K. Gogoi; *T. saruwatarii* (Hayata) Schlechter (1919: 275), and with the addition of 3 species viz., *T. acuminatissimum* (Blume) Reichenbach f. (1867: 121); *T. merguense* (Hooker f.) Kuntze (1891: 682) and *Thrixspermum trichoglottis* (Hooker f.) Kuntze (1891: 682) the number used to be 9 species.

In Tirap district of Arunachal Pradesh, during a field visit to the Hukanjuri area in 2019 by the authors, a few species of *Thrixspermum* were collected at a tropical altitude in vegetative condition and planted in the Regional Orchid Germplasm Conservation and Propagation Centre (Assam Circle) for flowering. Later, after flowering, it was identified by consultation of available literature (Seidenfaden 1975; Chowdhery 1998, 2009; King & Pantling 1898; Pearce & Cribb 2002; Pradhan 1997; Luckson 2007; Chen et al. 2009; Rao 2010; Gogoi & Yonzone 2015; Hegde 2017; Gogoi 2018a, 2019a, 2022; Singh et al. 2019) and consultation of herbaria as *T. acuminatissimum*; *T. merguense* and *T. trichoglottis* which are new to the state. A detailed description, illustration, and information on habitat and geographic distribution have been provided in the present manuscript to facilitate the field botanists to locate it in other parts of the N.E. Indian region. The voucher specimen has been deposited at the Herbarium of The Orchid Society of Eastern Himalaya (TOSEHIM), Regional Orchid Germplasm Conservation and Propagation Centre (Assam Circle), Assam.

### Taxonomic treatment

*Thrixspermum acuminatissimum* (Blume) Reichenbachf. Xenia Orchidacea.2: 121, 1867; Scidenfaden et al, Orchid of Thiland, iv-I, 518, 1962. *Sarcocilus notabilis* Hooker f., Flora of British India, 6: 42, 1890. *Dendrocolla acuminatissima* Blume, Bijdragen tot de flora van Nederlandsch Indie, 286, 1825. *Aerides acuminatissimum* (Blume) Lindley, Genera and Species of Orchidaceous Plants, 240, 1833. *Sarcocilus acuminatissimus* (Blume) Reichenbach f., Annales Botanices Systematicae, 6: 498, 1863. *Thrixspermum notabile* (Hooker f.) Kuntze, Revisio Generum Plantarum, 2: 682, 1891. *Ridleya notabilis* (Hooker f.) Pfitzer, Naturlichen Pflanzenfamilien. Nachtrage, 2: 16, 1900. Worldwide, the area sown to millet has remained relatively stable at around 38 million hectares for the past two decades. Both production and yield increased

by a little over 10 percent through the 1980s, but have remained unchanged since then. Current global production is about 28 million tons, and average yields are 0.75 t/ha. At a regional level, however, there are sharp differences in trends, especially between the two main producers, Asia and Africa.

**Specimen examined:** India, Arunachal Pradesh, Trirap district, Hukanjuri, dated 19. 04. 2019. Gogoi & Chowlu 00813 (TOSEHIM) Epiphytic; stem very short, 1–2 cm long; leaves distichous, 3.5–5 × 1–1.5 cm, subsessile, bilobed at apex, articulated to sheathing leaf base, coriaceous, oblong; peduncles 3 or more, arising from one point on the stem, 10–12 cm long, curved, naked; raceme 5–6.5 cm, bracts ovate, incurved coriaceous, subacute; pedicel and ovary very slender, 0.7 cm long; flowers yellow, odourless; sepals and petals yellow, filiform, membranous, 2–2.5 cm long, narrowly lanceolate, linear-oblong, acuminate, 3 nerved at the base; lip with a large sac rounded at the base, white with yellow and reddish-brown spots, apex white, delicately veined, contracted into a capillary tail; column light yellow, deeply saccate, footless, very short; pollinia 2, light yellow, membranous, clavate, sessile on a rather large gland.

**Flowering:** July–November. Habitat: Growing on lateral branches of lower canopy of host tree, cool and shady place in tropical mixed evergreen forest. Distribution: India (Arunachal Pradesh, Assam), Malaysia, Myanmar. Status: Rare. The species was found only in one locality

**Thrixspermum** centipede Loureiro, Flora Cochinchinensis. 520. 1790. *Thrixspermum papillosum* Carr, The Gardens' bulletin; Straits Settlements 5: 33. 1929. *Thrixspermum arachnites* (Blume) Reichenbach f. *Xenia Orchidaceae*. 2: 121. 1868. *Dendrocolla arachnites* Blume, Bijdragen tot de flora van Nederlandsch Indië. 287. 1825 (Fig. 1).

**Specimen examined:** Arunachal Pradesh, Itanagar, Chimpoo River, Chowlu 40085 (ARUN); Madhuban, Rao-28334 (Orchid Herbarium Tippi); Seijusa, Hegde-12202; Madhuban, Rao-28055; (*Orchid Herbarium Tippi*)

**Flowering:** June–July. Habitat: Growing on lateral branches of lower canopy of host tree, cool and shady place in tropical mixed evergreen forest. Distribution: India (Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Sikkim, West Bengal), Australia, Bangladesh, China, Indo China, Indonesia, Malaysia, Myanmar, Thailand. Status: Common; very common in tropical forest

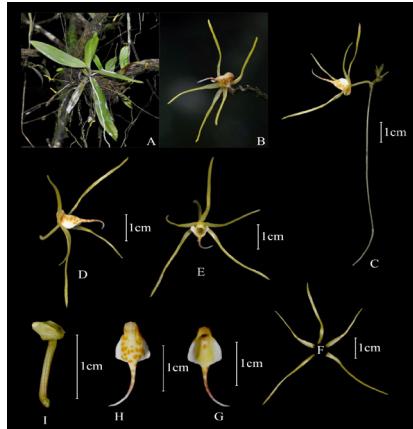


Figure 1. *Thrixspermum acuminatissimum*

A & B. habit; C. inflorescence; D. lateral view of flower; E. ventral view of flower; F. perigone; G. ventral view of lip; H. dorsal view of lip; I. ovary and column with the foot. Photo by Khyanjeet Gogoi.

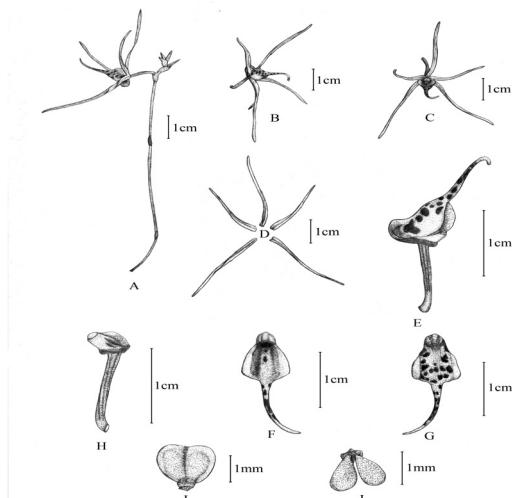
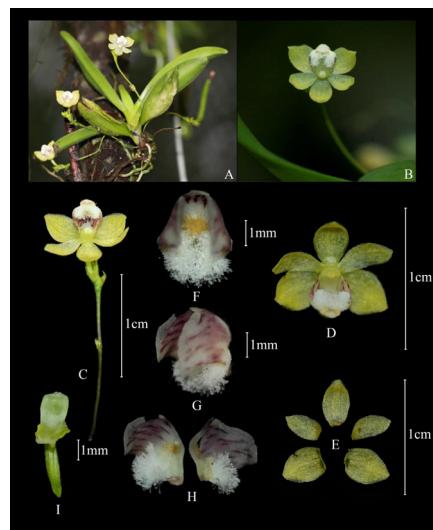


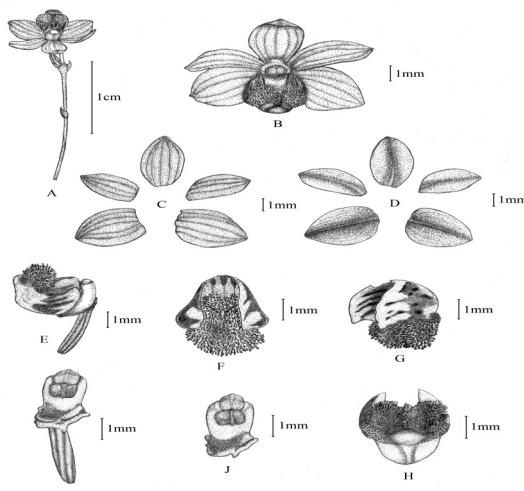
Figure 2. *Thrixspermum acuminatissimum*.

A inflorescence; B.lateral view of flower; C. ventral view offlower; D. perigone; E. lateral view of lip, column, and ovary, F. ventral view of lip; G. dorsal view of lip; H. ovary and column with the foot; I. dorsal viewof anther cap with pollinia;J. pollinia. Drawn by Khyanjeet Gogoi.



**Figure 3.** *Thrixspermum merguense*.

A. inflorescence; B. ventral view of flower; C. ventral view of perigone; D. dorsal view of perigone; E. lip, column, and ovary;F. ventral view of lip; G. lateral view of lip; H. dorsal view of lip; I. ovary and column with the foot; J. column. Drawn by Khyanjeet Gogoi (Fig. 2,3).



**Figure 4.** *Thrixspermum merguense*

A & B. habit; C. inflorescence; D.ventral view of flower; E. perigone; F. ventral view of lip; G. lateral view of lip; H.longitudinal section of lip; I. ovary and column with the foot. Photo by Khyanjeet Gogoi.



**Figure 5.** *Thrixspermum* species of Arunachal Pradesh.

A. *Thrixspermum centipeda*, B. *Thrixspermum changlangensis*, C. *Thrixspermum japonicum*, D. *Thrixspermum musciflorum*, E. *Thrixspermum pathaiensis*.

*Thrixspermum changlangensis* K. Gogoi, Pleione 13(1): 167–170. 2019.

**Specimen examined:** India, Arunachal Pradesh, Changlang district, Nampong, Khyanjeet Gogoi 00802 [Holo 00802A (ASSAM); Iso 00802 B, (DU); Iso 00802 C, (TOSEHIM) (The Orchid Society of Eastern Himalaya)].

**Flowering:** May–June. Habitat: Epiphytic on trees or branches in tropical mixed evergreen forest. Distribution: India (Arunachal Pradesh) endemic. Status: Rare; the species was found only in one locality.

*Thrixspermum japonicum* (Miquel) Reichenbach f., Botanische Zeitung (Berlin) 36: 75. 1878. *Sarcochilus japonicus* Miquel, Annales Musei Botanici Lugduno-Batavi. 2: 206. 1866.

**Specimen examined:** India, Arunachal Pradesh, Ziro Valley, Gogoi – 00804, (TOSEHIM) (The Orchid Society of Eastern Himalaya)].

**Flowering:** September–October. Habitat: Epiphytic on trees or branches, growing on the twigs and small branches of Pine trees. Distribution: India (Ziro, Arunachal Pradesh), Bhutan, China, Korea and southern Japan. Status: Rare; the species was found only in one locality.

*Thrixspermum merguense* (Hooker f.) Kuntze, Revisio Generum Plantarum, 2: 682. 1891. *Sarcochilus merguensis* Hooker f., Flora of British India, 6: 40. 1890. *Dendrocolla merguensis* (Hooker f.) Ridley, Journal of the Linnean Society. Botany, 32: 380. 1896. *Thrixspermum comans* J.J. Smith, Bulletin De Department De L'Agriculture Aux Indes Neerlandaises. 13: 61. 1907. *Thrixspermum bicristatum* Ames, Orchidaceae 5: 202. 1915. *Sarcochilus kusukusensis* Hayata, Icones Plantarum Formosanarum. 6: 83. 1916. *Thrixspermum kusukusense* (Hayata) Schlechter, Repertorium Specierum Novarum Regni Vegetabilis, Beihefte. 4: 274. 1919. *Thrixspermum comans* var. *bicristatum* (Ames) L.O. Williams, Botanical Museum Leaflets. 6: 80. 1938. *Ascochilus pulvinatus* Guillaumin, Bulletin du Muséum National d'Histoire Naturelle, series 2, 36: 539. 1965.

**Specimen examined:** India, Arunachal Pradesh, Trirap district, Hukanjuri, dated 19.04.2019. Gogoi & Chowlu 00812 (TOSEHIM) (Fig. 4&5). Plant epiphytic herb. Stem with several leaves. Leaves oblong or oblong narrowly elliptic, obtuse at apex, slightly bilobed, sheathing at base. Inflorescence 3–5 cm long, few-flowered; rachis slightly thickened; floral bracts broadly lanceolate, acute at apex. Flowers pale yellowish green with purple boundaries in the lip, contiguous. Dorsal sepal 0.4–0.5 × 0.2–0.3 cm, oblong or ovate oblong, acute at apex; laterals broadly elliptic, acute at apex. Petals ovate oblong, acute at apex. Lip 0.3–0.4 × 0.4–0.5 cm, triangular, white with light purple linings, 3 lobed; lateral lobes erect; mid lobe truncate; disc with 2 calli, tufts with hairs. Column short, 0.2 cm long.

**Flowering:** July–November. Habitat: Epiphytic on tree-trunks or branches in tropical mixed evergreen forest. Distribution: India (Arunachal Pradesh, Assam, Andaman & Nicobar Island), China, Indo China, Indonesia, Malaysia, Myanmar, Philippines, Thailand. Status: Rare; the species was found only in one locality.

*Thrixspermum musciflorum* A.S. Rao & J. Joseph, Bulletin of Botanical Survey of India 11: 204. 1971. *Thrixspermum musciflorum* var. *nilagiricum* J. Joseph & Vajr., Indian Forester 107: 648. 1981.

**Specimen examined:** Arunachal Pradesh, Namorah, 17.12.79. Hegde 2797; (Orchid Herbarium Tippi).

**Flowering:** May–June. Habitat: Epiphytic on tree trunks in tropical mixed evergreen forest. Distribution: India (Arunachal Pradesh, Assam, Manipur, Meghalaya, Sikkim, Kerala, Tamil Nadu), endemic. Status: Rare; distribution restricted in some particular areas.

*Thrixspermum patkaiensis* K. Gogoi, Lankesteriana 22(1): 9. 16. 2022.

**Specimen examined:** INDIA, Arunachal Pradesh, Changlang district, Hukanjuri, zoom, K. Gogoi & Chowlu 41506 (ARUN); Assam, Tinsukia district, K. Gogoi 00956 (TOSEHIM).

**Flowering:** May–October. Habitat: Epiphytic on tree trunks in tropical mixed evergreen forest. Distribution: India (Arunachal Pradesh, Assam) endemic. Status: Rare; the species was found only in a few localities.

*Thrixspermum saruwatarii* (Hayata) Schlechter, Repertorium Specierum Novarum Regni Vegetabilis. Beiheft. 4: 275. 1919. *Sarcochilus saruwatarii* Hayata, Icones Plantarum Formosanarum, 6: 81. 1916.

**Specimen examined:** India, Arunachal Pradesh, West Siang, Lharlung village near Mechuka 2020 m, 5.05.2011, Ona Apang 49362, 49363 (Orchid Herbarium Tippi); Mao & Bhaumik 25640 A,B,C (ARUN), Mechuka Yorko, 1900 m, Bhaumik 25068 A B (ARUN).

**Flowering:** May–June. Habitat: Epiphytic on tree trunks. Distribution: India (Arunachal Pradesh), Taiwan. Status: Rare; distribution restricted in some particular areas.

*Thrixspermum trichoglottis* (Hooker f.) Kuntze, Revisio Generum Plantarum 2: 682. 1891. *Sarcochilus trichoglottis* Hooker f., Flora of British India 6: 39. 1890. *Dendrocolla trichoglottis* (Hooker f.) Ridley, Journal of the Linnean Society. Botany 32: 381. 1896. *Dendrocolla alba* Ridley, Journal of the Straits Branch of the Royal Asiatic Society 44: 191. 1905. *Thrixspermum album* (Ridley) Schlechter, Orchis 5: 56. 1911.

**Specimen examined:** India, Arunachal Pradesh, Trirap district, Hukanjuri, dated 19.04.2019. Gogoi & Chowlu oo814 (TOSEHIM) (Fig. 6&7).

Stems 3–7 cm long, with several nodes, many leaved. Leaves 3–5.5 × 0.5–1 cm, leathery, obtuse and slightly unequally bilobed. Inflorescences 2 or 3, borne on lower part of stem, suberect, usually 3–5 cm, densely several flowered; peduncle ca. 1 mm in diam.; rachis 3–5 mm, slightly thickened. Flowers yellowish white, opening successively, not opening widely, short-lived; pedicel and ovary 0.5–0.8 cm. Dorsal sepal elliptic, 0.6 × 0.3 cm, obtuse; lateral sepals obliquely ovate, 0.4 × 0.3 cm, obtuse. Petals elliptic, 0.5 × 0.2 cm; lip 3-lobed, base with shallow sac, adaxially densely minutely papillate; lateral lobes erect, suborbicular, 0.4 × 0.2 cm, apical margin with long clavate cilia; mid-lobe 0.1 cm, thickened, ± conic-cucullate; disk with a clavate-linear callus extending from base to middle. Column 0.2 cm, foot 0.1 cm; anther cap subglobose, rounded.

**Flowering:** March–June. Habitat: Epiphytic on tree trunks in open forests. Distribution. India (Arunachal Pradesh, Assam, Kerala, Andaman & Nicobar Islands), Bangladesh, Indonesia, Laos, Malaysia, Myanmar, Singapore, Thailand, and Vietnam. Status: Rare; the species was found only in a few localities.

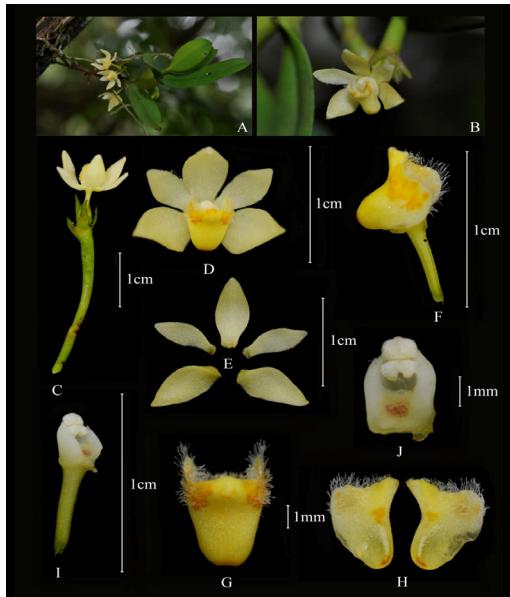


Figure 6. *Thrixspermum trichoglottis*.

A & B. habit; C. inflorescence; D. ventral view of flower; E. perigone; F. lateral view of lip, column, and ovary; G. ventral view of lip; H. longitudinal section of lip; I. ovary and column with the foot. Photo by Khyanjeet Gogoi.

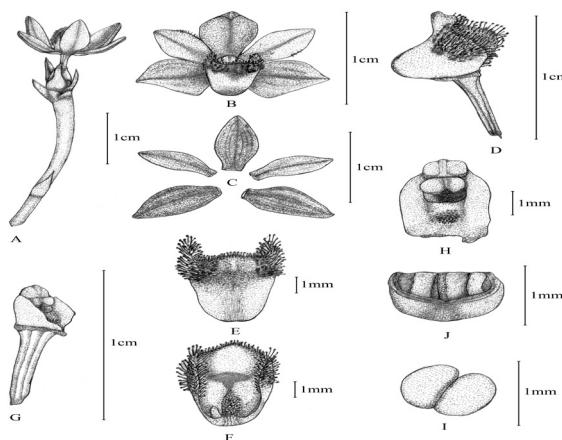


FIGURE 7. *Thrixspermum trichoglottis*.

A. inflorescence; B. ventral view of flower; C. perigone; D. lateral view of lip, column, and ovary; E. dorsal view of lip; F. ventral view of lip; G. ovary and column with the foot; H. ventral view of column; I. pollinarium; J. ventral view of anther cap. Photo by Khyanjeet Gogoi.

## Conclusion

With the new taxa included here, the current *Thrixspermum* species number in Arunachal Pradesh is brought to 9 species. An increasing surge in the collection of wild orchids has been seen, which apart from conservation has pushed the native species towards danger. Several growers have been developing an interest in planting wild orchid species. This has been a serious concern

as many of these species are already threatened by habitat loss and climate change. There is still a gap in the research conducted so far to determine the approximate orchid wealth of Arunachal Pradesh, with new records added each year. The increase in the human population has created a need for new settlements as well as agricultural lands and other developmental activities which poses serious threats to the present biodiversity in Arunachal Pradesh.

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