Thysananthus fruticosus (Marchantiophyta: Lejeuneaceae) – an addition to the Indian bryoflora from Andaman & Nicobar Islands

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ABSTRACT

Thysananthus fruticosus (Lindenb. & Gottsche) Schiffn. is recorded for the first time in Indian bryoflora from Andaman & Nicobar Islands. Diversity and distributional relationship and a key to the Indian taxa of the genus is also provided.

INTRODUCTION

The genus Thysananthus Lindenb. ex Lehm. is represented by 15 species, two varieties and one subspecies in the world (Sukkharak, 2015). The genus was first recorded in India by Mitten (1861) who reported T. spathulistipus (Reinw. & al.) Lindenb. based on a Griffith material from the Khasia Hills under the name Lejeunea spathulistipa (Reinw. & al.) Dumort. In the present state of our knowledge the genus is represented in the country by six taxa, viz. T. appendiculatus Steph., T. comosus Lindenb. ex Lehm., T. convolutus Lindenb. var. convolutus, T. gottschei (J.B.Jack & Steph.) Steph. var. gottschei, T. retusus (Reinw. & al.) B.M.Thiers & Gradst. subsp. retusus and T. spathulistipus (Reinw. & al.) Lindenb. (Mitten, 1861; Stephani, 1896; Verdoorn, 1934; Daniels & Raja, 2011a, 2011b; Daniels & al., 2011; Sukkharak, 2015). Daniels and Raja (2011a) for the first time described T. appendiculatus in Indian liverwort flora, but Sukkharak and Gradstein (2011) considered it as a doubtful record on the basis of certain discrepancies and deficiencies in the taxonomic description and illustrations provided by the Daniels and Raja (2011a) and views were later reinstated by Sukkharak (2015) as well. However, Daniels and Raja (2011b) clarified the doubts with modified description and illustration of the species. In the present communication, the taxa reported by Daniels and Raja (2011b) is included in Indian Bryoflora, due to their convincing authentication.
Fig -1: *Thysananthus fruticosus* (Lindenb. & Gottsche) Schiffn. 1. A portion of the plant in ventral view; 2. The same in dorsal view; 3. Male plants bearing androecial branches in ventral view; 4. Female plants bearing gynoecial branches in ventral view; 5. Transverse section of stem; 6. The same a portion enlarged; 7, 8. Leaves; 9, 10. Leaves showing vitta cells; 11. Apical leaf cells; 12. Median leaf cells; 13. The same showing oil-bodies; 14. Vitta cells from the middle portion of the leaf lobe (All micrographs from P. Singh & P. Kumari 61847).
During the study of recent collections and some older collections available at Central National Herbarium (CNH) of liverworts of Andaman & Nicobar Islands, the author came across an interesting population of the genus *Thysananthus* collected from Great Nicobar. A subsequent morpho-taxonomic study and literature review (Thiers & Gradstein, 1989; Gradstein, 1992; Gradstein & al. 2002; Sukkharak, & Gradstein, 2010a, 2010b, 2011; Daniels & Raja, 2011a, 2011b; Daniels & al., 2011; Sukkharak & al., 2011; Sukkharak, & Gradstein, 2015) revealed it as *T. fruticosus* (Lindenb. & Gottsche) Schiffn. The species belongs to section *Vittatae* Verdoorn, which is characterized by dendroid habit with creeping stoloniform stems, regularly pinnate branching, ovate-oblong leaf lobes with acute and irregularly dentate apex, vitta extending from base to 3/4 of leaf length or almost up to apex and usually triplicate perianth. The same has been described and illustrated in the present communication.

**DESCRIPTION**


Plants light greenish brown when fresh, light brown in herbarium; shoot 7–17 cm long, 2–3 mm wide; habit dendroid with creeping stoloniform stems, branching regularly pinnate; branching *Lejeunea*-type. Stem subor-biculic in outline in transverse section, 0.32–0.38 × 0.28–0.34 mm, 18–24 cells across the diameter; cortical cells in 4–6 layers, subquadrato-rectangular, 7.5–12.5 × 7.5–10.0 μm, thick-walled, light brown–yellowish brown; medul-lary cells polygonal, 7.5–17.5 × 7.5–15.0 μm, thin–slightly thick-walled. Leaves imbricate, when dry suberect and convolute and when moist weakly convex, leaf lobe ovate-oblong, 1.1–1.4 mm long, 0.7–1.0 mm wide, apex acute, irregularly dentate towards apex, teeth consisting of 2–6 cells, 2–4 cells wide at base, apex 1-celled, ventral margin plane, dorsal base cordate; apical leaf cells polygonal, 7.5–17.5 × 7.5–15.0 μm, thin-walled; median leaf cells polygonal, 12.5–25.0 × 10.0–15.0 μm, thin-walled; basal leaf cells slightly elongated, polygonal, 22.5–35.0 × 7.5–11.2 μm, thin-walled with cordate trigones, intermediate thickenings subnudolose, 0–2 per wall; vitta present, extending from base to 3/4 of leaf length or almost up to apex, 7–10 cell wide at base and 4–6 cells wide at middle, 16–26 cells long, rectangular polygonal, 35.0–87.5 × 10.0–15.0 μm, trigones cordate, often coalesced, intermediate thickenings 1–3 per cell; oil-bodies grayish yellow, 5–8 per leaf cell, usually ellipsoidal, 4.0–7.5 × 2.0–3.0 μm, coarsely segmented; leaf lobules ovate–oblong or subquadrato, 0.22–0.27 × 0.20–0.25 mm, 1/5–1/6 as long as leaf length, appendage on dorsal surface of lobule base absent; keel with small–large wing like appendages at base; lobule apex transverse, not or slightly continuing into the ventral lobe margin, entire or with one triangular tooth, tooth 1–2 cells long, 1–2 cells wide at base. Underleaves three times as wide as stem, imbricate–distant, ovate, 0.65–0.80 mm long, 0.6–0.7 mm wide, apex rounded–emarginate, dentate up to 1/3 portion of underleaves towards apex, basal margin entire, bases cuneate-slightly auriculate, underleaf bases not adnate with leaves. Asexual reproductive bodies not seen.

Diöicos. Androecial branches terminal or intercalary on lateral branches; male bracts hypostatic in 5–14 pairs, narrowly oblong–ovate, 0.45–0.60 mm long, 0.30–0.38 mm wide, apex acute, margin towards apex dentate; bract lobule, 2/3–3/4 as long as the bract lobe; bracteoles present throughout the androecium, ovate–slightly oblong, 0.40–0.50 mm long, 0.28–0.38 mm wide, apex truncate, irregularly dentate; antheridia not seen. Gynoecia with 1-lejeuneoid innovations; bracts lobe lanceolate, 0.50–0.65 mm long, 0.20–0.25 mm wide, apex apiculate, margins in upper 1/3 with triangular teeth; bract lobe length 1/2 of bract lobe length, apex apiculate, 1/3 margins with triangular teeth; bracteole rectangular, 0.50–0.60 mm long, 0.20–0.25 mm wide, apex truncate–slightly bilobed, 1/2 of bracteole length with triangular teeth, margins recurved. Perianth oblong, 1.3–1.5 mm long 0.7–0.8 mm wide, keels in upper 1/3 with laciniate teeth, teeth 3–7 cells long, 2–3 cells wide at base, 2–4 unicellular towards apex; beak 27.5–50.0 μm long, 2–4 cells long. Seta circular in outline in transverse section, 250–275 mm in diameter with 16 outer cells surrounding 4 inner cells. Mature sporophytes not seen.

**Habitat:** Corticolous, growing in moist and shady places, in association with *Lopholejeunea sikkimensis* Steph. and Radula fulvipolia (Hook. f. & Taylor) Gottsche.

**Distribution:** INDIA [Andaman & Nicobar Islands (Great Nicobar–present study)], FIJI (Söderström & al., 2011 as *D. fruticosus*; Sukkharak, 2015), INDONE-SIA (Söderström & al., 2010 as *D. fruticosus*; Sukkharak,
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resembles var. India, Andaman & Nicobar. The genus - (of T. fruticosus - in the appearance of underleaves convolutus s.l.) by Spruce (Nees) Lindb. and was placed in a sepa is a member of; Sukkharak, 2015), Papua New Guinea, Hepat (Spruce) by Gradstein - 90 www.nelumbo-bsi.org cell (5–8 in the former) (Sukkharak, 2015). 1–2 cells long in the former) and 3–5 oil-bodies per leaf tooth 4–5 cells long (1/5–1/6 of lobe length and entire or (absent in the former), lobules 1/4–1/2 of lobe length and mer), presence of appendages on the dorsal lobule bases (dendroid growth and regularly pinnate branching in the former), leaf and underleaf margin entire (dentate in for mer), presence of appendages on the dorsal lobule bases (absent in the former), lobules 1/4–1/2 of lobe length and tooth 4–5 cells long (1/5–1/6 of lobe length and entire or 1–2 cells long in the former) and 3–5 oil-bodies per leaf cell (5–8 in the former) (Sukkharak, 2015).

The plants from Nicobar Islands differ from the typical material of T. fruticosus in the appearance of underleaves (longer than wide in the latter), leaf lobes 1/5–1/6 as long as leaf lobe (more or less 1/3 in the latter) and sometimes presence of two additional weak dorsal keel in the transverse section of perianth (three in the latter). However, these variations comes under the range of variation as author have also observed in the specimens of Papua New Guinea, C. E. Carr 12078 (CAL) and Sukkharak (2015 Figure 24: C, D) shows 3/4 vitta and 1/7–1/8 as long as lobe length leaf lobule.

Key to Indian taxa of the genus Thysananthus

1a. Leaf lobe with a vitta .................................................... 2
1b. Leaf lobe without vitta ................................................... 3

2a. Plants not dendroid, with projecting growth and irregularly pinnate branching; leaf and under-leaf margin entire; leaf lobe 1/4–1/2 of lobe length, dorsal lobule bases with appendages, lobule entire or with 1–2 cells long tooth; oil-bodies 5–8 per leaf cell

T. fruticosus

2b. Plants dendroid with creeping stoloniform stems and ascending leafy stems; branching regularly pinnate; apical leaf and underleaf margin irregularly dentate; leaf lobule 1/5–1/6 of lobe length, dorsal lobule bases without appendages, lobule entire or with 1–2 cells long tooth; oil-bodies 3–5 per leaf cell

T. retusus

3a. Leaf margins entire ..................................................... 4
3a. Leaf margins toothed .................................................... 5

4a. Leaves weakly convex when moist; leaf lobules 1/4 – 1/3 of lobe length; underleaves flat obovate and truncate

T. comosus

4b. Leaves strongly convex when moist; leaf lobules 1/2 of lobe length; underleaves broadly spatulate and rounded

T. gottschei var. gottschei

5a. Leaves asymmetrical, leaf lobes strongly convex when moist

T. convolutus var. convolutus

5b. Leaves symmetrical, leaf lobes weakly convex when moist ..................................................... 6

6a. Plants dioicus; leaf oblong-falcate; lobule 1/5–1/3 of lobe length, lobule keel on one side of the stem with a foliar appendage

T. appendiculatus

6b. Plants autoicus; leaf ovate; lobule 1/4–1/3 of lobe length, lobule keel without foliar appendage

T. spathulistipus

Specimens examined: India, Andaman & Nicobar Islands, Great Nicobar Island, Shompen Hut Stream, c. 56 m, 07°09′14.2″ N, 93°52′62.5″ E, 16.03.1994, J. P. Ghosh 63884 (CAL); Campbell Bay, East-West Road, GNBR, Nature’s trail, c. 73 m, 07°00′255″ N, 93°52′772″ E, 07.02.2014, D.K. Singh 61673C (CAL); 5 km from Navy Dera Base camp towards Mount Thulier, c. 47 m, 07°08′11.2″ N, 93°52′59.2″ E, 25.03.2015, P. Singh & P. Kumari 61847 (CAL).


DISCUSSION

T. fruticosus was originally described as a species of the genus Bryopteris (Nees) Lindb. and was placed in a separate subgenus Dendrolejeunea (of Lejeunea s.l.) by Spruce (1884). Lacouture (1908) raised Dendrolejeunea (Spruce) Lacout. to generic level but this has not been followed by later authors and they accepted Schiffner’s (1893) attribution as Thysananthus fruticosus. The genus Dendrolejeunea was again reinstated for T. fruticosus by Gradstein (1992). However, a recent molecular study (Sukkharak & al., 2011) showed that D. fruticosus is a member of Thysananthus.

Among the Indian species T. fruticosus resembles T. retusus subsp. retusus in general appearance of the plants and presence of vitta cells in the middle portion of leaves. However, the latter differs from the former in having projecting growth and irregularly pinnate branching (dendroid growth and regularly pinnate branching in the former), leaf and underleaf margin entire (dentate in former), presence of appendages on the dorsal lobule bases (absent in the former), lobules 1/4–1/2 of lobe length and tooth 4–5 cells long (1/5–1/6 of lobe length and entire or 1–2 cells long in the former) and 3–5 oil-bodies per leaf cell (5–8 in the former) (Sukkharak, 2015).
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REFERENCES


