

Cyanotis Ceylanica Hassk. (Commelinaceae), First Record to India from Eastern Ghats of Tamil Nadu, India



Balachandran Natesan, Umamaheswari Paneerselvam, Dhatchanamoorthy Narayanasamy

Abstract: *Cyanotis ceylanica* Hassk. (Comelinaceae) is reported as a new record for the flora of India from Gingee hills, Eastern Ghats of Tamil Nadu. Detailed descriptions of morphological and reproductive characters based on field observation with photographic images are provided for easy identification of this species.

Keywords: *Comelinaceae, Cyanotis, Gingee Hills, Pakkam malai RF, Villupuram district*

I. INTRODUCTION

The genus *Cyanotis* D.Don was first described during 1825 and it comprises 56 species worldwide (Govaerts and Faden, 2012, [4]) with diverse distribution in Asia and Africa (Faden, 2000, [2]), whereas Plants of the World Online (POWO) accepted only 50 species. In India 16 species were enlisted by Karthikeyan et al. (1989) but Nandikar and Gurav (2014, 2020) revised the genus and reduced to 13 species. However Narasimhan and Sheeba (2021) compiled 16 species for Tamil Nadu. During the botanical exploration between 2018 and 2020 on Pakkam Malai reserve forest, Villupuram District of Tamil Nadu one *Cyanotis* species was collected near a seasonal stream. In-depth literature screening (Wight, 1853, [14]; Hasskarl, 1867, [5]; Hooker, 1894, [7]; Fischer, 1931, [3]; Trimen, 1974, [13]; Faden, 1998, [1]; Faden, 2000, [2]) and referring the KEW digital image (K000854101) it was identified as *C. ceylanica*.

II. TAXONOMIC TREATMENT

Cyanotis ceylanica Hassk., *Commel. Ind.* 1870: Clarke in DC. *Mon. Phan.* 3: 252. 1881 (as “*zeylanica*”); Trimen, *Cat.* 95. 1885 (as “*zeylanica*”); Hook. f., *Fl. Br. Ind.* 6: 387. 1892 (as “*zeylanica*”); Hook. f. in Trimen. *Handb. Fl. Ceylon* 4: 313. 1898 (as “*zeylanica*”), pro parte; Alston in Trimen, *Handb. Fl. Ceylon* 6: 290. 1991 (as “*zeylanica*”).

Figures 1-2 *Type:* Sri Lanka, *Thwaites* in *C.P.* 3223 (B!, G!, K!). *Cyanotis lanceolata* Thw., *Enum. Pl. Zeyl.* 323. 1864, pro parte, non Wight, 1853. *Cyanotis lanceolata* Thw. var. *subglabra* Thw. *Enum. Pl. Zeyl.* 323. 1864, pro *Thwaites* in *C.P.* 3216 (PDA!), nom. Illeg.

Spreading annual (to perennial) herb, forming a mat to 1 m wide, primary stems prostrate-ascending, side branches ascending, branching and rooting at the basal nodes; sheaths 5–14 mm long, pubescent-glabrous, mouth long silky hairs extending to a single line of pubescence just below the fused edge of the sheath; leaves cauline, distichous, leaf at main stem 11.2-13 x 2.0-2.5 cm, leaf at secondary stem 3.5-5.6 x 0.6-1.2 cm, blade oblong-lanceolate, apex acuminate, base rounded, margin ciliate with long white hairs, adaxial side pubescent-glabrescent-glabrous when mature, dark green, abaxial side glaucescent, with silky hairs. Inflorescence terminal and axillary, (sub) sessile, from the axils of top 4-5 leaves; axillary flowers sessile enclosed within leaf sheaths, inserted, bract 2-3 ovate, not exceeding the cincinnus; bracteoles lanceolate, falcate. apex acute-acuminate, margin ciliate with long patent hairs; terminal inflorescence a scorpioid cyme, usually 4-flowered, bract ovate, not exceeding the cincinnus, bracteoles 4-6, opposite each other, ovate-lanceolate, 1 cm, falcate, apex acuminate, long ciliate along the margins. Flowers bisexual; sepals lanceolate-oblong, basally united, 6-9 x 5 mm, dorsal side densely ciliate, ventral side glabrous; corolla pale violet-white lobes broadly ovate, apex acute; stamens 6, exceeding the corolla, filament slender, upper half densely bearded with blue moniliform hairs, ending with fusiform glabrous tumid, anthers yellow, cordate; style equalling or slightly exceeding the stamens, with apical fusiform tumid, glabrous; ovary oblong, 3-lobed, hairy in upper half; capsule sessile, ellipsoid, 3-6 x 1.5-3 mm, apex long ciliate, 3-valved; seeds 6, 2 per locule, broadly ovoid to pyramidal, 1.5-3 x 1-1.8 mm, truncate at base, testa brown, deeply wrinkled, both longitudinal and transverse, irregularly and deeply pitted, hilum punctiform, ventral.

Flowering & Fruiting: November – February; flowers closes around 10.30 am.

Habitat: on wet and humus floor, near a seasonal stream, dry up during summer.

Distribution: Endemic to Indian subcontinent (Sri Lanka and India)

Specimen examined: INDIA, Tamil Nadu, Villupuram District, Pakkam Malai RF, 12.175019' N, 79.270943 E, 182 m, 12.12.2018,

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Balachandran N & Barathan N 27101 (HIFP!) and 24.12.2020, Balachandran N & Barathan N 27110 (HIFP!). Notes: *C. ceylanica* Hassk., *C. racemosa* B. Heyne ex Hassk., and *C. villosa* (Spreng.) Schult. & Schult.f.f. are allied each other in habit but they were differed each other by morphology and reproductive parts (Table 1). They are similar at the position of inflorescence (axils and terminal), staminal filaments beard with blue moniliform hairs, fusiform thickening at the apex of staminal filaments and style end and the capsule. However *C. ceylanica* inflorescence is enclosed within the leaf sheath, as like *C. axillaris* (L.) D. Don ex Sweet. In addition only one cincinnus at terminal and in the axils with maximum of 4 flowers and deeply wrinkled and pitted seeds. Hasskarl (1870), Trimen (1974) and Faden (2000), Nandikar and Gurav (2014, 2020) recorded only one inflorescence at terminal but this study observed one in terminal and at top 3-4 axils has each one sessile cincinnus. Whereas *C. villosa* differs in having pilose/pubescent internode, long stalked terminal helicoid cincinnati, 1-4 in an axil and sparsely bearded style. *C. racemosa* is unique with discoloured leaves, cincinnati short stalked, 1-3 in an axil. The field observation made from 2018 to 2020 in the study habitat *C. ceylanica* was found as annual, alive for a period of 4-5 months but in garden environment we maintained more than a year and the leaves has more hairy than in wild. We observed both annual and perennial habit, robustness and the hairy nature of the plant might be due to the wet condition of the soil as well as the duration of time exposure to sun. Faden (2000) and Nandikar and Gurav (2014) also noted the variations found in *C. ceylanica* and from different species of *Cyanotis*.

C. lanceolata is synonymised under *C. racemosa* Heyne ex Hassk. by Nandikar and Gurav (2014, 2020) but POWO (2022) accepted the former name. However as per Wight (1853) Icon's (t. 2085) figure 5 (androecium) and 6 (gynoecium) have no subapical thickening so it is unclear that the character belonged to neither *C. lanceolata* nor *C. racemosa*. Further detailed field observations on morphology and molecular based phylogenetic analysis may pave the way to clear this uncertainty.

III. CONCLUSION

There are 16 species of *Cyanotis* reported in India and *C. ceylanica* is an addition to the flora of India from the Eastern Ghats of southern India. Meanwhile, the taxonomical issues found among *C. ceylanica*, *C. lanceolata*, *C. racemosa*, and *C. villosa* need to be rectified through the molecular study followed by phylogenetic analysis.

IV. ACKNOWLEDGEMENTS

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REFERENCES

1. Faden R. B. (1998). Commelinaceae. In: Kubitzki K., editor, The Families and Genera of Vascular plants. 4. Springer Verlag., Berlin. pp. 109–128. [\[CrossRef\]](#)
2. Faden R. B. (2000). Commelinaceae. In: Dassanayake M. D. and Clayton W. D., editors. A revised handbook to the flora of Ceylon, 14. Oxford and IBH Publishing, New Delhi. pp. 116–196.
3. Fischer C. E. C. (1931). Commelinaceae. In: Gamble J. S., editor. Flora of Presidency of Madras 3. West, Newman and Adlard, London . pp.1533–1552.
4. Govaerts R., Faden R. B. (2012). World Checklist of Commelinaceae. Facilitated by the Royal Botanic Gardens, Kew. Available at: <http://apps.kew.org/wcsp/>. (Accessed 13 June 2022).
5. Hasskarl J. K. (1867). Commelinaceae: In: Schweinfurth Beitrage G., editor. zur Flora Aethiopiens, Berlin, Georg Reimer. pp. 206-214.
6. Hasskarl J. K. (1870). Commelinaceae indicae, imprimis archipelagi indici, 20. Typis Caroli Ueberreuter (M. Salzer). [\[CrossRef\]](#)
7. Hooker J. D. (1894). *The Flora of British India*. 6. Reeve and Co., London. pp. 374-383.
8. Karthikeyan S., Jain S. K., Nayar M. P., Sanjappa M. (1989). *Flora Indicae Enumeratio: Monocotyledonae*. Botanical Survey of India, Kolkata. pp. 435.
9. Nandikar M. D., Gurav R. V. (2014). A Revision of the Genus *Cyanotis* D. Don (Comelinaceae) in India. *Taiwania* 59(4): 292-314.
10. Nandikar M. D., Gurav R. V. (2020). Commelinaceae. In: Mao A. A., Dash S. S., editors. Flowering Plants of India, An Annotated Checklist (Monocotyledons), Botanical Survey of India.
11. Narasimhan D., Sheeba J. J. (2021). Flowering Plants of Tamil Nadu: A Compendium. Care Earth Trust, Chennai, India, pp 1112.
12. POWO. (2021). Plants of the World Online. Facilitated by the Royal Botanic Gardens, Kew. Available at: <https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:172499-1>. (Accessed 13 June 2022).
13. Trimen H. (1974). *A Handbook to the Flora of Ceylon* (revised ed.) 1, Dehra Dun. 1–171.
14. Wight R. (1853). *Icones plantarum Indiae orientalis or figures of Indian plants*, 6: 29-30, t. 2071-2088. Madras.

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Table 1. Distinguished character among *C. ceylanica*, *C. racemosa* and *C. villosa*

Characters	<i>C. ceylanica</i>	<i>C. racemosa</i>	<i>C. villosa</i>
Internode	Glabrous but with a line of pubescence just below the fused edge of the sheath, not always	Glabrous but with a line of pubescence below the fused edge of the sheath	Pilose to variously pubescent
Leaves	Not discolorous; glabrous above, pilose-glabrescent below	Discolorous; silky pubescent or pilose beneath	Densely-sparsely pubescent or pilose on both surfaces
Leaf sheath	Silky pubescent - glabrous	Sericeous or pilose	Pilose or villous hairy
Inflorescence	Enclosed within the leaf sheath; one at terminal and 3-4 axillary, intruded	Clustered at the end of shoots, exerted from the leaf sheath	Terminal and axillary, well exerted from the leaf sheath
Cincinnus	Each axil has one cincinnus, sessile	4-5 cincinnati at top 2-3 axils, short stalked	Each axil has 1-4 cincinnati, long stalked
Flowers in a cincinnus	Usually 4-flowered at terminal, 2-3 flowered at axils	More than 5-flowered	More than 5-flowered
Bract	Small, ovate, not exceeding the cincinnus	Long, ovate-lanceolate, foliaceous, exceeding the cincinnus	Long, ovate-lanceolate, foliaceous, exceeding the cincinnus
Bracteole	Long patent hairs on the margin	Margin ciliate	Margin ciliate
Style	Glabrous	Glabrous	Style sparsely bearded as in stamen
Seed testa	Deep longitudinal and transverse striations and pitted	Striate and variously pitted	Striate and pitted



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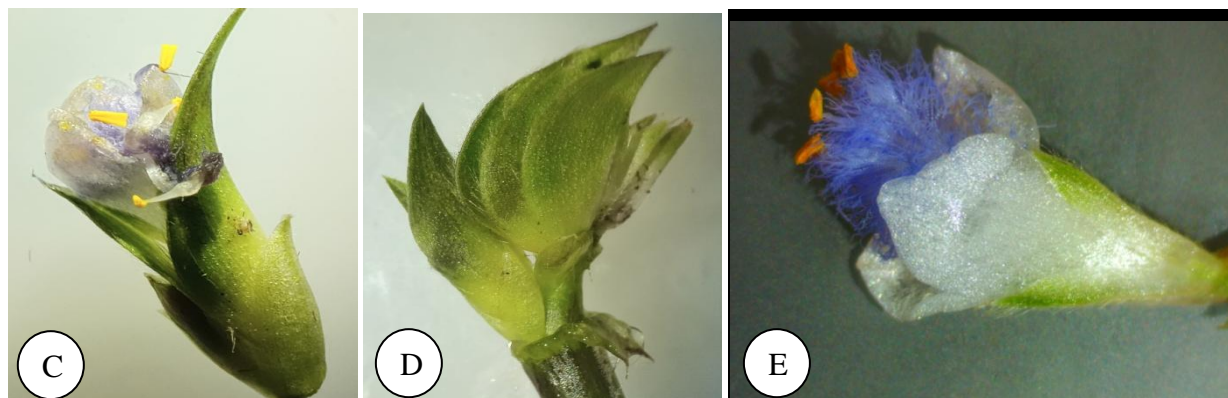


Figure 1. *Cyanotis ceylanica*: a. Habit; b. Flowering branch; c. Axillary inflorescence; d. Terminal & axillary inflorescence; e. Single flower (photos by Balachandran N & Umamaheswari P).

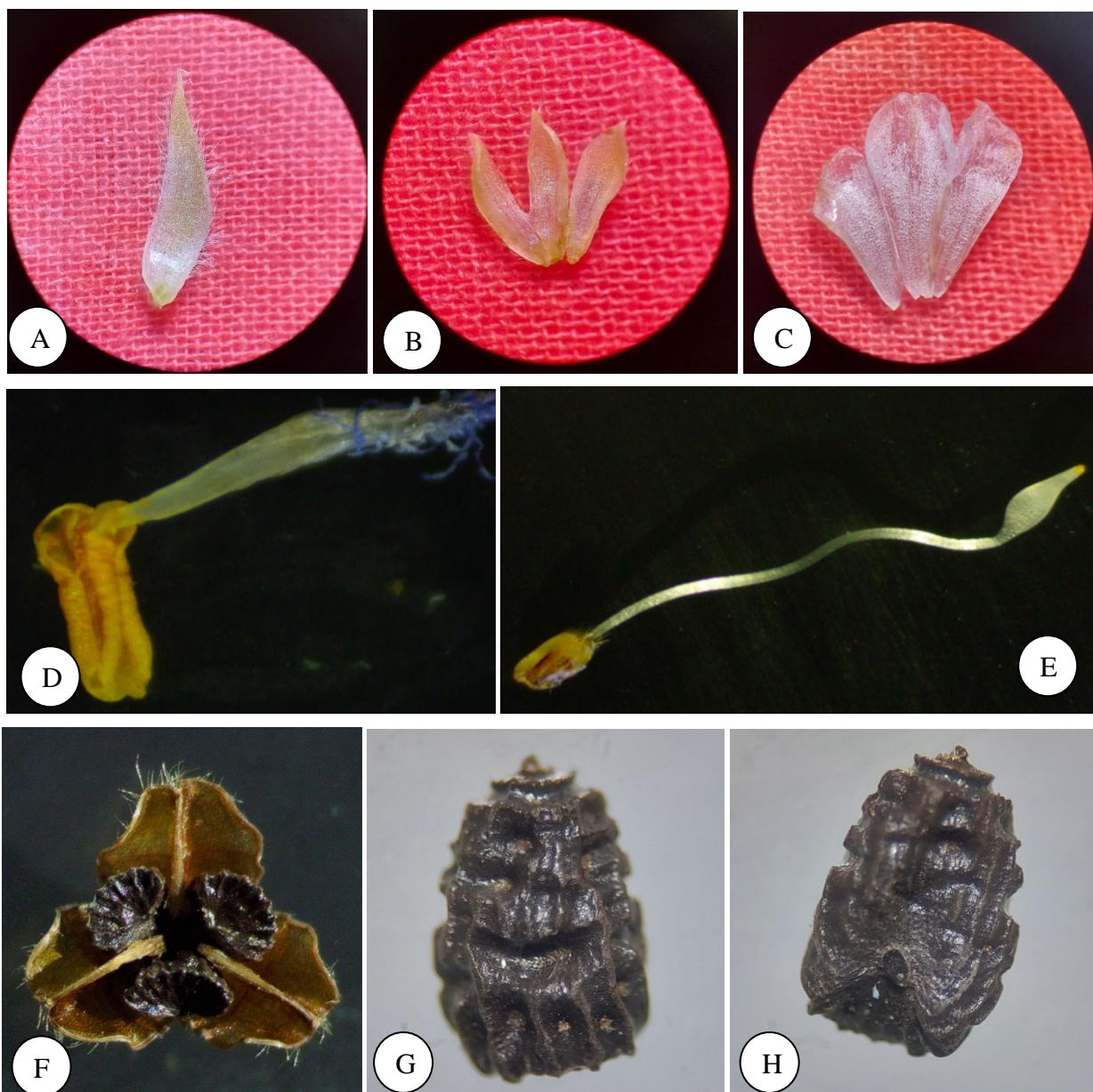


Figure 2. *Cyanotis ceylanica*: A. Bracteole with long patent hairs; B. calyx united at the base; C. Corolla united 2/3 of their length; D. Stamen attached on glabrous tumid; E. Style with subapical tumid; F. Dehiscent capsule with seeds; G. Seed dorsal side; H. seed ventral side (Microscopic images taken by Balachandran N & Umamaheswari P).