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How to cite:

Viswanathan M.B., Prem Kumar E.H. & N. Ramesh 2000. Novelties in *Balanophora indica* (Arn.) Griff. (Balanophoraceae) from Peninsular India. *Rheedeia* 10(2): 121-126.

<https://dx.doi.org/10.22244/rheedeia.2000.10.02.07>

Published in print: 31.12.2000

Published Online: 01.01.2022

Novelties in *Balanophora indica* (Arn.) Griff. (Balanophoraceae) from Peninsular India

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Abstract

Two new varieties of *Balanophora indica* (Arn.) Griff. namely, var. *agastyamalayana* and var. *tirunelveliensis*, collected from the Kalakkad-Mundanthurai Tiger Reserve of the Southern Western Ghats of India, are described and illustrated.

INTRODUCTION

The genus *Balanophora* Forster & Forster f. has 15 species distributed from Madagascar to Japan, South and Southeast Asia to Australia and Polynesia (Hansen, 1972). In India, the genus is represented by 7 species. *B. indica* (Arn.) Griff. var. *indica* is distributed in the evergreen subtropical forests between 500 and 2500 m elevation in the north-eastern states of Assam and Manipur and in the Western Ghats of Maharashtra, Karnataka, Kerala and Tamil Nadu in India. In addition, it is distributed in Sri Lanka, Bangladesh, Myanmar, Southwest China, Vietnam, Thailand and Malaysia to Australia. Another variety namely, *B. indica* (Arn.) Griff. var. *minor* Eichl. is restricted to the Nilgiri hills of Tamil Nadu in Peninsular India, and Thailand.

***Balanophora indica* (Arn.) Griff. var. *agastyamalayana* Viswanathan, Prem Kumar & Ramesh, var. nov. (Fig.1).**

Balanophora indica (Arn.) Griff. var. *indica* foliis late ellipticis and oblongo-lanceolatis, distincte cucullatis et generatim magnioribus; bracteis longioribus, pedicellis brevioribus, synandrio oblongo-elliptico, ad 3.5 mm lato et pistilis parvioribus, ad 1 mm longis differt.

Types: India, Tamil Nadu, Kalakad-Mundanthurai Tiger Reserve, 8°20'-8° 53' N and 77° 10' - 77° 35' E, Poongulam R.F., ± 1200 m, 24 May 98, Viswanathan, Prem Kumar & Ramesh 2156 (Holo - MH; Iso - SPKCES).

Plants dioecious, brick-red, 9-13 cm long from the point of fusion with host root to the top of inflorescence; tubers single or branched at base, subspherical, stellately warted;

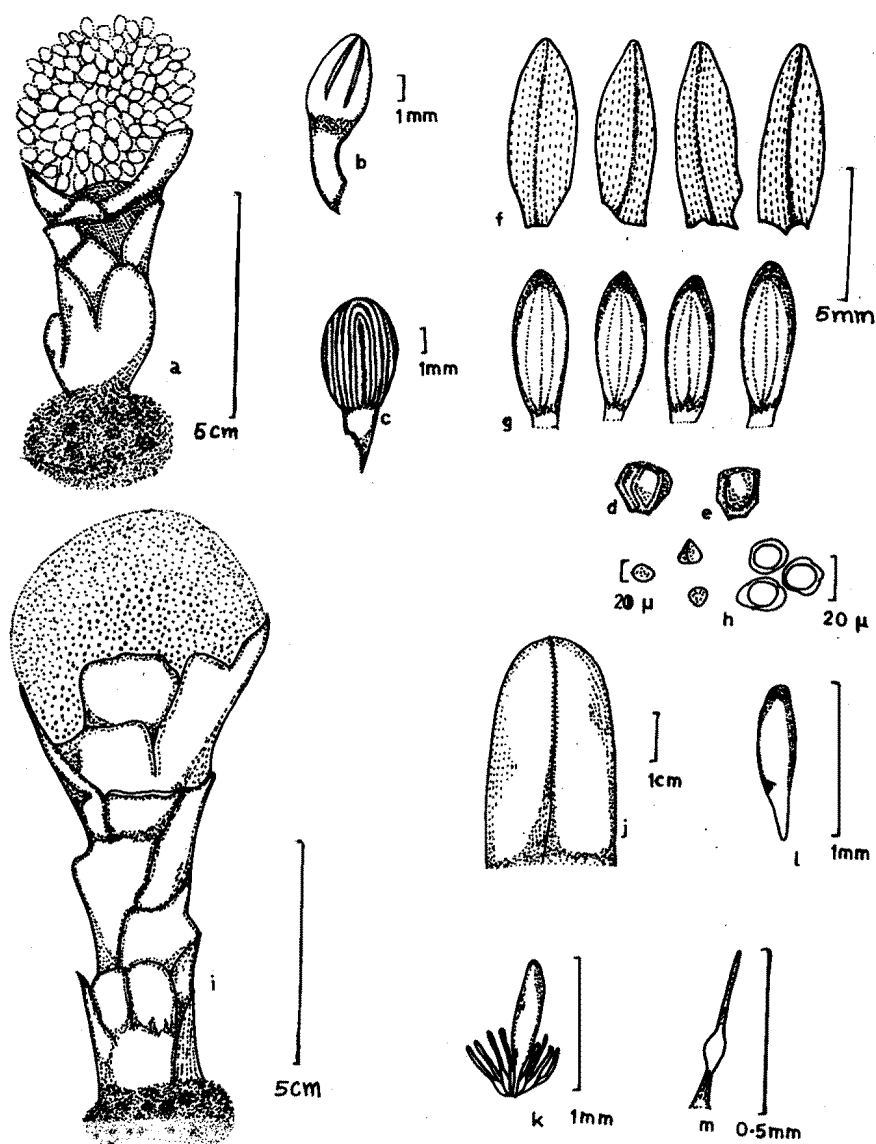
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Fig. 1. *Balanophora indica* (Arn.) Griff. var. *agastyamalayana* Viswan., Prem Kumar *et* Ramesh: a-h, Male plant and floral parts: a. Habit; b. Flower; c. Synandrium; d. Bract - dorsal view; e. Bract - ventral view; f. Tepals - dorsal view; g. Tepals - ventral view; h. Pollen grains; i-m. Female plant: i. Habit; j. Leaf; k. Spadicle and pistils; l. Spadicle; m. Pistil.

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single tuber 4-9 cm wide. Leaves 10-20, spirally arranged in 6 rows, greenish yellow, broadly elliptic, elliptic, oblong-elliptic or oblong-lanceolate, 1-5 x 1.5-2.8 cm, cucullate. Male flowers: spadices ellipsoid, c. 3.6 x 4.3 cm; pedicels fleshy, terete, broadened upwards, immersed in cavities lying above the fleshy bracts, 3-4 x c. 3 mm; bracts one for each flower, fleshy, 5-angular, truncate; angles dissimilar. Flowers actinomorphic, elongated laterally, 4 or 5-merous, c. 7 x 4 mm for unopened ones, c. 7 x 7 mm in opened ones. Tepals 4 or 5, oblong-elliptic, c. 7 x 2.5-2.7 mm, cucullate, fleshy, truncate at base, entire at margin, obtusely acute or subacute at apex, prominently 1-ridged outside, faintly 3-ridged inside. Torus terete, c. 2 x 1.5 mm. Synandrium oblong-elliptic, 16-20 ridged, 4-5 x 3.25-3.5 mm; ridges obsolete just below apex, button-shaped at apex, obtusely mucronate-topped; pollen grains yellow, 3-porate, spheroidal, triangular with aperture membranes semicircularly curved in polar view, 10-20 μ in diameter; exine granular in equatorial region, 1.25-2 μ thick. Female flowers: spadices globose, 4-5 x 4-5 cm. Spadices black, 1250-1275 μ long; lower part terete, 200-275 x 100-225 μ ; upper part oblong-obovoid, truncate or obtuse at apex, 975-1075 x 500-575 μ ; cuticular ridges of top cells conspicuous, 5-10 μ thick. Pistils around spadices, 425-550 μ long; stipe pale yellow, terete, 75-125 μ long; ovary pale yellow, spindle-shaped, 125-175 x 100-150 μ ; style yellow to black upwards, 175-250 μ long; stigma terminal.

Balanophora indica var. *agastyamalayana* differs from var. *indica* in the leaves being broadly elliptic to oblong-lanceolate, distinctly cucullate and generally larger, longer bracts, shorter pedicels, oblong-elliptic synandrium up to 3.5 mm wide and smaller pistils up to 1 mm long.

Habitat: Southern tropical wet evergreen forest, about 1200 m.

Host: *Euonymus dichotomus* Heyne ex Roth

Associated plants: *Alpinia abundiflora*, *Embelia basaal* and *Mallotus aurea-punctatus*.

Flowering: January - May.

***Balanophora indica* (Arn.) Griff. var. *tirunelveliensis* Viswanathan, Prem Kumar & Ramesh, var. nov. (Fig.2).**

Balanophora indica (Arn.) Griff. var. *indica* tuberibus parvioribus, 2-10 cm latis; foliis, latioribus, 2-2.8 cm latis, numeris pluris; spadicis magnioribus, 7-14 x 3-7.5 cm, bracteis longioribus, ad 13 mm longis, pedicellis longioribus, ad 2 mm longis et synandrio oblongo-elliptico, magnioribus differt.

Types: India, Tamil Nadu, Kalakkad-Mundanthurai Tiger Reserve, 8°20' - 8°53' N and 77° 10' - 77°35' E, Upper Kodaiyar, $\pm$ 1,200 m, 23 Jan. 1999, Viswanathan 3232 (Holo - MH; Iso - SPKCES); Poongulam R.F., $\pm$ 1,200 m, 25 May 1998, Viswanathan, Prem Kumar and Ramesh 2176 (Para - SPKCES).

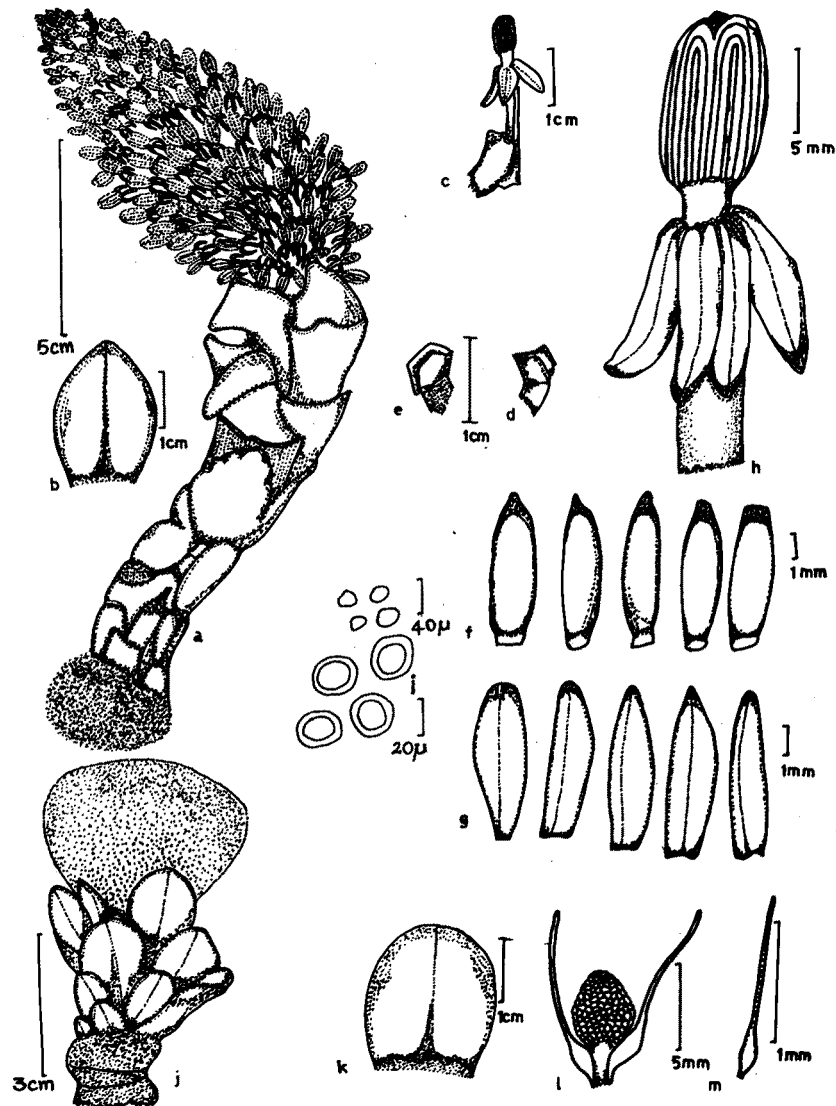
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Fig. 2. *Balanophora indica* (Arn.) Griff. var. *tirunelveliense* Viswan., Prem Kumar *et* Ramesh: a-i. Male plant and floral parts: a. Habit; b. Leaf; c. Flower and bract; d. Bract - dorsal view; e. Bract - ventral view; f. Tepals - dorsal view; g. Tepals - ventral view; h. Flower; i. Pollen grains; j-m. Female plant and floral parts: j. Habit; k. Leaf; l. Spadicle and pistils; m. Pistil.

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Plants dioecious, yellowish-red, 20-26 cm high from the point of fusion with host root to the top of inflorescence; tubers in mass, branching from base; tubers single or branched from base, subspherical, finely granular with scattered stellate warts; single tuber 2-10 cm wide. Stems slender, 10-12 x 2-2.5 cm. Leaves 21-27, spirally arranged, scale-like, suborbicular to orbicular, 2-3 x 2-2.8 cm, cucullate, broad at base, accrescent upwards, entire at margin, obtuse at apex. Male flowers: spadices fleshy, ovoid, obovoid or ellipsoid, creamish yellow-red, 7-14 x 1.3-7.5 cm; bracts golden yellow, one each for a flower at base, truncate, 6-angled, concave ventrally, 7.5-13 x 5-8 mm; pedicels golden yellow, fleshy, straight or arcuate, broadened upwards, immersed in cavities lying above the fleshy bracts, 10-22 x 2-4 mm. Flowers 5- or 6- merous, actinomorphic, 6-9 x 4-6 mm. Tepals 5, oblong-elliptic, c 7-10 x 2.5-4 mm, decurved in flowering, entire at margin, obtuse at apex, cucullate, thickened towards apex. Torus terete, 1-2 x 2-3 mm. Synandrium oblong-elliptic, creamish white, 4.5-7 x 3-4 mm; anthers horseshoe-shaped, 16-22-ridged; ridges obsolete just below apex, button-shaped at apex, obtusely mucronate-topped; pollen grains yellow, 3-porate, spheroidal, triangular with aperture membranes semicircularly curved in polar view, 17.5-22.5 μ in diameter; exine granular in equatorial region, 1-2 μ thick. Female flowers : spadices subglobose, c. 3.5 x 5 cm. Spadices golden yellowish brown, 1025-1350 μ long; lower part terete, 325-600 x 125-200 μ ; upper part obconical, obtuse or truncate at apex, 550-750 x 450-650 μ ; cuticular ridges of top cells conspicuous, 10-20 μ thick. Pistils around spadices, 1475-1725 μ long; stipe pale yellow, terete, 250-325 μ long; ovary pale yellow, spindle-shaped, 275-300 x 250-275 μ ; style yellow to black upwards, 900-1150 μ long; stigma terminal.

Balanophora indica var. *tirunelveli* differs from var. *indica* in having smaller (2-10 cm wide) tubers; numerous broader (2-2.8 cm) leaves; larger (7-14 x 1.3-7.5 cm) spadices; larger (13 cm) bracts; longer pedicels up to 2 mm long and in oblong-elliptic and larger synandrium.

Habitat: Southern tropical wet evergreen forest, about 1200 m.

Host: *Euonymus dichotomus* Heyne ex Roth

Associated plants: *Alpinia abundiflora*, *Embelia basaal*, *Mallotus aurea-punctatus*, *Ochlandra travancorica* and *Sonerila travancorica*.

Flowering : January - May.

Acknowledgements

The authors sincerely thank the Director, Wildlife Institute of India, Dehra Dun, for financial assistance; Mr. R.P.S. Katwal, Chief Wildlife Warden, Chennai and Dr. V.K. Melkani, Field Director & Conservator of Forests, Project Tiger, Tirunelveli, for giving necessary permission to carry out the research in the Tiger Reserve and collect authentic specimens for study. The authors are indebted to Emeritus scientists of the Botanical Survey of India – Dr. N.P. Balakrishnan, for expert comments, and Dr. V.J. Nair for Latin diagnosis

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and valuable comments – and Dr. P. Daniel, Deputy Director, Southern Circle of the Botanical Survey of India, Coimbatore for granting necessary permission to refer literature and specimens. The co-operation of Mr. M. Muthuramakrishnan, Field Assistant, is gratefully remembered here.

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