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RESEARCH ARTICLE

A NEW VARIETY OF THOTTEA SIVARAJANII (ARISTOLOCHIACEAE) FROM WESTERN GHATS, INDIA

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Abstract

Thottea sivarajanii var. *anamalaiana* newly discovered from the Anamalai hills of Western Ghats, India is described and illustrated. The woody habit, comparatively less pubescent inflorescence and flowers, glabrous stem, petiole and fruits, highly reduced staminodes, prominent bracts and bracteoles etc. are some of the characteristics that delimit this variety from the species proper.

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Introduction:-

The Indo-Malayan genus *Thottea* was established in 1783 by Christen Friis Rottboel (1727-1797), a Danish physician and a pupil of Linnaeus with *Thottea siliquosa* as the type species, based on Van Rheede's illustration in *Hortus Malabaricus*. The genus is distributed across India, Sri Lanka, Bangladesh, Myanmar, Thailand, Vietnam, China, Sumatra, Malaysia, Singapore, Java, Borneo and Philippines. Analysis of relevant literature (Ding Hou, 1984; Mabberley, 2008; Yao, 2013; Robi *et al.*, 2014; Sunil & Kumar, 2014; Nayar *et al.*, 2014) shows that there are 37 species in the genus, among which 14 species are in India, 11 of which are in the Western Ghats region, with 10 species exclusively endemic. *Thottea sivarajanii* Santhosh, Shanavas & Binu is one such species described from Wayanad in Kerala (Kumar *et al.*, 2000).

Materials & Methods:-

During recent floristic explorations, the authors have collected a specimen closely allied to *Thottea sivarajanii* from the Anamalai hills of Coimbatore district in Tamil Nadu (10°13' - 10°33'N and 79°49' - 77°21'E) which on critical taxonomic analysis with the help of relevant literature (Fischer, 1921; Henry *et al.*, 1987; Annaselvam & Parthasarathy, 1999; Matthew, 1983, 1999) have shown to be different from the species proper in certain characters and accordingly described and illustrated as a new variety. Differences of the new taxon with the species proper are charted out in table 1. The type specimens are kept at TBGT and live plants are conserved *ex-situ* in the conservatory of JNTBGRI. A complete description, photo plate, drawings and relevant notes on the new variety are provided for easy diagnosis. The plant specimens were collected from the Solaikuruku forest segment, a part of the Anamalai Tiger Reserve that consisted of an evergreen patch marked by the luxuriant vegetation. Several collections of *Thottea* were made at regular intervals and the specimens thus collected were matched with the herbarium specimens housed at MH and the type of *T. sivarajanii* housed at TBGT. Relevant literatures were also consulted for confirmation.

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Table 1:- Differences of *Thottea sivarajanii* var. *anamalaiana* with *Thottea sivarajanii*.

Characters	<i>Thottea sivarajanii</i> var. <i>anamalaiana</i>	<i>Thottea sivarajanii</i>
Habitat	Evergreen and shola forests, between 1200-2000 m asl.	Semi-evergreen and evergreen forests, \pm 500 m asl., seen rarely up to 1000 m
Habit	Woody, 2-5 m tall, with copious woody upright branches from the base	Shrub, 1-2 m tall with copious slender upright branches from the base
Stem	Internodes slightly zig - zag	Internodes straight
Leaf shape	Broadly elliptic-lanceolate	Narrowly lanceolate
Leaf size	12-23 cm x 3-8 cm	13-22 cm x 2.5-6 cm
Petiole	0.5-0.8 cm long, glabrous	0.3-0.5 cm long, pubescent
Lamina underside	Puberulent when young, more on the veins, slightly glaucous	Puberulent throughout, not glaucous
Bracts	0.2 cm long, lanceolate, sparsely hairy	0.6 cm long, ovate-oblong, densely hairy
Flower	1-1.5 cm across	1 cm across
Flower buds	Not exactly trigonous, less pubescent	Trigonous, densely strigose hairy without
Perianth	Sparsely hairy without; glabrescent within, margin scarcely or not reflexed	Densely strigose hairy without and within, margin strongly reflexed
Stamens	Bundles mostly 3 of three stamens	Bundles mostly 3 of two stamens
Stigmatic lobes	5-8, with hooked hairs, more towards tip	4-6, without hooked hairs, only pubescent at tip
Gynostemium	Sparsely pubescent	Densely pubescent
Pods	10-15 cm long, stout, 4-angled, slightly twisted, glabrous	5-7 cm long, slender, sharply 4-angled and more or less straight, pubescent

Results & Discussion:-

The woody habit which appears like a small tree reaching up to 5 m height; glabrous stem; less branching and less pubescent nature of the inflorescence and flowers, prominent bracts and bracteoles, flowers with less velvet hairs inside; slightly twisted glabrous pods *etc.* are some of the marked differences that differentiate the new variety from the species proper.

Thottea sivarajanii* var. *anamalaiana A. Nazarudeen, G. Rajkumar *et* M. Alister *var. nov.* (Figs.1 & 2).

Compared to the species proper which enjoys distribution in the semi-evergreen and evergreen forests, \pm 500 m (1000 m) asl. (Santhosh Kumar *et al.*, 2000), the new variety grows in the evergreen and shola forests, between 1300- 2000 m asl.

Type: INDIA, Tamil Nadu, Coimbatore District, Solaikuruku, \pm 1200 m, 13 March 2015, A. Nazarudeen, G. Rajkumar & M. Alister, 84114 (Holotype: TBGT); Akkamalai, \pm 1550 m, 08 July 2015, G. Rajkumar, A. Nazarudeen & M. Alister, 85274 (Paratype: TBGT); Iyerpadi, \pm 1130 m, 10 July 2015, G. Rajkumar, A. Nazarudeen & M. Alister, 85416 (Paratype: TBGT).

Woody robust shrub, attaining a tree form, 4-5 m high; stem thick and solid, forming clumps, young branches mostly distichous; internodes 2-5 cm long. Leaves alternate, broadly elliptic lanceolate, 12 - 23 x 3 - 8 cm, glaucous beneath, base attenuate, apex long acuminate, margin entire, coriaceous, puberulent when young, more on the veins below; petiole 0.5-0.8 cm long, swollen, glabrous; mid rib reaches one third of its length from the base, strongly 3-ribbed, with 2 lateral weak ribs reaches half way up, ending 2-3 cm above from the base, merging with the lateral veins of the side ribs. Cymes axillary, less pubescent; bracts lanceolate, 0.4 - 0.5 x 0.1 - 0.2 cm, silky brown hairy, 0.4 - 0.5 cm long, 0.1- 0.2 cm broad. Flowers 3-5, 1-1.5 cm across; pedicels silky hairy, 0.3-0.4 cm long; perianth lobes 3, lobing up to the base, lobes 0.5-0.7 x 0.5- 0.6 cm, orbicular or broadly ovate, base buccate, tip acute, margin slightly or not reflexed, sparsely hairy without, deep brown velvet hairy within; stamens 9, 0.2 cm long, mostly in 3 groups of 2 each, staminal groups facing the cavity of the perianth lobes; filaments and connectives hairy, anthers dithecous, 0.1 cm long, linear, extrorse, dehiscence longitudinal, connective slightly produced, covered with hooked hairs on the inner side, staminodes reduced in to small projections alternate to the perianth lobes; gynostemium sparsely hairy, 0.5-0.7 cm long; ovules many, placentation axile; stigmatic lobes 4-8, sparsely with holed hairs, more

towards tip. Fruits stout, quadrangular, with narrow base and acute tip, 7-10 (15) cm long, slightly twisted, glabrous, splits through 4 valves. Seeds 10-20, 0.3 x 0.2 cm, trigonous, oblong, transversely pitted, creamy yellow.

Flowering & Fruiting:-

Almost throughout the year.

Etymology:-

The variety is named after the type locality, the Anamalai hills of Tamil Nadu, India.

Distribution:-

T. sivarajanii var. *anamalaiana* is an endemic, understory element in the type locality and the adjoining hills of ATR (Anamalai Tiger Reserve).

Habitat & Ecology:-

Thottea sivarajanii var. *anamalaiana* grows in evergreen and shola forests between 1200 – 2000 m elevation AMSL, in association with *Meiogyne pannosa* (Dalzell) J. Sinclair, *Ardisia pauciflora* B. Heyne ex Roth., *Antistrophe serratifolia* (Bedd.) Hook. f., *Salacia fruticosa* Wall., *Psychotria anamallayana* Bedd., *Micrococca beddomei* Hook. f.) Prain, *Pellionia heyneana* Wedd., *Elaeocarpus tuberculatus* Roxb., *Cullenia exarillata* A. Robyns, *Acranthera anamallica* Bedd., *Miliusa indica* Lesch ex A. DC, *Myristica malabarica* Lam., *Piper mullesua* Buch.-Ham. ex D. Donet.

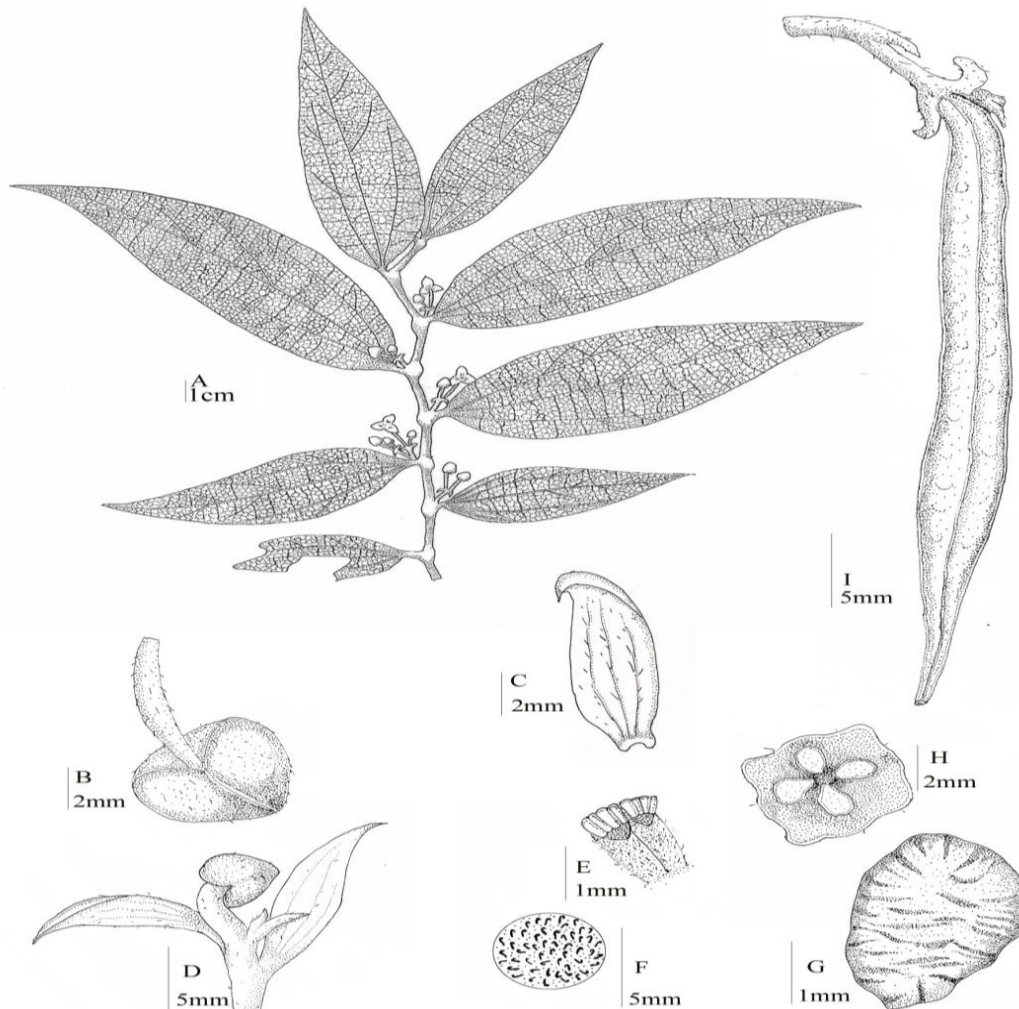


Figure 1. *Thottea sivarajanii* var. *anamalaiana* A. Nazarudeen, G. Rajkumar et M. Alister var. nov. A. Habit; B. & D. Flower buds; C. Bract; E. Stamen; F. Hooked hairs on the connective enlarged; G. Seed; H. Fruit cross section; I. Fruit



Figure 2. *Thottea sivarajanii* var. *anamalaiana* A. Nazarudeen, G. Rajkumar et M. Alister var. nov. A. Habit; B. & C. Stem; D. Zig zag pattern of stem tip; E. & H. Flower; F. Flowering twig; G. Flower buds; I. Fruit; J. Dehiscent fruit.

Conservation status:-

Following the Red List Categories and Criteria, version 13 of IUCN (2017), the present taxon meet the requirements to be included in the threatened category. On account of its extent of occurrence (EOO) which is less than 200 km² and the area of occupancy (AOO) of less than 75 km² with fewer than 2500 mature individuals, the taxon qualify itself to be included in the Endangered (EN) category.

Notes:-

In India, *Thottea* inhabits in two distinct geographical areas such as Western Ghats and Andaman Islands. The forests of Western Ghats in general and the Anamalai hills in particular form the richest area with respect to the floristic composition and high level of endemism. The tremendous biological diversity has qualified this geographic region as one among the most potential centers of speciation. A great variety of climatological and altitudinal conditions together with varied ecological habitats have contributed much to the formation of immensely rich vegetation and diverse flora. The steep variations in topography, humid tropical climate and plenty of rain fall have proved this geographical entity a unique center of endemism. *Thottea sivarajanii* var. *anamalaiana* is one such taxon newly reported from the evergreen patch at Solaikuruku, the place in turn is definitely under a great deal of threat due to excessive and perturbing anthropogenic activities in relation to monoculture plantation.

Additional specimens examined:-

India, Tamil Nadu, Coimbatore District, Karmalai, ± 1450 m, 12 August 2015, A. Nazarudeen, G. Rajkumar & M. Alister, 85735; Balaji temple, ± 1300 m, 07 July 2015, G. Rajkumar, A. Nazarudeen & M. Alister, 85248 (TBGT).

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