A new species of *Syzygium* (Myrtaceae) from the Kalakkad-Mundanthurai Tiger Reserve in Peninsular India

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ABSTRACT
A new species of Myrtaceae, *Syzygium agastyamalayanum* M.B.Viswan. & Manik., sp. nov., is described here from the Kalakkad-Mundanthurai Tiger Reserve in the Agastyamalai hills of the Southern Western Ghats in Peninsular India. This species is allied to *Syzygium zeylanicum* (L.) DC. var. *zeylanicum* by habit being trees, opposite leaves, terminal and axillary umbellate panicular type of inflorescence, flowers in umbellules, funneliform hypanthium, 4- or 5-merous sepals and petals, many stamens of different lengths, 2-locular ovary with many ovules and 1-seeded berries but differs by leaves being obovate, obovate-oblanceolate or elliptic, acute at base, obtusely acute or subacute, rarely retuse at apex; secondary veins 14-20 pairs, without shorter intermediaries, uniform, prominent, brochidodromous; intramarginal vein prominent; petioles short, turgid, up to 4 mm long; hypanthium brown-punctate; sepals semi-circular, rounded at apex; petals reniform-orbicular, cordate or rounded at base, undulate at margin, obtuse at apex, punctate; berries subglobose or globose, 14.5-15 mm across, pink to dark black, glabrous; and seed *c.* 10 × 8 mm. Using IUCN Red List Categories and Criteria, the conservation status of the species is assessed as critically endangered based on the field data.

KEY WORDS
Myrtaceae,
Syzygium,
Kalakkad-Mundanthurai
Tiger Reserve,
Agastyamalai hills,
Peninsular India,
critically endangered,
new species.

RÉSUMÉ

Une nouvelle espèce de Syzygium *(Myrtaceae) de la Réserve de tigres de Kalakkad-Mundanthurai en Inde péninsulaire.*

Une nouvelle espèce de Myrtaceae, *Syzygium agastyamalayanum* M.B.Viswan. & Manik., sp. nov., est décrite de la Réserve de tigres de Kalakkad-Mundanthurai, située dans les collines d'Agastyamalai, au sud des Ghâts occidentaux d'Inde péninsulaire. Cette espèce est proche de *Syzygium zeylanicum* (L.) DC. var. *zeylanicum* par son port arborescent, ses feuilles opposées, son inflorescence terminale ou axillaire de type ombellé-paniculé, ses fleurs en ombellules, son hypanthium tubulaire, ses sépales et pétales 4- ou 5-mères, la présence de nombreuses étamines inégales, un ovaire biloculaire multiovulé et des baies uniséminées ; mais elle en diffère par ses feuilles obovales, obovales-oblancéolées ou elliptiques, aiguës à la base, et obtusément aiguës ou subaiguës, rarement émarginées à l'apex ; ses 14-20 paires de nervures secondaires, sans nervilles plus courtes, uniformes, saillantes, brochidodromes ; la nervure intramarginale proéminente ; les pétioles courts, robustes, mesurant jusqu'à 4 mm de long ; l'hypanthium ponctué de brun ; les sépales semi-circulaires, arrondis à l'apex ; les pétales réniformes-orbiculaires, cordés ou arrondis à la base, à marge ondulée, obtus à l'apex, tachetés ; les baies plutôt globuleuses, de 14,5-15 mm de diamètre, roses à noires, glabres ; et la graine d'environ 10 × 8 mm. Cette espèce est, d'après les données de terrain, estimée comme en danger critique d'extinction, selon les critères et catégories de la liste rouge de l'UICN.

MOTS CLÉS
Myrtaceae,
Syzygium,
Réserve de tigres de Kalakkad-Mundanthurai,
collines d'Agastyamalai,
Inde péninsulaire,
en danger critique d'extinction,
espèce nouvelle.

INTRODUCTION

The genus *Syzygium* R.Br. ex Gaertn. (Myrtaceae) is represented by over 1200 species distributed in the African and Asian tropics, Malesia, Australia and SW Pacific (Parnell *et al.* 2007) wherein 108 species are present in India (Duthie 1878-1879) and 30 (Ashton 1981) or 31 species in Sri Lanka (Kostermans 1981). Of which, 12 species and one subspecies were regarded as endemics. Subsequently, two Sri Lankan endemics, *S. makul* Gaertn. and *S. neesianum* Arn., were reported from Silent Valley in the Palakkad (Palghat) District of Kerala State, India (Manilal & Sabu 1984). Over the last several decades, 10 additional species have been described from India, including *S. periyarensis* Jomy & Sasidharan (Sasidharan & Jomy 1999) and *S. parameswaranii* Mohanan & Henry (Mohanan & Henry 1987) from Kerala State, *S. zeylanicum* (L.) DC. var. *ellipticum* Henry, Chandrabose & N.C.Nair (Henry *et al.* 1980), *S. sriganesanii* Ravikumar & Lakshmanan and *S. zeylanicum* (L.) DC. var. *megamalayanum* Ravikumar & Lakshmanan from Tamil Nadu State (Ravikumar 1999). In 1987, Chithra reported 30 species and three varieties from Tamil Nadu State in India. Murugan *et al.* (2002), while reporting *S. neesianum* Arn. from Tamil Nadu State, inadvertently indicated that their report was an addition to the Indian flora. Further, the twig (Fig. 1A) differs from that of the type (BM000754861, Natural History Museum, London, and Wight [1843: t. 533; 1850: t. 15]). Several researchers, including the authors of the present paper, have collected *S. parameswaranii* Mohanan & Henry from Tamil Nadu State (Mohanan & Henry 1987). One more new species, *S. agastyamalayanum,* is described here by us from the Kalakkad-Mundanthurai Tiger Reserve in India. Altogether, the genus in Tamil Nadu State now comprises 33 species and four varieties, with 13 species shared by the Indian and Sri Lankan floras.

MATERIALS AND METHODS

During an intensive botanical survey of the Kalakkad-Mundanthurai Tiger Reserve in Tamil Nadu State of India, the senior author collected flowering and fruiting specimens of a species of *Syzygium* that did not match any of the described species of *Syzygium* in the world. Based on a scrutiny of published and available literatures, we therefore described the plant from the Kalakkad-Mundanthurai Tiger Reserve as a new species.

SYSTEMATICS

Syzygium agastyamalayanum
M.B.Viswan. & Manik., sp. nov.
(Fig. 1)

Syzygium zeylanicum (L.) DC. var. zeylanicum *affinis, sed foliis obovatis, obovato-oblanceolatis vel ellipticis, base acutis, apice obtuse acutis vel subacutis, rare retusis; nervis secondariis 14-20 paribus sine nervis intermediis, uniformibus ad distinctum nervum intramarginalem conjunctis; petiolis turgidis, ad 4 mm longis; hypanthium brunneo-punctatis, sepalis semicircularibus, apice rotundatis; petalis reniformi-orbicularis, base cordatis vel rotundatis, margine undulatis, apice obtusis, punctatis; baccis subglobosis vel globosis, 14.5-15 mm in diam., roseus ad atro-nigricus, glabris et seminibus c. 10 × 8 mm, differt.*

TYPUS. — India, Tamil Nadu State, Kalakkad-Mundanthurai Tiger Reserve (8°20'-8°53'N, 77°10'-77°35'E), Upper Kodayar, *c.* 900 m, 23.I.1999, *Viswanathan 3204* (holo-, MH; iso-, herbarium of the Department of Plant Science, Bharathidasan University).

PARATYPES. — India, Tamil Nadu State, Kalakkad-Mundanthurai Tiger Reserve (8°20'-8°53'N, 77°10'-77°35'E), Agastiyar Peak, *c.* 1700 m, 14.IV.1999, *Viswanathan 3596* (herbarium of the Sri Paramakalyani Centre for Environmental Sciences).

DESCRIPTION

Trees, up to 15 m high; branchlets many, 4-angled at first, later subterete, lenticellate; internodes 8-32 × 2-7 mm. Leaves opposite, obovate, obovate-oblanceolate or elliptic, 3-6.6 × 1.5-2.9 cm, coriaceous, acute at base, recurved at margin, obtusely acute or subacute, rarely retuse at apex, glabrous; midrib canaliculate above, prominently raised beneath, terete; secondary veins 14-20 pairs, opposite, brochidodromous; intramarginal vein prominent; petiole turgid, 2-4 × 1-1.5 mm, glabrous. Inflorescences both terminal and axillary umbellate panicles, 3-4 × 3-4.5 cm, glabrous; peduncles 4-angled, glabrous; primary axes 5-10 × 1-1.5 mm; secondary axes 5-8 × 0.8-1 mm. Flowers 10-20 in each umbellule; pedicels 2-6 × 1-1.5 mm, slender. Hypanthium funneliform, *c.* 2.5 × 4.5 mm, brown-punctate. Sepals 4 or 5, semi-circular in outline, *c.* 1 × 2.5 mm, entire at margin, rounded at apex, glabrous. Petals 4 or 5, white, concave, reniform-orbicular, 2-2.8 × 2.4-2.6 mm, membranous, cordate or rounded at base, undulate at margin, obtuse at apex, punctate, glabrous; punctate numerous. Stamens many, of different lengths, 2.7-7.5 × 0.7-1 mm, glabrous; filaments yellow, 1.8-6 × 0.4-1.1 mm, incurved; anthers yellow, reniform, *c.* 1.1 × 0.9 mm. Ovary obovate, fleshy, *c.* 3.8 × 2.5 mm; locules 2; ovules many; style yellow, glabrous; stigma minute. Berries pink to dark black, subglobose or globose, 15-17 × 14.5-15 mm, glabrous. Seed pale brown, solitary, subglobose, *c.* 10 × 8 mm, glabrous.

DISTRIBUTION

A strict endemic of the Kalakkad-Mundanthurai Tiger Reserve in the Tamil Nadu State in the Agastyamalai hills of the Southern Western Ghats in Peninsular India.

HABITAT AND ECOLOGY

This species occurs in southern tropical wet evergreen forests in association with several tree species, including *Aglaia elaeagnoidea* (Juss.) Benth. var. *bourdillonii* (Gamble) N.C.Nair, *Euphorbia vajravelui* Binojk. & N.P.Balakr., *Saprosma corymbosum* (Bedd.) Bedd., *Vernonia travancorica* Hook.f. and *Wendlandia bicuspidata* Wight & Arn. and with the following shrub, *Sarcandra chloranthoides* Gardner, herbs of *Impatiens hensloviana* Arn., *Sonerila sadasivanii* M.P.Nayar, *S. tinnevelliensis* Fischer, and *S. travancorica* Bedd. as well as the parasite *Balanophora indica* (Arn.) Griff. var. *agastyamalayana* M.B.Viswan., Prem Kumar & Ramesh and the epiphyte *Dendrobium panduratum* Lindl. subsp. *villosum* Gopalan & Henry.

PHENOLOGY

Flowering in January and February; fruiting in March and April.

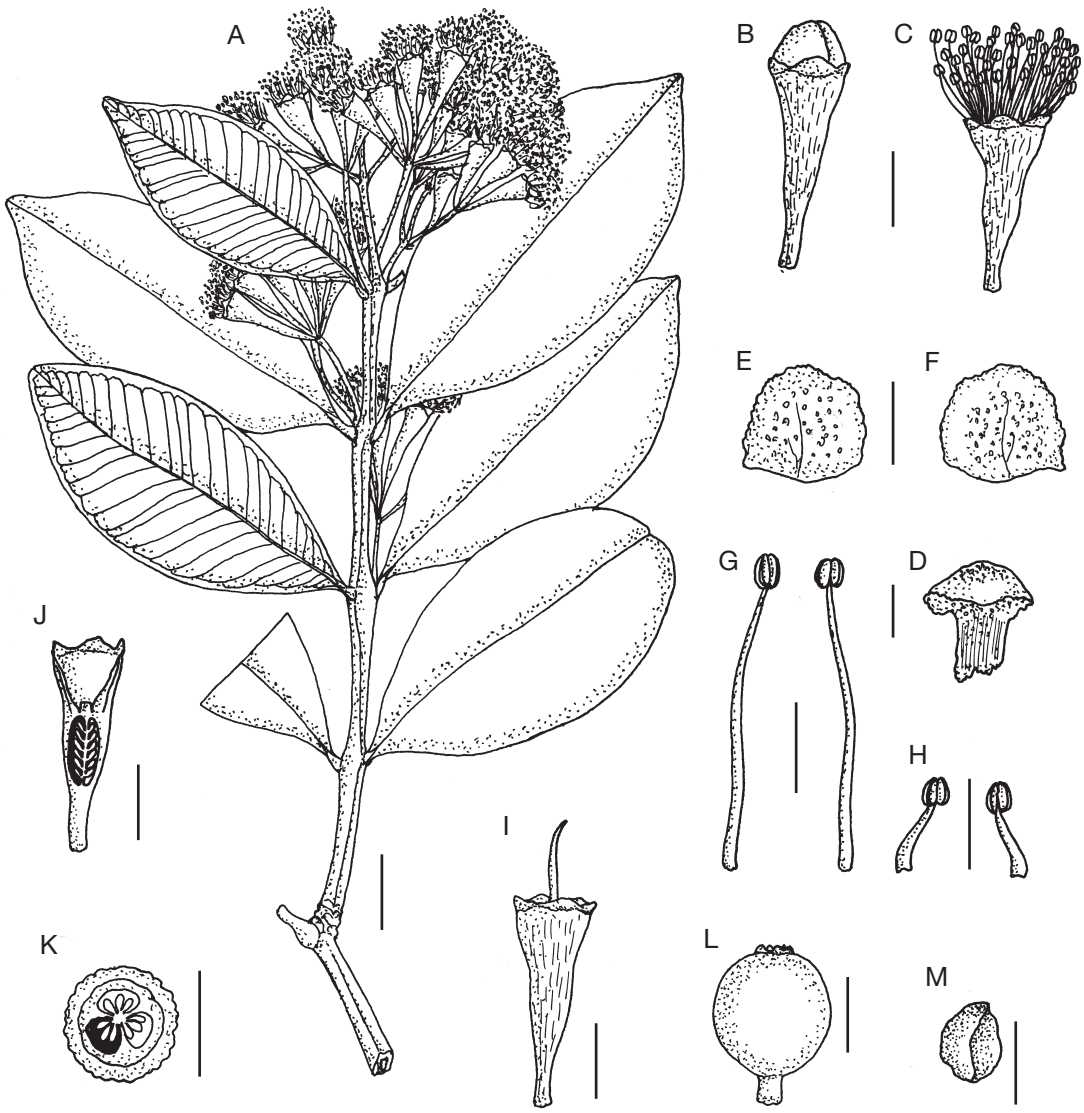

FIG. 1. — *Syzygium agastyamalayanum* M.B.Viswan. & Manik., sp. nov.: **A**, habit (flowering twig); **B**, bud; **C**, flower without petals; **D**, sepal (dorsal side); **E**, petal (dorsal side); **F**, petal (ventral side); **G**, **H**, stamens; **I**, ovary; **J**, longitudinal section of ovary; **K**, transverse section of ovary; **L**, berry; **M**, seed. A-K, *Viswanathan 3204*; L, M, *Viswanathan 3596*. Scale bars: A, L, 10 mm; B, C, I, J, 5 mm; D, 1 mm; E-H, 2 mm; K, 2.5 mm; M, 11 mm.

CONSERVATION STATUS

Field observations made between 1998 and 2002 indicate that *Syzygium agastyamalayanum* has an area extent (as defined by IUCN 2001) of less than 100 km^2 (B1); severely fragmented subpopulations (a); extreme fluctuation (c); only two locations (iii) and does not exceed 50 mature individuals (iv). Using the IUCN Red List Criteria (IUCN 2001), we assess the conservation status of the species as critically endangered (CR).

TABLE 1. — Characters distinguishing *Syzygium agastyamalayanum* M.B.Viswan. & Manik., sp. nov. from *S. zeylanicum* (L.) DC. var. *zeylanicum*.

Characters	*S. agastyamalayanum*	*S. zeylanicum* var. *zeylanicum*
Leaves	obovate, obovate-oblanceolate or elliptic, acute at base, obtusely acute or subacute, rarely retuse at apex	ovate, ovate-lanceolate or elliptic-lanceolate, rounded or narrowed at base, acuminate at apex
Secondary veins	14-20 pairs, without shorter intermediaries, uniform, prominent, brochidodromous	10-14 pairs, with shorter intermediaries, not uniform, obscure, not brochidodromous
Intramarginal vein	prominent	obscure
Petioles	short, turgid, up to 4 mm long	well-developed, slender, up to 7 mm long
Hypanthium	brown-punctate	grey-pruinose
Sepals	semi-circular, rounded at apex	ovate, obtuse or subacute at apex
Petals	reniform-orbicular, cordate or rounded at base, undulate at margin, obtuse at apex, punctate	broadly orbicular, truncate at base, entire at margin, rounded or obtusely acute at apex, not punctate
Berries	subglobose or globose, 14.5-15 mm across, pink to dark black, glabrous	broadly ellipsoid or subglobose, 4-8 mm across, white, pruinose
Seed size	*c*. 10 × 8 mm	*c*. 6.5 × 5.5 mm

ETYMOLOGY

Syzygium agastyamalayanum is so named because it comes from the Agastyamalai Hills from where type specimen was collected.

REMARKS

Syzygium agastyamalayanum M.B.Viswan. & Manik., sp. nov. most closely resembles *S. zeylanicum* (L.) DC. var. *zeylanicum*. However, distinguishing characters are shown in Table 1.

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