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Syzygium nivae Barbhuiya, J.Sarma & S.Dey, sp. nov., inflorescence and fruits (photos by J. Sarma).

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A new rheophytic species of *Syzygium* Gaertn. (Myrtaceae) from Assam, North East India

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ABSTRACT
A new species of *Syzygium* Gaertn. (Myrtaceae) is described from North East India: *Syzygium nivae* Barbhuiya, J.Sarma & S.Dey, sp. nov. The new species is a rheophyte, which is restricted to the Kopili riverbed of West Karbi Anglong district of Assam. The present species shows little affinity with *Syzygium khasianum* (Duthie) N.P.Balakr. in having lanceolate leaves, paniculate inflorescence and calyptrate petals, but differs in various aspects, such as shrubby rheophytic plant habit, narrower leaves, non-caudate leaf apex, shorter peduncles, larger flowers etc.

KEY WORDS
Myrtaceae,
Syzygium,
rheophyte,
endemic,
West Karbi Anglong,
Assam.

RÉSUMÉ
Une nouvelle espèce rhéophytique de Syzygium *Gaertn. (Myrtaceae) d'Assam, nord-est de l'Inde.*
Une espèce nouvelle de *Syzygium* Gaertn. (Myrtaceae) est décrite du nord-est de l'Inde : *Syzygium nivae* Barbhuiya, J.Sarma & S.Dey, sp. nov. Cette espèce est une rhéophyte, circonscrite aux rives de la rivière Kopili, dans le district Karbi Anglong Ouest (Assam). Elle montre une faible affinité avec *S. khasianum* (Duthie) N.P. Balakr. par ses feuilles lancéolées, son inflorescence paniculée et ses pétales calyptrés, mais en diffère par divers caractères, tels que son port arbustif rhéophytique, ses feuilles plus étroites à apex non caudés, ses pédoncules plus courts, ses fleurs plus grandes, etc.

MOTS CLÉS
Myrtaceae,
Syzygium,
rhéophyte,
endémique,
Karbi Anglong Ouest,
Assam.

INTRODUCTION

Syzygium Gaertn. is the largest genus in Myrtaceae (clove family), which comprises *c.* 1200 species (Soh & Parnell 2015). It is a paleotropical genus with a wide range of occurrence mainly in southern and southeastern Asia, Australia, Malesia, and New Caledonia. Some species occur in east Africa, Madagascar, the Mascarenes, southwestern Pacific Islands, Taiwan, and southern Japan (Chen & Craven 2007; Soh 2017). Duthie (1878-1879), in Hooker's *Flora of British India*, treated the genus under *Eugenia* L. *sensu lato*, with 131 species which has been split into genera *Eugenia* and *Syzygium* with the majority of Indian species now placed in the latter genus (Byng *et al.* 2015). The genus shows high diversity in North Eastern India and Western Ghats. Kanjilal *et al.* (1938) enumerated *c.* 35 species from North East India under *Eugenia sensu lato* and Sujanapal & Kunhikannan (2017) reported *c.* 48 species of *Syzygium* from the Western Ghats. In India, the genus has received very little attention as till date there is no comprehensive revisionary work available for the area, except the discovery of few new species in recent years (Viswanathan & Manikandan 2008; Shareef *et al*. 2012, 2013, 2014; Ratheesh *et al*. 2014; Sujanapal *et al*. 2014; Venkat Ramana *et al*. 2014) and it is hoped that many more novel species awaits their formal scientific discovery.

During field explorations (2016-2018) at Koka, Panimur, Amreng and Zirikindeng regions of West Karbi Anglong District of Assam the senior author found this rheophytic shrub growing on rock crevices at the edges of Kopili riverbed near Koka. Observations in the field and critical examination of the voucher specimen have revealed number of morphological differences from all other hitherto known species of genus *Syzygium*, which warrants the description of a new species.

SYSTEMATICS

Syzygium nivae Barbhuiya, J.Sarma & S.Dey, sp. nov.
(Figs 1; 2)

The new species differs from *S. khasianum* (Duthie) N.P.Balakr. for its shrubby rheophytic plant habit, narrower leaves, non-caudate leaf apex, shorter peduncles, larger flowers and oblong to subglobose fruits.

TYPUS. — **India**. Assam, West Karbi Anglong District, Panimur, Koka, on the edges of Kopili riverbed, 25°43'-56.6"N, 92°49'-19.31"E, *c.* 90 m, 17.VIII.2016, fl., *J. Sarma s.n.* (holo-, HBARC[HBARC00006399]!).

ETYMOLOGY. — The species is named after Mrs Niva Deka, the wife of first author of the paper, who constantly encouraged her husband to continue his botanical explorations in remote area of the state of Assam. By profession, Mrs Deka is an Engineer and presently working under the government of Assam.

DISTRIBUTION. — Endemic to the type locality, Koka, Panimur, West Karbi Anglong District, Assam, India (Fig. 3).

PHENOLOGY. — The plant flowers during the months of August to October and its fruit matures in October and November.

CONSERVATION STATUS. — *Syzygium nivae* Barbhuiya, J.Sarma & S.Dey, sp. nov. is provisionally categorized as 'Data Deficient' (DD), as only 50 mature individuals were located during the survey at Koka locality. To ascertain its actual status, the entire course of Kopili River is required to be surveyed.

HABITAT AND ECOLOGY. — *Syzygium nivae* Barbhuiya, J.Sarma & S.Dey, sp. nov. grows in rock crevices along the Kopili riverbed, at altitudes 86-102 m above MSL. The riverbed is characterized by the alternating bands of shale and sandstones. The sandstone are mainly composed of quartz, lithic fragments with meager amount of feldspar and cemented by calcareous and ferruginous cements (Bhuyan 2016). The rate of water flow of the river is very high during June-July and gradually slowed down from August, when the plant starts flowering. The other associated rheophytes occurring in the type locality were *Syzygium cyanophyllum*, *S. polypetalum*, *Ixora yunnanensis*, *Pavetta puffii*, *Carissa* sp., *Tarenna pumila*, *Eriobotrya angustissima*, *Millettia* sp., *Melastoma malabathricum* etc.

TABLE 1. — Morphological differences between *Syzygium nivae* Barbhuiya, J.Sarma & S.Dey, sp. nov. and *S. khasianum* (Duthie) N.P.Balakr.

Characters	***Syzygium nivae* Barbhuiya, J.Sarma & S.Dey, sp. nov.**	***Syzygium khasianum* (Duthie) N.P.Balakr.**
Habit	A shrub, to 2.5 m high	A middle-size spreading tree
Leaf blade	narrowly lanceolate, 3.1-6.6 × 0.8-1.1 cm	ovate lanceolate, 5.0-7.5 × 1.1-2.7 cm
Leaf apex	acuminate, not caudate	abruptly acuminate, shortly caudate
Leaf base	attenuate	cuneate or attenuate
Lateral nerves	numerous, 0.5-1.6 mm apart	numerous, 0.4-1.4 mm apart
Petiole	8.3-11 mm long	8.0-17 mm long
Inflorescence	paniculate-cyme, terminal and axillary, to 12 cm long and 6.8 cm in diam.	paniculate-cyme, terminal and axillary, 10-14 cm long and 6-10 cm in diam.
Peduncle	1.8-2.5 cm long	5.0-7.5 cm long
Pedicel	absent or to 0.6 mm long	absent or to 1 mm long
Flower bud	pyriform, 5-6 mm long	pyriform, *c*. 3.8 mm long
Flowers	10-12 mm in across	*c.* 6.3 mm in across
Hypanthium	obconic, 4.9-7.4 mm long and 4.2-5.2 mm wide at mouth	obconic, 3.2-4.7 mm long and 2.5-3.5 mm wide at mouth
Petals	4, calyptrate, sub-orbicular, bowl-shaped, 2.4-3.0 mm in diam.	4, calyptrate, rarely free, bowl-shaped, 1.5-2.0 mm in diam.
Style	thickened at base slightly narrowed upwards, *c*. 8.3 mm long	uniform, *c.* 6.5 mm long
Fruit	slightly oblong or subglobose, 10-16 mm long	cylindric *c*. 6.3 mm long
Distribution	India (Assam: West Karbi Anglong District) (Fig. 3)	India (Meghalaya: Garo & Khasi Hills) (Fig. 3)

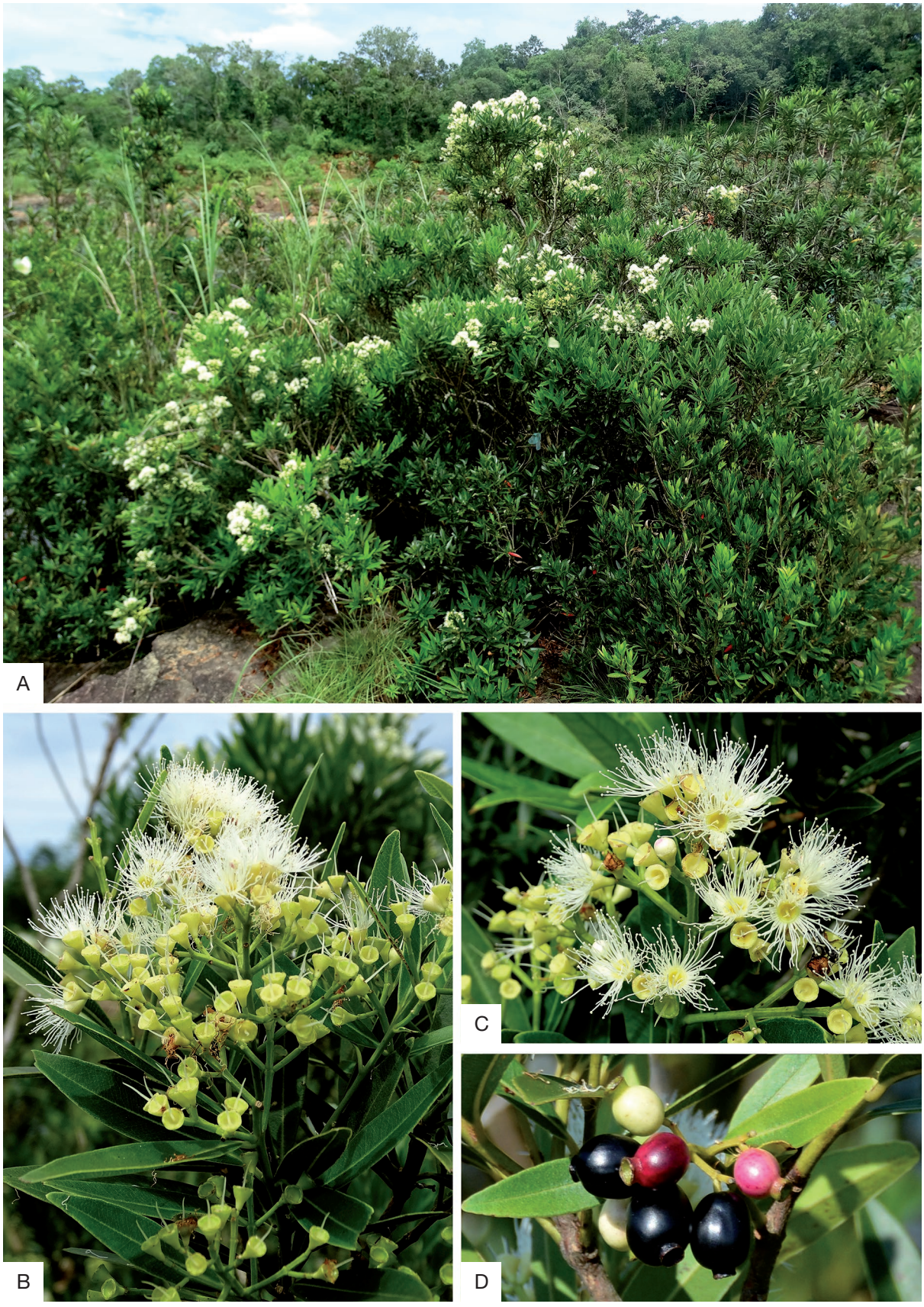

FIG. 1. — *Syzygium nivae* Barbhuiya, J.Sarma & S.Dey, sp. nov.: **A**, type locality showing plant habit and habitat; **B**, inflorescence; **C**, flowers; **D**, fruits (photos by J. Sarma).

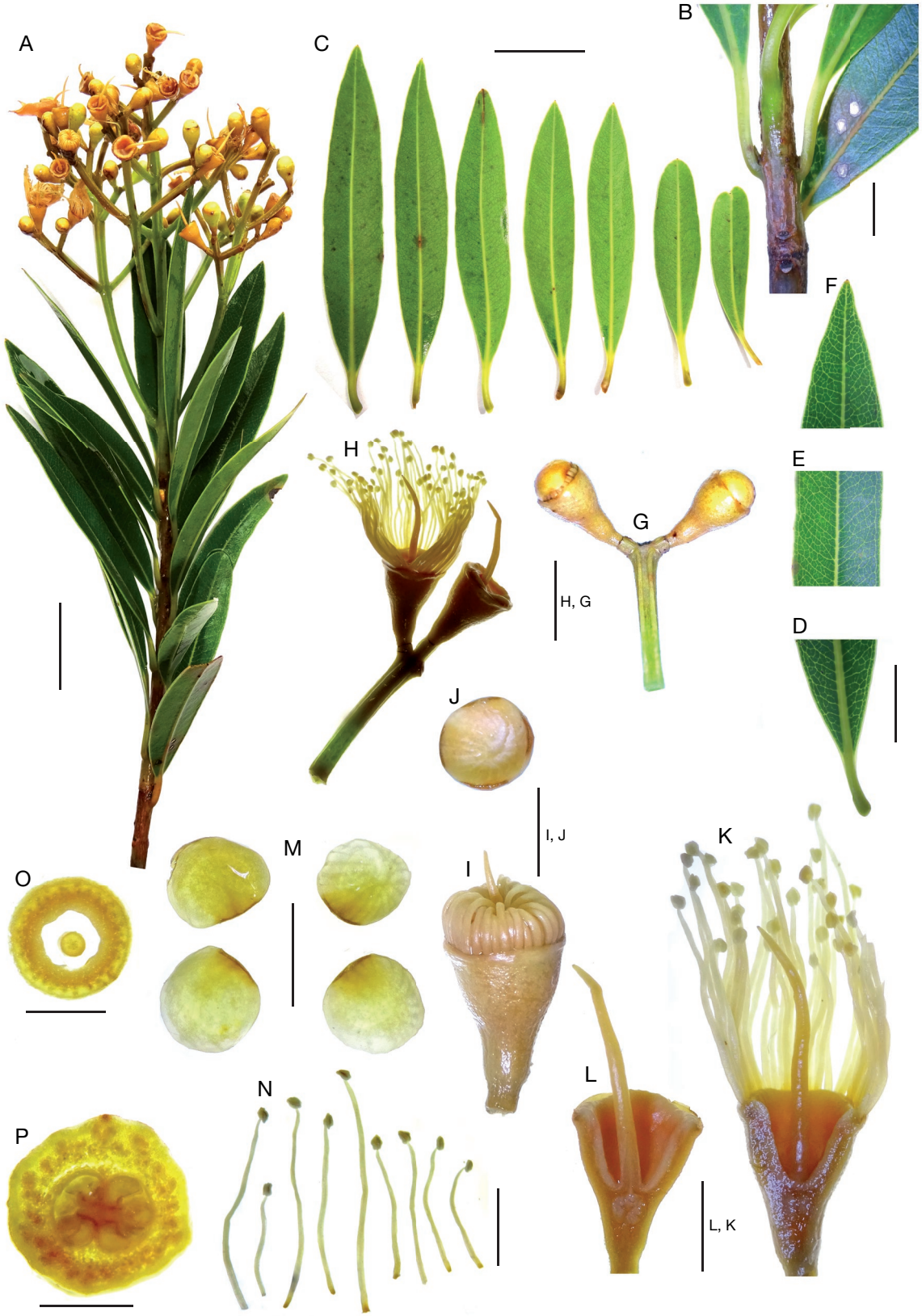

Fig. 2. — *Syzygium nivae* Barbhuiya, J.Sarma & S.Dey, sp. nov.: **A**, apex of a branch showing inflorescence and leaves; **B**, a portion of the stem showing arrangement of leaves; **C**, leaves; **D**, leaf base showing petiole; **E**, middle portion of a leaf showing reticulate venation; **F**, leaf apex; **G**, a portion of the inflorescence showing flower buds; **H**, a portion of the inflorescence showing flowers; **I**, an opened flower bud; **J**, calyptra; **K**, L.S. of the flower; **L**, L.S. of hypanthium and gynoecium; **M**, petals; **N**, stamens; **O**, T.S. of calyx tube and style; **P**, T.S. of ovary (photos by H. A. Barbhuiya, based on holotype). Scale bars: A, C, 2 cm; B, G, H, 5 mm; D-F, 1 cm; I-N, 3 mm; O, 2 mm; P, 1 mm.

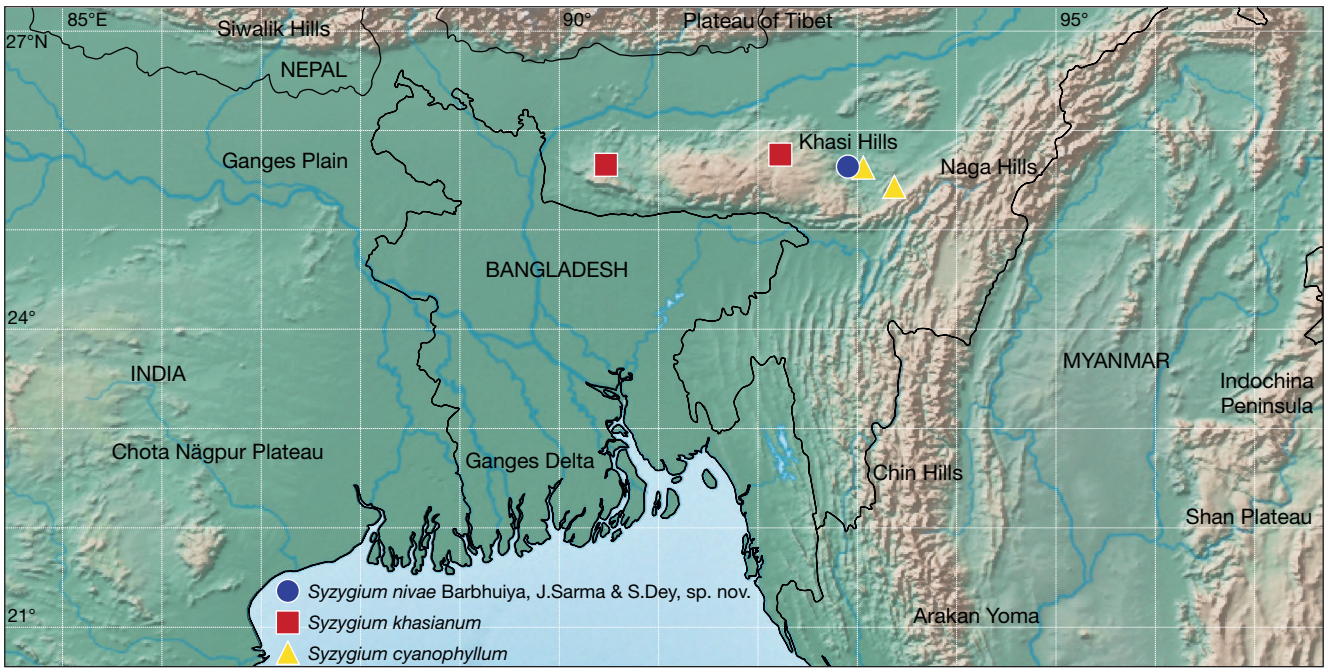

Fig. 3. — Distribution map of *Syzygium nivae* Barbhuiya, J.Sarma & S.Dey, sp. nov., *S. khasianum* (Duthie) N.P.Balakr. and *S. cyanophyllum* (P.C.Kanjilal & Das) Raizada. Map Created with SimpleMappr, http://www.simplemappr.net (Shorthouse 2010).

Description

A rheophytic shrub, to 2.5 m high; branchlets terete. Leaves opposite decussate, coriaceous; blade narrowly lanceolate, 3.1-6.6 × 0.8-1.1 cm, margins revolute, finely reticulate, both surfaces glabrous, deep green above, pale-green beneath, apex acuminate or obtuse, rarely retuse, base attenuate; midvein subcanaliculate above, raised beneath; lateral veins numerous, obscure, brochidodromous, 0.5-1.6 mm apart; intramarginal vein looped, 0.5-0.8 mm away from the leaf margin; petiole yellowish, 8.3-11 mm long, glabrous. Inflorescence a paniculate-cyme, terminal and axillary at upper leaf axils, to 12 cm long and *c.* 6.8 cm in diam.; branches quadrangular, green, opposite spreading, 1.4-2.5 mm in diam.; peduncle subquadrangular, 1.8-2.5 cm long. Flowers sessile or shortly pedicellate; pedicel, to 0.6 mm long. Flower bud pyriform, 5-6 mm long, flowers 10-12 mm in across during anthesis; hypanthium obconic, 4.9-7.4 mm long and 4.2-5.2 mm wide at apex. Calyx tube *c.* 3.1 mm long and up to 5.2 mm in diam.; lobes inconspicuous. Petals 4, falling as a calyptra, suborbicular, bowl-shaped 2.4-3.0 mm in diam. Stamens many, of different lengths; filaments cylindric, narrowed at apex, 4.0-8.6 mm long and 0.1-0.3 mm in diam.; anthers minute, versatile, 0.4-0.6 × 0.2-0.4 mm. Ovary fleshy *c.* 3.1 × 1.7 mm, 2-locular, glabrous; style *c.* 8.3 mm long, 0.2-0.5 mm in diam., cylindric, thickened at base, narrowed upwards; stigma inconspicuous. Fruits slightly oblong or subglobose, 1.0-1.6 × 0.8-1.3 cm, apex with cup-shaped limb, reddish when young, blackish on ripening and slightly sweeter in taste.

Remarks

Syzygium nivae Barbhuiya, J.Sarma & S.Dey, sp. nov. shows superficial similarity with *S. khasianum* (Duthie) N.P.Balakr. But the latter is quite distinct from the former by its arboreal habit, abruptly acuminate and caudate leaf apex, longer peduncles, much smaller flowers, etc. The detailed comparison between the two species is summarized in the Table 1. The other closely related species occurring in the same locality was *S. cyanophyllum* (P.C.Kanjilal & Das) Raizada, which can be easily distinguished from the newly described species by its smaller leaves, shortly corymbose inflorescence bearing flowers with long hypanthium.

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