

Syzygium nusatenggaraense (Myrtaceae), a new rainforest tree species with a calyptrate calyx from the Lesser Sunda Islands, Indonesia

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Abstract

A new rainforest tree species of the myrtle family (Myrtaceae), *Syzygium nusatenggaraense* Sunarti & Y.W.Low is described here based on two collections from the Lesser Sunda Islands. This species is superficially similar to *Syzygium arcanum* P.S.Ashton, a Bornean endemic tree species, but differs in a suite of morphological characters and geographic distribution. The new species is illustrated, and description is here given.

Satu spesies pohon hutan hujan baru dari suku jambu-jambuan atau Myrtaceae, *Syzygium nusatenggaraense* Sunarti & Y.W.Low diterbitkan disini berdasarkan kepada dua koleksi dari Kepulauan Nusa Tenggara. Spesies ini mirip dengan satu spesies pohon endemik Borneo *Syzygium arcanum* P.S.Ashton, tetapi berbeda dalam rangkaian karakter morfologi dan distribusi geografisnya. Spesies baru tersebut diilustrasikan dan deskripsi diberikan di sini.

Keywords: East Nusa Tenggara Province, Flores, Malesia, Sumbawa, taxonomy, Wallacea, West Nusa Tenggara Province

Introduction

The genus *Cleistocalyx* Blume was erected to accommodate two Old World myrtaceous taxa with calyptrate calyces, namely *Cleistocalyx nitidus* (Korth.) Blume and *Cleistocalyx nervosus* (Lour.) Blume (Blume, 1850). Later, a revision of the genus enumerated 21 taxa occurring from Bangladesh to South-eastern China, through Southeast Asia into northern Australia, New Caledonia and Fiji (Merrill and Perry, 1937). However, the genus was not recognised by subsequent workers (such as Henderson, 1949; Kochummen, 1978; Hyland, 1983) due to lack of corroborative evidence acquired from anatomical studies (Dadswell and Ingle, 1947; Ingle and Dadswell, 1953; Pike, 1956; Schmid, 1972). Results obtained from molecular phylogenetic analyses showed *Cleistocalyx* to be polyphyletic; members of the genus were found to have derived from multiple lineages across the *Syzygium* phylogeny (Harrington and Gadek, 2004; Biffin et al. 2006; Craven and Biffin, 2010; Vasconcelos et al. 2020; Low et al. 2021). In addition, molecular results supported uniting of the various segregate syzygioid genera such as *Acmena* DC., *Jambosa* Adans., *Piliocalyx* Brongn. & Gris, *Waterhousea*

B.Hyland and *Cleistocalyx*, under a single genus, *Syzygium* P.Browne ex Gaertn. (Craven and Biffin, 2010; Maurin et al. 2021).

Syzygium is the largest tree genus in the world with over 1000 species enumerated (Beech et al. 2017). Naturally occurring *Syzygium* species are restricted to the Old World, extending from the African continent through to the Indian subcontinent, Southeast Asia, Australia and the Pacific islands, but the centre of its species diversity lies in Southeast Asia (Craven et al. 2006; Parnell et al. 2007; Govaerts et al. 2021), in the phytogeographical region defined as Malesia (van Steenis, 1950). The most well-known species of the genus is the clove tree, *Syzygium aromaticum* (L.) Merr. & L.M.Perry, highly prized for its dried flower buds widely used as a spice, flavour enhancer, preservative and in pharmacology (Ridley, 1912; Burkill, 1966; Batiha et al. 2020). Other notable members of the genus are *Syzygium aqueum* (Burm.f.) Alston, *S. cumini* (L.) Skeels, *S. jambos* (L.) Alston, *S. malaccense* (L.) Merr. & L.M.Perry and *S. samarangense* (Blume) Merr. & L.M.Perry, cultivated in the tropics worldwide for their small to large, juicy, edible fruits (Kochummen, 1978; Ashton, 2011). Due to its immense species diversity and apparent lack of salient morphological characters for species distinction, *Syzygium* is notorious for being a “taxonomically difficult” group and was neglected by botanists, even labelled as a “Cinderella” genus (Craven, 2001; Parnell et al. 2007; Craven and Biffin, 2010). This is reflected in the large number of unnamed specimens held in various regional herbaria (Parnell et al. 2007).

Sumbawa is the largest island amongst a chain of volcanic islands that forms the Lesser Sunda Islands. While sorting through herbarium material of Sumbawan *Syzygium* at Herbarium Bogoriense (BO), an unidentified *Syzygium* specimen (*Kostermans 18766*) with a calyptrate calyx terminating in a long rostrum was encountered. In attempting to identify this taxon, we examined all *Cleistocalyx* taxa enumerated in Merrill and Perry (1937) and concluded that *Kostermans 18766* is distinct from all *Cleistocalyx* taxa listed in their revision. The *World Checklist of Selected Plant Families* (WCSP) records 22 *Syzygium* species for the Lesser Sunda Islands (Govaerts et al. 2021). We proceeded to examine herbarium specimens of these 22 *Syzygium* taxa held at K, BO and SING (herbarium abbreviations follow Thiers 2021-continuously updated), as well as virtual herbarium collections of the Nationaal Herbarium Nederland (L) through the BioPortal Naturalis website (<https://bioportal.naturalis.nl/?language=en>) and type images at JSTOR Global Plants (<https://plants.jstor.org>), and established that *Kostermans 18766* is distinct from the 22 *Syzygium* taxa enumerated for Lesser Sunda Islands. A survey of all *Syzygium* taxa with calyptrate calyx described for Malesia further revealed that *Kostermans 18766* is superficially similar to a Bornean endemic, *Syzygium arcanum* P.S.Ashton (Ashton, 2006; Ashton 2011), but distinct based on a suite of morphological characters and geographical distribution. It is concluded that *Kostermans 18766* is an undescribed novelty and is named here as *Syzygium nusatenggaraense* Sunarti & Y.W.Low. Separately, a collection from Flores (*Verheijen 3005*) that also represents *Syzygium nusatenggaraense* was brought to our attention by Peter Wilson (pers. comm.) and this extends the range of its distribution beyond Sumbawa.

Syzygium nusatenggaraense has a disjunct distribution represented by two collections across the Lesser Sunda Islands. Both islands, Flores and Sumbawa, have been relatively well botanised in the intervening years and the species has not been recollected, suggesting that it is rare. Although description of new species based on only two collections is not ideal, it is important to document biodiversity while species and their habitats are extant. This maximises their subsequent chance for rediscovery and further study.

Taxonomic treatment

Syzygium nusatenggaraense Sunarti & Y.W.Low, **sp. nov.** (Fig. 1).

Diagnosis: This species is morphologically similar to *Syzygium arcanum* P.S.Ashton but differs in having young twigs smooth and slightly compressed (vs angular and sharply 4-ribbed in *S. arcanum*), the leaf base obtuse (vs narrowly cuneate in *S. arcanum*), up to 30 pairs of secondary veins with spaces in between veins c. 1 mm wide (vs up to 10 pairs and 6–7 mm wide in *S. arcanum*), lower leaf surface sparsely black dotted (vs densely black dotted in *S. arcanum*), and flower buds obovoid with an abrupt pointed rostrum to 3 mm long (vs ovoid and without a conspicuous rostrum in *S. arcanum*).

Type: INDONESIA: West Nusa Tenggara Province: Sumbawa, West Sumbawa, Mount Batulanteh, northwestern slope, moist *Dipterocarpus retusus* forest, 500–700 m asl, 7 May 1961, *Kostermans 18766* (holo: L [L.2520634]! iso: A, BO [BO1721103]!, G, K!, SING [SING0212723]!).

Etymology: The species epithet denotes the fact that the species is so far known only from Lesser Sunda Islands, where it was collected from Flores and Sumbawa.

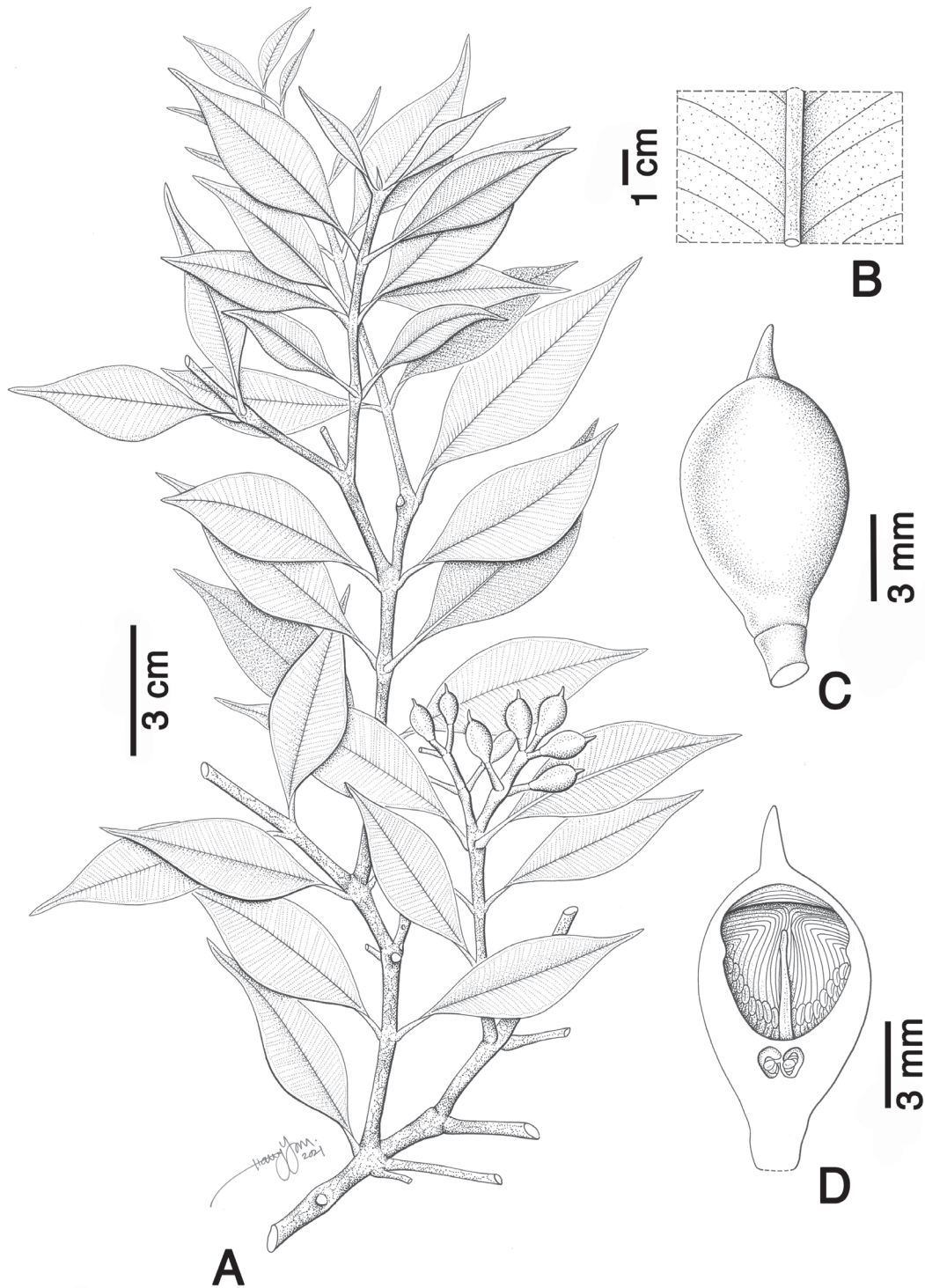


Fig. 1. *Syzygium nusatenggaraense* Sunarti & Y.W.Low. **A.** habit of a leafy flowering branch; **B.** close-up of lower leaf surface showing densely black dotted glands; **C.** close-up of a flower bud showing the apex terminating with a pointed rostrum; **D.** flower bud opened longitudinally; note the densely packed and folded stamens surrounding the immature style. All drawn from the type, *Kostermans 18766* (SING). Illustration by X.Y. Loh.

Tree to 25 m tall, 30 cm diam.; bark pale brown to dark brown, fibrous. Plants glabrous throughout. *Branchlets* smooth and slightly compressed. *Leaves* opposite to rarely subopposite and decussate; petioles 5–8 mm long, c. 1 mm wide; lamina lanceolate, 4–6 × 1.7–2.4 cm, thin coriaceous, drying dark brown, paler beneath, lower surface densely black dotted, margin entire; leaf base obtuse; leaf apex acuminate to caudate; midrib sunken on upper surface, raised and prominent on lower surface; secondary veins numerous, up to 30 pairs, parallel and c. 1 mm apart, raised on both surfaces and more prominent on lower surface; intramarginal vein 1, up to 0.5 mm from the margin. *Inflorescences* terminal or axillary, up to 6 cm long, hardly branched or multiple

branchlets emerging from single node. *Flower buds* with a fused perianth (calyx lobes) forming a calyptra terminating with an abrupt pointed rostrum to 3 mm long, the calyptra falls off as a cap-like structure during anthesis, obovoid, 11–13 × 5.5–6 mm, pseudostalk to 2 mm long; pedicels 1–17.5 mm long; hypanthium obconical, 8–9 × 5.5–8 mm. *Stamens* numerous, arranged in rows at mouth margin of the hypanthium; filaments 5–8 mm long, dark red; anthers to 0.5 × 0.4 mm. *Style* to 9 mm long; ovary 2-locular, up to 11 ovules per locule; placentas axile, ovules radiating, ascending. *Fruits* unknown.

Distribution: *Syzygium nusatenggaraense* is so far recorded only from Flores and Sumbawa, Lesser Sunda Islands (Fig. 2).



Fig. 2. Geographic distribution of *Syzygium arcanum* and *Syzygium nusatenggaraense*.

Habitat and ecology: In Flores, *Syzygium nusatenggaraense* was recorded from the highlands of Potjo Gurung, Ruteng at 1700 m asl (Verheijen 1963; Mees 2006); in Sumbawa, it was recorded from moist evergreen forest dominated by *Dipterocarpus retusus* (Dipterocarpaceae) at 500–700 m asl.

Phenology: Flower buds, open flowers and immature fruits collected in May and September.

Preliminary conservation assessment: *Syzygium nusatenggaraense* is here classified as Data Deficient (DD), following the recommendations proposed under IUCN (2012). This species is known only from two collections made between 1961–1971 and more efforts are needed to document this species carefully in its habitat and to reassess its range, population size and threats considering almost all tropical rainforest regions have been identified as biodiversity hotspots (Myers et al. 2000; Nic Lughadha et al. 2020).

Additional specimen examined: INDONESIA: East Nusa Tenggara Province: Flores, Sano, Ruteng, Potjo Gurung, 1700 m asl, 18 Sep 1971, Verheijen 3005 (L [L.2520595]!).

Notes: Phylogenetic studies (see Harrington and Gadek, 2004; Biffin et al. 2006; Low et al. 2021) have shown *Syzygium* species with calycine calyptra derive from multiple lineages and anatomical analysis (Vasconcelos et al. 2020) indicates that closed *Syzygium* calyces have multiple developmental origins. As a result, locating the species most closely related to *Syzygium nusatenggaraense* will be a challenge, further compounded by the lack of a complete inventory of *Syzygium* species occurring in the Lesser Sunda Islands and surrounding regions. It is possible that closely related species of *Syzygium nusatenggaraense* have free calyx lobes, but we are unable to identify plausible candidates amongst the 22 *Syzygium* species enumerated for the Lesser Sunda Islands until now (Govaerts et al. 2021).

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