



Monoon kalimantanense (Annonaceae), a new species from Kalimantan, Borneo, Indonesia

SUBEKTI NURMAWATI^{1,2,5}, NUNIK SRI ARIYANTI^{3,6}, TATIK CHIKMAWATI^{3,7} & PAUL J.A. KEBLER^{4,8}

¹Plant Biology Graduate Program, Department of Biology, Faculty of Mathematics and Natural Sciences, IPB University (Bogor Agricultural University), Bogor, Indonesia.

²Biology Study Program, Faculty of Science and Technology, Universitas Terbuka, Jakarta, Indonesia.

³Department of Biology, Faculty of Mathematics and Natural Sciences, IPB University (Bogor Agricultural University), Bogor, Indonesia.

⁴Universiteit Leiden, Hortus Botanicus Leiden, PO Box 9500 2300 RA Leiden, The Netherlands.

⁵✉ nurma@ecampus.ut.ac.id; <https://orcid.org/0000-0001-5585-3252>

⁶✉ nunika@apps.ipb.ac.id; <https://orcid.org/0000-0002-5487-741X>

⁷✉ tchikmawati@yahoo.com; <https://orcid.org/0000-0001-9085-7590>

⁸✉ p.j.a.kessler@hortus.leidenuniv.nl; <https://orcid.org/0000-0001-6569-4726>

Introduction

During the study of *Monoon* Miquel (1865: 15) in western Malesia, we found two individuals of this genus cultivated in the Bogor Botanic Garden. According to the catalogue *An alphabetical list of plant species cultivated in the Bogor Botanic Gardens*, these plants were collected from South Kalimantan in 1977 (Sari *et al.* 2010). Leaves and aggregate fruits of these plants indicated that they are a species of *Monoon* (Annonaceae). The leaves exhibit eucamptodromous venation, decurrent insertion of secondary veins, and scalariform tertiary veins. The aggregate fruits consist of many one-seeded, stalked monocarps. However, other characters indicated that they differ from already known *Monoon* species. We consider these plants, therefore as new to science.

This new species shares characters with *M. lateriflorum* (Blume) Miquel (1865: 19), previously *Guatteria lateriflora* Blume (1825: 20) and *M. sclerophyllum* (Hook. & Thomson) Xue & Saunders in Xue *et al.* (2012: 1033), previously *Polyalthia sclerophylla* Hooker & Thomson (1872: 65), in having ramiflorous, fasciculate inflorescences, many-flowered fascicles, oblong petals slightly constricted basally and many-stipitate monocarps (ca. 30) in aggregate fruits. However, other characters of leaves, flowers, and monocarps indicate that this new material differs from *M. lateriflorum*, and *M. sclerophyllum* (Table 1).

Taxonomy

Monoon kalimantanense Nurmawati, *sp. nov.* (Fig. 1, 2)

Type:—INDONESIA. Cultivated at Bogor Botanic Gardens XX.D.122a, 6°35'48.89"S, 106°47'59.20"E, from seed material collected in the wild by de Vogel, provenance possibly South Kalimantan, without specific information, prepared 23 Apr 2018, *Handayani 342* (holotype: BO!)

Small trees, leaves 35–49 cm long. Inflorescences ramiflorous, with many flowers, stigma surface densely curly hairy. Inflorescences position and monocarp of *Monoon kalimantanense* is similar to *M. lateriflorum* and *M. sclerophyllum* but differs in having larger leaves with a rounded base, green pedicels, broadly triangular and densely hairy sepals, shorter oblong petals and monocarps slightly asymmetrically attached on the stipe.

Small trees ca. 12 m high, dbh ca. 20 cm. Twigs slightly terete with tubercles, covered with sparsely appressed hairs but ultimately glabrous. Leaves horizontally spreading; petiole transversely grooved circularly, 7–12 × 4–6 mm, dark brown when dry, glabrous; lamina elliptic-oblong, 35–49 × 13–16 cm, base rounded, apex acute to strongly acuminate (acumen ca. 2 cm); midrib plain, glabrous adaxially, prominent and puberulous abaxially, longitudinally

furrowed; secondary veins eucamptodromous, slightly straight, 1–2 mm from the margin, 17–22 pairs, 2.0–2.5 cm between the two secondary veins, attached decurrently to the midrib, diverging at 45–50 degrees from the midrib, plain adaxially, prominent abaxially, glabrous on both sides; tertiary veins scalariform, prominent abaxially. Inflorescences ramiflorous fasciculate, borne on woody tubercles of branches, many-flowered (c. >3 flowers) in fascicles. Pedicels 1–3 cm long, ca. 0.1 cm in diameter, green, sparsely hairy; single bracteole attached at the mid-point of the pedicel, clasping, triangular, ca. 0.2 × 0.4 cm, apex acute, glabrous abaxially, pubescent adaxially; sepals 3, connate at base, broadly triangular, 2–3 × 4–5 mm, apex acute, glabrous adaxially, densely covered with rusty hairs abaxially; petals 6, in two whorls; outer petals slightly imbricate, connate at base, oblong, 2.2–4.5 × 0.5–0.7 cm, slightly constricted at lower part, apex acute, venation conspicuous, greenish, pubescent on both sides, inner petals oblong, 2.5–5.0 × 0.7–1.0 cm, valvate, concave at base; androecium with numerous stamens, spirally and tightly arranged into a pentagonal, obovate, 1.5–2.0 × 0.5–1.0 mm, connective convex, glabrous; gynoecium with carpels 15–20 tightly packed; carpels ca. 2 × 1 mm, ovaries cylindrical, ca. 1 mm long, glabrous, stigma sessile, cylindrical ca. 0.5 mm long, densely hairy apically, torus subglobose, conical, densely hairy. Fruit aggregate with (7) 15–30 monocarps, pedicel longitudinally grooved, 1.7–2.0 cm long, 0.3–0.4 cm thick, glabrous; torus subglobose, 1.5–2.2 × 1.2 cm, basal abscission 3–4 mm diameter, glabrous; stipe slightly wrinkled, 10–20 mm long, 4–5 mm thick, glabrous; monocarps ellipsoidal, slightly asymmetrical, 2.3–2.7 cm long, 1.6–1.8 cm in diameter, glabrous, black when ripe and dried, pericarp ca. 0.5 mm thick. Seed one per monocarp, ellipsoidal, ca. 2.0 × 1.2 cm, attached vertically, smooth, distinct, surface longitudinally grooved, smooth; endosperm ruminations lamelliform, soft.

TABLE 1. Comparison of morphological characters of *Monoon kalimantanense*, *M. lateriflorum* and *M. sclerophyllum*.

Character	<i>M. kalimantanense</i>	<i>M. lateriflorum</i>	<i>M. sclerophyllum</i>
Leaf base	rounded	subcordate	obtuse
Leaf size (cm)	35.0–49.0 × 13.0–16.0	10.0–36.0 × 4.0–12.0	13.0–20.0 × 4.0–6.5
Tertiary veins	prominent abaxially	prominent abaxially	prominent on both sides
Living flower pedicel	green	yellow	red
Sepal shape	broadly triangular	orbiculate	ovate
Abaxial sepal indumentum	densely hairy	sparsely hairy	sparsely hairy
Petal colour	greenish	yellow with red basal flush	red with dark red basal flush
Outer petal (cm)	2.2–4.5 × 0.5–0.7	6.0–7.0 × 0.9–1.0	4.0–4.5 × 0.5–0.8
Inner petal (cm)	2.5–5.0 × 0.7–1.0	5.0–5.5 × 0.6–0.8	3.5–4.0 × 0.4–0.6
Stipe attachment on monocarps	asymmetrical	symmetrical	symmetrical

Distribution, habitat, and ecology:—Known only from the Bogor Botanical Garden, most probably originally in South Kalimantan, Meratus Mts, near Muara Uja, Jaro Dam. The plants cultivated in the Garden have full exposure to sunlight with an average rainfall of 3000 to 4000 mm annually.

Phenology:—Flowering and fruiting in the rainy season in April when the specimens were prepared and based on our observations in January, February, June, and July.

Etymology:—Referring to its provenance in South Kalimantan.

Conservation Status:—Possibly known only from South Kalimantan without specific provenance, and thus according to IUCN criteria (IUCN 2013) its status should be data deficient (DD).

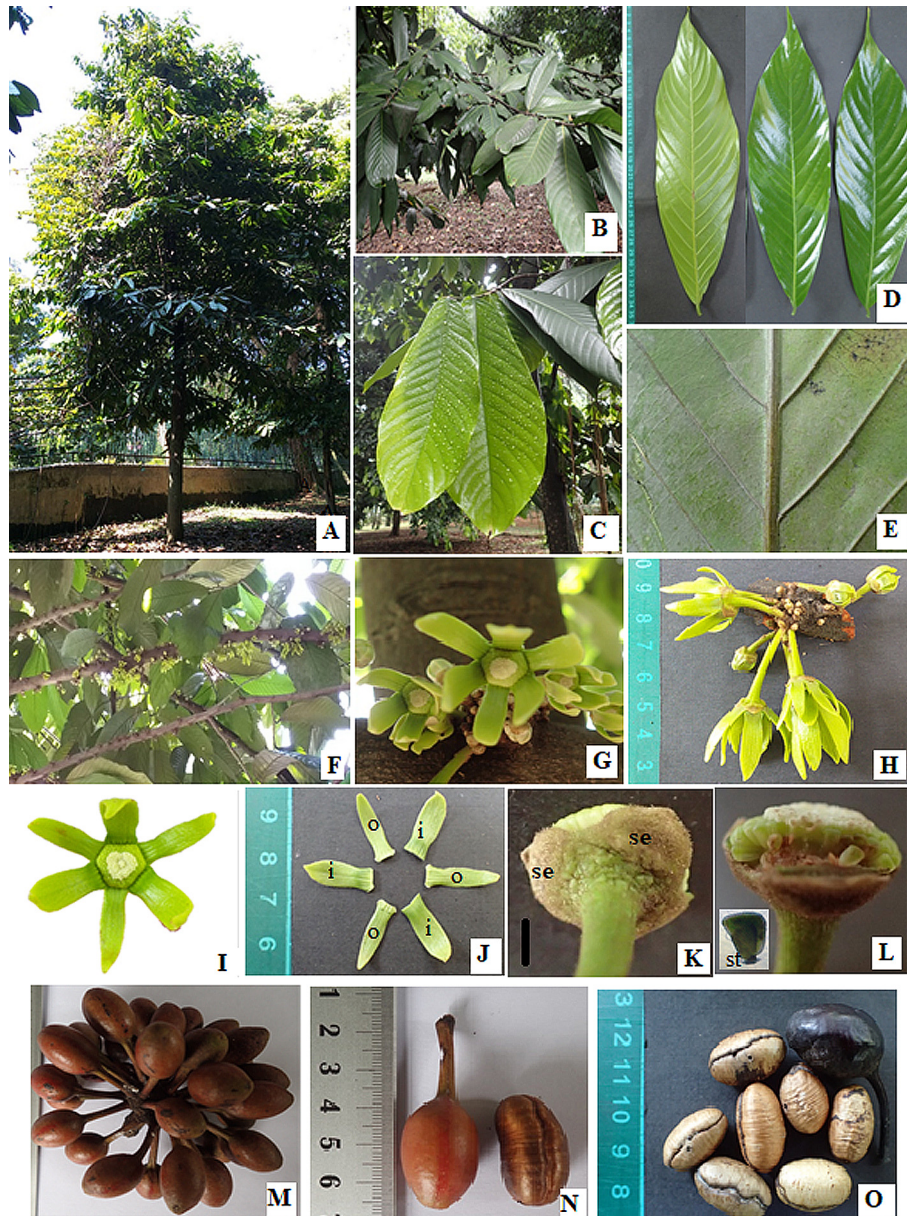


FIGURE 1. *Monoon kalimantanensis*. A. Plant habit. B. Spreading branches with mature leaves. C. Glossy young leaves. D. Abaxial and adaxial surfaces of the lamina. E. Decurrent secondary veins. F. Ramiflorous inflorescences. G–H. Flowers in fascicles. I. Flower with stamens and carpels arranged on the torus. J. Inner (i) and outer (o) petals removed from the torus. K. Sepal. L. Stamens arrangement on the torus. M. Fruit. N–O. Monocarps and seeds. Labels: se = sepal, st = stamen. Scale bars, K–L = 1 mm. Photos by S. Nurmawati from Bogor Botanic Gardens, block XX.D.122a.

Notes:—According to Sari *et al.* (2010) and de Vogel (1980), the new species is planted in blocks XX.D.122 and XX.D.122a at Bogor and was collected as seeds from the wild in South Kalimantan by E.F. de Vogel (*DV2247*). In this study, we found a specimen with the same collection number at Leiden (L), but this collection and the two plants in cultivation at Bogor have important differences, particularly infructescences, the number of seeds per monocarp, and monocarp shape. The latter at L is clearly *Orophea creaghii* (Ridley) Leonardia & P.J.A. Kessler (2001: 149), as noted on the label. The differences are abundant ellipsoidal monocarps with a single seed in the plants at Bogor Botanic Garden. In contrast, the herbarium material at L, de Vogel (*DV 2247*), has a few sub-globose monocarps with two seeds. These are different species, although most probably both collected in the same area in 1972. The discrepancy is likely caused by a human error during the handling of the specimens at that time. In our recent study, we recognize 24 species of *Monoon* in Borneo, mainly characterized by inflorescences born from the axils of leaves or main trunk with solitary flowers to many in fascicles. Only five of them, i.e., *M. congestum* (Ridl.) Xue & Saunders in Xue *et al.* (2012:

1030) described as *Xylopiya congesta* Ridley (1912: 387), *M. lateriflorum*, *M. longifolium* (Sonn.) Xue & Saunders in Xue *et al.* (2012: 1030) previously *Uvaria longifolia* Sonnerat (1782: 233), *M. sclerophyllum*, and *M. kalimantanensis* exhibit peculiar characters in having ramiflorous inflorescences with many flowers in fascicles. An identification key to these five species is presented below.

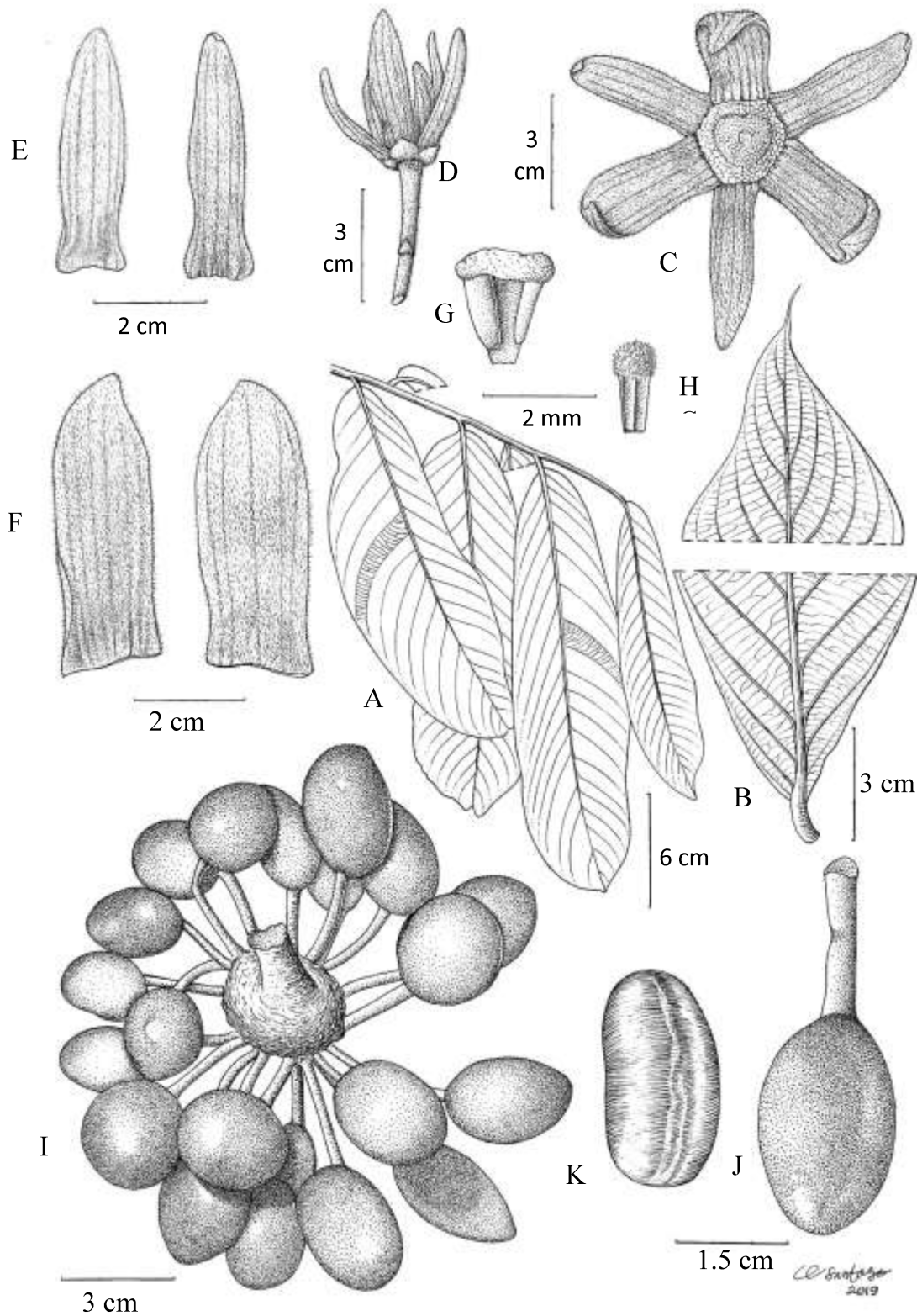


FIGURE 2. *Monoon kalimantanensis*. A. Leaves on twig. B. Lamina base, lamina apex, and scalariform tertiary vein. C. Flower. D. Pedicellate flower with a bracteole. E. Outer petals. F. Inner petals. G. Stamen. H. Ovary. I. Fruit. J. Stipitate monocarp. K. Seed. Illustration by Wahyu Santoso.

1. Branches pendulous, leaf margin undulate.....*M. longifolium*.....2
- Branches spreading, leaf margin flat2
2. Bracteole at base of the pedicel about 1 mm long; petals lanceolate, ≤ 2 mm wide; stigma glabrous; torus of aggregate fruit c. 10 mm in diameter.....*M. congestum*.....3
- Bracteole at mid-point of pedicel, 2–5 mm long; petals oblong, 5–10 mm wide: stigma hairy; torus of aggregate fruit c. 20 mm in diameter3
3. Lamina lanceolate, base cuneate, abaxial midrib glabrous, tertiary veins prominent on both sides; stamens hairy.....*M. sclerophyllum*.....4
- Lamina oblong-elliptic, base rounded, abaxial midrib hairy, tertiary veins prominent abaxially, stamens glabrous4
4. Lamina with adaxial midrib glabrous, secondary veins 17–22 pairs; pedicel 1–3 cm long, glabrous; sepals 4–5 mm wide, glabrous abaxially; petals 2.2–4.5 cm long, light green; ovary glabrous; monocarp with stipe 1.7–2.0 cm long*M. kalimantanense*.....5
- Lamina with adaxial midrib hairy, secondary veins 8–14 pairs; pedicel 4–6 cm long, hairy; sepals ca. 2 mm wide, hairy abaxially; petals 6–7 cm long, yellow with red flush at base; ovary hairy; monocarp stipe 3.0–5.5 cm long.....*M. lateriflorum*.....5

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