

# TREE FLORA of SABAH AND SARAWAK

Volume One

edited by  
E. Soepadmo and K.M. Wong



ITTO  
International Tropical  
Timber Organization



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TREE FLORA  
of  
SABAH AND SARAWAK

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**GOVERNMENT OF MALAYSIA**



**INTERNATIONAL TROPICAL TIMBER ORGANIZATION**



**OVERSEAS DEVELOPMENT ADMINISTRATION, U.K.**

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## Volume One

*edited by*

E. Soepadmo and K.M. Wong

*A joint publication of*



Sabah Forestry  
Department, Malaysia



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# CONTENTS

	<i>Page</i>
Foreword	VII
Acknowledgements	IX
<b>INTRODUCTION</b>	
Background to the Tree Flora of Sabah and Sarawak Project ( <i>E. Soepadmo</i> )	XIII
A Brief History of Botanical Collecting and Documentation in Borneo ( <i>K.M. Wong</i> )	XXI
Biogeography and Ecology ( <i>P.S. Ashton</i> )	XLIII
<b>THE TREE FLORA PROPER</b>	
1. Aceraceae ( <i>A. Noorsiha</i> )	1
2. Alangiaceae ( <i>A. Berhaman</i> )	5
3. Anisophylleaceae ( <i>K.M. Wong &amp; L. Madani</i> )	15
4. Araucariaceae ( <i>P.C. Yii</i> )	27
5. Bignoniaceae ( <i>A. Berhaman</i> )	33
6. Burseraceae ( <i>K.M. Kochummen</i> )	45
7. Capparaceae ( <i>Deborah Kennard</i> )	101
8. Celastraceae ( <i>K.M. Kochummen</i> )	107
9. Chrysobalanaceae ( <i>Ghilleen T. Prance</i> )	155
10. Clethraceae ( <i>A. Berhaman</i> )	181
11. Connaraceae ( <i>Lesmy Tipot</i> )	187
12. Cornaceae ( <i>R.C.K. Chung</i> )	199
13. Datisceae ( <i>E.J.F. Campbell-Gasis</i> )	209
14. Goodeniaceae ( <i>K.M. Wong</i> )	213
15. Hypericaceae ( <i>K.M. Wong</i> )	219
16. Illiciaceae ( <i>Richard M.K. Saunders</i> )	227
17. Juglandaceae ( <i>E.J.F. Campbell-Gasis</i> )	233
18. Monimiaceae ( <i>P.C. Yii &amp; Lesmy Tipot</i> )	245
19. Nyssaceae ( <i>P.C. Yii</i> )	253
20. Ochnaceae ( <i>K.M. Kochummen</i> )	257
21. Olacaceae ( <i>Lesmy Tipot</i> )	271
22. Oxalidaceae ( <i>R.C.K. Chung</i> )	287
23. Pittosporaceae ( <i>John B. Sugau</i> )	297
24. Rhamnaceae ( <i>Carsten Schirarend</i> )	305
25. Rhizophoraceae ( <i>L. Madani &amp; K.M. Wong</i> )	321
26. Rutaceae ( <i>David T. Jones</i> )	351
27. Simaroubaceae ( <i>Julius Kulip &amp; K.M. Wong</i> )	421
28. Sonneratiaceae ( <i>Othman Bojo</i> )	443
29. Staphyleaceae ( <i>J.T. Pereira</i> )	453
30. Styracaceae ( <i>R. Kiew</i> )	463
31. Trigoniaceae ( <i>K.M. Wong</i> )	467
Abbreviations of Frequently Cited References	471
Commonly Used Abbreviations for Localities	473
Glossary	474
Index to Scientific Names	487
Index to Vernacular Names	506

## CORNACEAE

**R.C.K. Chung**

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Ridley, FMP 1 (1922) 889 (excluding *Alangium*, *Aralidium* and *Nyssa*); Merrill, EB (1921) 459, PEB (1929) 233; Danser, Blumea 1 (1934) 46; Backer & Bakhuizen f., FJ 2 (1965) 158; Matthew, Blumea 23 (1976) 51, FM 1, 8 (1977) 85; Kochummen, TFM 3 (1978) 53; Anderson, CLTS (1980) 164; Whitmore, Tantra & Sutisna, CLK 1 (1989) 49.

Trees, shrubs, or rarely herbs. **Leaves** *opposite, subopposite or alternate*, simple, entire or rarely serrate, pinnately veined, *exstipulate*, usually petiolate. **Flowers** *regular (actinomorphic), 4–5-merous, bisexual or sometimes unisexual*, arranged in axillary or terminal cymes, panicles or heads; *calyx-tube* adnate to the ovary, 4–5-lobed or subtruncate, *persistent in fruit*; petals 4–5, free, valvate or imbricate in buds; stamens short and equal in number with the petals, 2-locular, dehiscing lengthwise; *disc large*, cushion-shaped at the top of the ovary, *generally persistent in fruit*; *ovary inferior, 1–4-locular, ovule 1 in each locule, pendulous*, with dorsal or ventral (in *Curtisia* and *Mastixia*) raphe, style simple or lobed. **Fruit** usually a *drupe*, rarely a *berry* (in *Aucuba* and *Griselinia*). **Seeds** usually 1–2, rarely 4, *with small elongate embryo embedded in copious oily endosperm*.

**Distribution.** About 8–15 genera and 100 species; mainly in the temperate zones and in the tropics (rare in Africa and South America). In Sabah and Sarawak, represented by the genus *Mastixia* with 7 species.

**Ecology.** Insect-pollination is probably a general phenomenon in the family, except in *Griselinia litoralis* which has been reported to be wind-pollinated.

**Uses.** In Sabah and Sarawak, very little is known about the utilization of members of the family. However, the fruit of *Chamaepericlymenum suecicum* is eaten by the Eskimos. In France, *Cornus mas* (Cornelian cherry) is grown as ornamentals, and the fruit is edible and used as a source of raw material for making "Vin de Cornouille". The Assegay tree or Cape Lance wood (*Curtisia faginea*) produces durable, red to brown timber and used for making furnitures in South Africa. *Aucuba japonica* is a popular evergreen garden shrub widely cultivated in temperate and subtropical countries.

**Taxonomy.** The taxonomic and systematic status of the Cornaceae remains controversial (Matthew *l.c.* 1976, *l.c.* 1977; Mabberley, The Plant Book (1987) 146; and Brummitt, Vascular Plant Families & Genera (1992) 543). In the Malesian region, Ridley (*l.c.*) and Keng (OFMSP, 1969) included *Alangium*, *Aralidium*, *Mastixia* and *Nyssa* in the Cornaceae, whereas van Steenis (Checklist Gen. Names Mal. Bot. (1987) 50) placed *Alangium* in its own family (Alangiaceae), *Aralidium* in the Araliaceae, and *Nyssa* in the Nyssaceae, leaving *Mastixia* as the sole representative of the family in the Malesian region.

## MASTIXIA Blume

(Greek , *mastix* = whip; the whiplike apex of the petals)

Bijdr. (1825) 654, Mus. Bot. Lugd. Bat. 1 (1850) 256; Bentham & Hooker *f.*, Gen. Pl. (1887) 950; Harms in Engl. & Prantl, Pfl. Fam. 3 (1898) 262; Wangerin in Engl., Pfl. Reich. 4, 229, 41 (1910) 19; Ridley *l.c.* 889; Merrill *l.c.* (1921) 459, *l.c.* (1929) 233; Danser *l.c.* 47; Backer & Bakhuizen *f. l.c.* 159; Matthew *l.c.* (1976) 51, *l.c.* (1977) 85; Kochummen *l.c.* 53; Whitmore, Tantra & Sutisna *l.c.* 49; Ng, MFFSS 1 (1991) 47.

Trees, usually without buttresses. **Bark** grey to grey-brown, smooth with horizontal rings, rarely cracked to shallowly fissured, *often exuding white resin when bruised*; inner bark orange-yellow, gritty, granular, *with strong smell of sugarcane water*. **Sapwood** soft, yellowish white or white. **Leaves** *alternate, subopposite or opposite*, margin entire; midrib sunken on adaxial surface, prominent below; lateral veins usually distinct on the abaxial surface. **Inflorescences** terminal or sometimes axillary cymose-panicles. **Flowers** *bisexual*, in triads, sessile, subtended by tiny, persistent bracts; *calyx-tube* obconical or barrel-shaped or cup-shaped, lobes spreading or not, broader than long or sometimes appear as minute sharp tips, *persistent in fruit*; petals thick, concave, valvate in bud, inflexed and strongly connate at the upper parts; stamens attached below the disc, abutting on and alternating with disc-lobes, opposite the calyx-lobes, filaments subulate, flattened and tapered toward its upper part, anthers cordate, dorsifixed, introrse-latorse; *ovary turbinate, one-locular, surmounted by a fleshy, lobed and grooved disc which is sometimes persistent in fruit*; style very short, stout, ribbed; *stigma punctiform, sometimes bifid or 4–5-lobed*, reflexed, *some persistent in fruit*. **Fruit** a drupe, ovoid, ellipsoid or oblong, *surmounted by calyx-tube and crowned by the persistent disc (the exposed part of the fruit)*; *pericarp* (exocarp and mesocarp) thin or thick, *turning to dark purple or blue when ripe*; fruit-wall formed by calyx-tube and pericarp; endocarp stony. **Seed** 1, ovoid or ellipsoid, with membranous testa; endosperm large and U-shaped in transverse section; embryo small and straight, cotyledons thin and foliaceous; germination epigeal.

**Distribution.** About 13 species; from the western Ghats and Sri Lanka, NE India, Bhutan, Burma, Thailand, Indo-China, S Yunnan, Hainan, through Malesia to New Britain and the Solomon Islands. 7 species (including 2 endemic) are found in Sabah and Sarawak.

**Ecology.** Found mainly in valleys, slopes or ridges of primary and secondary mixed dipterocarp forests, often in moist habitats, from sea-level to 2200 m.

**Uses.** Although the trees may reach a considerable size, the scattered occurrence does not contribute to their general use as timber. In addition the timber has little commercial value and therefore only used for packing cases and temporary constructions.

**Taxonomy.** *Mastixia* is strictly a SE Asian genus. It was included in the Cornaceae by Bentham & Hooker *f. (l.c.)* and Hutchinson (Genera of Flowering Plants 2 (1967) 42), whereas Harms (*l.c.*) and Wangerin (*l.c.*) included it in a distinct subfamily. Wangerin distinguished two subgenera, *viz. Tetramastixia* and *Pentamastixia*. Matthew (1976 & 1977), on the other hand, established two subgenera, *Manglesia* (2 species) and *Mastixia* (11 species). He recognised two series, the *Oppositae* and *Alternae* within the subgenus *Mastixia* based on a single character, *viz. whether the first branches of the inflorescence are opposite (or subopposite) or alternate*. In the absence of flower and fruit and due to the

presence of resin in the bole and on the cut ends of logs, the genus can be easily confused with some species of the Dipterocarpaceae that have smooth or cracked bark, such as *Vatica* species. However, in *Mastixia* the inner bark is thick and gritty with a strong sugarcane smell and the wood is soft. Foresters sometimes confuse this genus with those of the Lauraceae (*medang*) because of the gritty inner bark and strong aromatic smell; however *medang* has no resin.

### Key to *Mastixia* species

1. Leaf surface velvety hairy below, if glabrescent then midrib hairy.....2  
 Leaf surface glabrous.....3
2. Leaves alternate. Twigs and stalks distinctly grooved.....**4. M. macrocarpa**  
 Leaves opposite. Twigs and stalks not so.....**7. M. trichotoma**
3. Leaves glaucous below.....**3. M. glauca**  
 Leaves not glaucous below.....4
4. Leaf-margin wavy when dry; stalks 2–3 cm long.....**2. M. eugenioides**  
 Leaf-margin not wavy when dry; stalks shorter than 2 cm.....5
5. Leaves thickly leathery; margin curled inwards. Twigs dark brown to black when dry  
 .....**5. M. pentandra**  
 Leaves thinly leathery; margin not curled inwards. Twigs grey or grey-brown when dry  
 .....6
6. Leaf lateral veins looping near margin. Flower buds up to 3 mm diameter; petals  
 densely hairy on the abaxial surface.....**1. M. cuspidata**  
 Leaf lateral veins not looping near margin. Flower buds up to 2 mm diameter; petals  
 glabrous on the abaxial surface.....**6. M. rostrata**

#### 1. *Mastixia cuspidata* Blume

(Latin, *cuspidatus* = sharp-pointed; the leaf apex)

*l.c.* (1850) 256; Miquel, *Fl. Ind. Bat. I*, 1 (1855) 772; Ridley *l.c.* 891; Merrill *l.c.* (1921) 459; Danser *l.c.* 55 (excl. var. *margarethae*); Matthew *l.c.* (1976) 79, *l.c.* (1977) 95; Kochummen *l.c.* 54; Whitmore, Tantra & Sutisna *l.c.* 49. **Type:** *Korthals, s.n.*, Sumatra, West Coast (lectotype L; isolectotype U). **Synonyms:** *Mastixia pentandra* Blume var. *cuspidata* (Blume) Miq. *l.c.* (1858) 1095; *Mastixia bracteata* Clarke in Hooker *f.*, *Fl. Brit. Ind.* 2 (1879) 746.

Tree to 40 m tall, and 40 cm diameter. **Bark** greyish to chocolate-brown, smooth to shallowly fissured; inner bark yellowish to brownish, mottled. **Sapwood** yellowish to brownish. Twigs subglabrous, grey-brown. **Leaves** alternate, subopposite or opposite, stalk slender, 0.5–1.5 cm long; blades narrowly obovate, elliptic or oblong, 3.5–9 x 1.5–3.5 cm, thinly leathery, glabrous; base cuneate, apex cuspidate with a tip 0.5–1(–1.5) cm long, oblique; lateral veins (4–)5 pairs, curving near the margin and joining with next one to form looped intramarginal veins, sunken above; intercostal veins faint to inconspicuous below,

inconspicuous above. **Inflorescences** to 4 cm long, subglabrous to puberulous. **Flowers** 5-merous, green to yellow, buds to 3 mm diameter; *calyx-tube densely silky-hairy*, with 5 lobes, broader than long, subglabrous; *petals* 1.5–2 x 0.5–1 mm, *densely silky-hairy on abaxial surface*; stamens 5, filament 1–3.2 mm long; disc yellowish. **Fruits** oblong, 1.5–3 x 0.5–1.3 cm; fruit-wall thin; *persistent disc well-exposed*; persistent calyx-lobes inconspicuous. **Seeds** ellipsoid, 1.5–2.5 x 0.4–1 cm.

**Vernacular name.** Sarawak—*biansu gunong* (Iban).

**Distribution.** Sumatra, Peninsular Malaysia and throughout Borneo. Uncommon in Sabah and Sarawak. In Sabah, recorded from Sipitang, Sandakan, Lahad Datu, and Tawau. In Sarawak, known from Mt. Matang (1st Div.), Sri Aman (2nd Div.), Mt. Dulit near Long Kapa (4th Div.), and Belaga (7th Div.).

**Ecology.** In primary and secondary mixed dipterocarp forests, to 900 m. Flowering in February–March and July–October; and fruiting in January, March, July–August and October.

Sterile specimens of small-leaved *M. cuspidata* are difficult to distinguish from *M. rostrata* ssp. *caudatifolia*.

## 2. *Mastixia eugenioides* Matthew

(leaves resembling that of *Eugenia*)

*l.c.* (1976) 73, *l.c.* (1977) 93; Whitmore, Tantra & Sutisna *l.c.* 50. **Type:** *Beccari PB 2033*, Sarawak, Mt. Matang (holotype FI; isotype L).

Tree to 30 m tall and 30 cm diameter. **Bark** greyish to yellowish brown, smooth; inner bark yellowish brown. Twigs glabrous. **Leaves** *opposite, stalk green to greenish yellow, stout, 1.5–3 cm long*; blades elliptic to oblong-elliptic, 4–15 x 2–5.5 cm, thickly leathery, glabrous; base cuneate, margin wavy after drying, apex acuminate to caudate; *lateral veins 5–7 pairs*, flattened above; intermediate lateral veins and intercostal veins prominent below. **Inflorescences** to 8 cm long, glabrous. **Flowers** *4-merous*, buds about 1.5–2 mm diameter; calyx-tube glabrous, with 4 lobes, broader than long, glabrous; petals 4, 1–1.5 x 0.5–0.8 mm, glabrous on abaxial surface; stamens 4, filament 0.6–1 mm. **Fruits** green turning to purple when ripe, ovoid (young stage) to oblong, 2–2.5 x 1–1.5 cm; fruit-wall thin; persistent disc not well-exposed; persistent calyx-lobes inconspicuous. **Seed** ellipsoid, 1.9–2.4 x 0.8–1.1 cm.

**Vernacular name.** Sarawak—*sempetan* (Kenyah).

**Distribution.** Endemic to Borneo (Sarawak, Sabah, Brunei, and Kalimantan). In Sarawak, recorded from Bukit Senyandang Lingga (2nd Div.), Lambir Hills National Park; Similajau FR (4th Div.), Lawas (5th Div.), and Kapit (7th Div.). In Sabah, known from Tenom, Sandakan and Tawau.

**Ecology.** In primary mixed dipterocarp forests, from lowlands up to 1200 m. Flowering in July–August, fruiting in September–December.

### 3. *Mastixia glauca* Matthew

(Greek, *glaukos* = bluish-grey; the lower surface of the leaves)

*l.c.* (1976) 76, *l.c.* (1977) 95; Whitmore, Tantra & Sutisna *l.c.* 50. **Type:** *Hj. Bujang S. 13481*, Sarawak, 1st Div., Kuching, G. Santubong East (holotype L; isotypes K, SAR).

Tree to 15 m tall, 25 cm diameter. Twigs yellowish, glabrous. **Leaves** *alternate, stalk stout, 2–3.5 cm long*; blades obovate, 7–16 x 4–8.5 cm, thickly leathery, *glaucous and waxy below, glabrous*; base obtuse, margin wavy when dry, apex apiculate; *lateral veins 4–5 pairs* with intermediate lateral veins faint to inconspicuous; intercostal veins inconspicuous. **Inflorescences** subglabrous to puberulous. **Flowers** 4(–5)-merous, greenish yellow; buds 2.8–3.2 mm diameter; calyx-tube puberulous, with 4(–5) lobes, as long as wide, puberulous; petals 4(–5), 1.6–2.1 x 0.6–1.2 mm, hairy on abaxial surface; stamens 4–5, filament 0.9–1.2 mm long. Fruits & seeds unknown.

**Distribution.** Endemic to Sarawak, and so far only known from Mt. Santubong.

**Ecology.** In mixed dipterocarp forest at about 90 m. Flowering in April–May.

### 4. *Mastixia macrocarpa* Matthew

(Greek, *macros* = large, *carpos* = fruit)

*l.c.* (1976) 75, *l.c.* (1977) 94; Whitmore, Tantra & Sutisna *l.c.* 50. **Type:** *Benang S. 24745*, Sarawak, Miri, Bakam Road (holotype A; isotypes BO, K, KEP, L, MEL, NY, SAN, SAR, SING).

Tree to 20 m tall, 20 cm diameter. Twigs covered with sticky resin when fresh, rusty brown, rough-hairy and *distinctly grooved*. **Leaves** *alternate, stalk stout, 4–6 cm long, grooved, hairy like the twigs*; blades elliptic-oblong to oblong, 13–26 x 5.5–13 cm, thinly leathery, *villous below*; base *cuneate to asymmetric*, apex acute to acuminate; *lateral veins 7–10 pairs*, flatten above, prominent below; *intercostal veins prominent, scalariform or reticulate*. **Inflorescences** to 9 cm long, densely hairy. **Flowers** 5-merous, densely hairy, buds *c.* 4 mm diameter; calyx-tube densely hairy, with 5 lobes, broader than the length, villous; petals 5, 1.8–2.3 x 0.8–1.2 mm, velvety on abaxial surface; stamen 5, filament 1–1.5 mm long. **Fruits** pale green, oblong-ovoid, *c.* 4 x 2 cm; fruit-wall thin; persistent disc not well-exposed; persistent *calyx-lobes prominent, 4–5 mm long*. **Seeds** ellipsoid, *c.* 3.8 x 1.8 cm.

**Distribution.** Borneo, Philippines (Luzon). In Sarawak known from Miri, Bakam Road; not yet recorded from Sabah, Brunei, and Kalimantan.

**Ecology.** In mixed dipterocarp forest, at about 75 m. Flowering in October, fruiting in June.

## 5. *Mastixia pentandra* Blume

(Greek, *penta* = five, *-andrus* = male; with 5 stamens)

*l.c.* (1825) 654; Danser *l.c.* 49; Backer & Bakhuizen *f. l.c.* 159; Matthew *l.c.* (1976) 80, *l.c.* (1977) 95; Whitmore, Tantra & Sutisna *l.c.* 50. **Type:** Blume, *s.n.* (= *Leiden no.* 901, 169–375), Java (lectotype L; isolectotypes NY, W).

subsp. **scortechinii** (King) Matthew

*l.c.* (1976) 80, *l.c.* (1977) 54. **Basionym:** *Mastixia scortechinii* King, J. As. Soc. Beng. 71, 1 (1902) 72. **Type:** *Scortechinii* 1971, Perak (lectotype K; isolectotypes BM, CAL, G, L, P). **Synonyms:** *Mastixia megacarpa* Ridl. *l.c.* 891; *Mastixia parvifolia* Hallier *f.*, Beih. Bot. Centralbl. 34, 2 (1916) 41, Merrill *l.c.* (1921) 459.

Tree to 40 m tall, 80 cm diameter; *buttresses short*. **Bark** grey-brown, smooth to shallowly fissured with horizontal rings and lenticels in rows; inner bark yellowish brown to dark yellow, *with strong smell of sugarcane*. **Sapwood** pale yellow to brownish. **Twigs** glabrous, *dark brown to black*. **Leaves** *alternate, spiral or subopposite, stalk stout, 1–2 cm long*; blades obovate to oblong or elliptic, 5–12 x 2.5–5 cm, *thickly leathery*, glabrous; base cuneate, *margin curled inwards*, apex acute or acuminate but sometimes caudate; *lateral veins 4–6 pairs*, flattened above; *intercostal veins and reticulations faint to inconspicuous on both surfaces*. **Inflorescences** to 8 cm long, puberulous to villous. **Flowers** (4–)5-merous, greenish or yellowish white, buds *c.* 2 mm diameter; calyx-tube puberulous, with (4–)5 lobes, as long as wide; petals (4–)5, 1.2–1.5 x 0.8–1 mm, hairy on the abaxial surface; stamens (4–)5, filament 0.5–0.7 mm long. **Fruits** green, ripening purple to bluish black, ovoid to oblong, 1.6–3.5 x 0.8–1.2 cm; fruit-wall thick; persistent disc well-exposed and sometimes bulging; persistent calyx-lobes inconspicuous. **Seeds** ovoid, 0.9–1.2 x 0.5–0.8 cm.

**Vernacular names.** Sabah and Sarawak—*kaju wulu, medang surungan* (Malay).

**Distribution.** Thailand, Sumatra, Peninsular Malaysia, Borneo (Sabah and Kalimantan), and Celebes. In Sabah recorded only from Mt. Kinabalu and Mesilau Hill.

**Ecology.** Uncommon, distributed from lowland to submontane forests to 1500 m. Flowering and fruiting in January–December

**Taxonomy.** In Matthew's treatment, *Mastixia pentandra* was segregated into six subspecies, *viz. pentandra, moluccana, chinensis, cambodiana, philippinensis* and *scortechinii*. Of these, only *M. pentandra* subsp. *scortechinii* is known from Sabah.

## 6. *Mastixia rostrata* Blume

Fig. 1.

(Latin, *rostratus* = with a beak, narrowed into a slender tip or point; the leaf apex)

*l.c.* (1850) 258; Danser *l.c.* 52; Backer & Bakhuizen *f. l.c.* 159; Matthew *l.c.* (1976) 73, *l.c.* (1977) 94; Anderson *l.c.* 164; Whitmore, Tantra & Sutisna *l.c.* 50. **Type:** Blume, *s.n.* (= *Leiden no.* 901, 169–384), Java (lectotype L).

subsp. **caudatifolia** (Merr.) Matthew

*l.c.* (1976) 74, *l.c.* (1977) 94. **Basionym:** *Mastixia caudatifolia* Merr. *l.c.* (1929) 233. **Type:** Elmer 21584, British North Borneo, Tawau, Elphinstone Prov. (holotype UC; isotypes A, BM, BO, GH, HBG, K, L, NY, P, SING, U, UC, US). **Synonyms:** *M. margarethae* Wangerin, Fedde Rep. 4 (1907) 335; *M. cuspidata* Blume var. *margarathae* (Wangerin) Hallier f. *l.c.* 41.

Tree to 30 m tall and 50 cm in diameter. **Bark** greyish to chocolate-brown, smooth to occasionally shallowly fissured; inner bark yellowish to pale orange-yellow, fibrous, soft. **Sapwood** yellowish. **Twigs** glabrous, grey or grey-brown. **Leaves** alternate, subopposite or opposite, stalk slender, to 1(–1.5) cm long; blades elliptic-oblong to elliptic, 4–8(–10) x 2–5 cm, papery to thinly leathery, glabrous; base cuneate, margin not curled inward, apex caudate with the tip to 1.5 cm long; lateral veins 4–6 pairs, prominent below, sunken above, not looping toward leaf margin; intercostal veins faint to inconspicuous below. **Inflorescences** to 6 cm long, subglabrous. **Flowers** 4-merous, green-yellow, buds to 1 mm diameter; calyx-tube glabrous, with 4 lobes, broader than long, glabrous; petals 4, 1.1–1.3 x 0.7–0.9 mm, glabrous on the abaxial surface; stamens 4, filament 1–1.3 mm long; disc yellowish. **Fruits** ovoid to oblong, 1.5–2.2 x 0.5–1 cm; fruit-wall thick; persistent disc not well-exposed; persistent calyx-lobes inconspicuous. **Seeds** ellipsoid, 1.3–2 x 0.6–0.8 cm.

**Vernacular name.** Sarawak—*patoli entelit* (Iban).

**Distribution.** Sumatra, Peninsular Malaysia (new record), and Borneo. Widely distributed in Sabah and the W and C parts of Sarawak.

**Ecology.** In primary mixed dipterocarp forest on clay-rich soils, from lowland to 1600 m. Flowering in June to October, fruiting in August to March.

**Taxonomy.** In Matthew's treatment, *Mastixia rostrata* was segregated into two subspecies, viz. *rostrata* and *caudatifolia*. Of these, only *M. rostrata* subsp. *caudatifolia* is known from Sabah and Sarawak.

## 7. *Mastixia trichotoma* Blume

(Greek, *tri* = three, *tomos* = part; the 3-branched inflorescence)

*l.c.* (1825) 655, King *l.c.* 72; Wangerin *l.c.* (1910) 24; Merrill *l.c.* (1921) 459; Danser *l.c.* 57; Matthew *l.c.* (1976) 68, *l.c.* (1977) 92; Kochummen *l.c.* 54; Anderson *l.c.* 164; Whitmore, Tantra & Sutisna *l.c.* 50. **Type:** Blume, *s.n.*, West Java, Mt. Salak (lectotype L; isolectotypes BM, W). **Synonyms:** *Mastixia laxa* Blume *l.c.* (1850) 257 (including var. *angustifolia*); *Mastixia acuminatissima* Blume *l.c.* (1850) 258; *Mastixia caesia* Blume *l.c.* (1850) 258; *Mastixia kimanilla* Blume *l.c.* (1850) 258.

Tree to 40 m tall and 50 cm diameter. **Bark** yellowish grey to grey-brown, smooth to shallowly fissured; inner bark yellowish brown to pale brown. **Sapwood** pale white. **Twigs** not distinctly grooved, yellowish brown to pale brown, puberulous to woolly. **Leaves** opposite, stalk stout or slender, 1–3.5 cm; blades ovate, elliptic, lanceolate to oblong, 5–24 x 2.5–12 cm, thinly to thickly leathery, subglabrous to velvety hairy below; base acute, cuneate, obtuse or attenuate, apex acute to acuminate; lateral veins 5–15 pairs, sunken above, prominent below; intercostal veins reticulate, faintly visible to prominent below. **Inflorescences** to 15 cm long, puberulous to woolly. **Flowers** 4–5-merous, green to yellowish green; buds 1–2.5 mm diameter; calyx-tube puberulous to villous, with 4 or 5 lobes, as long as wide, puberulous to villous; petals 4 or 5, puberulous to villous on the abaxial surface; stamens 4 or 5. **Fruits** ovoid to ellipsoid, 1.5–3 x 0.6–1.5 cm, fruit-wall

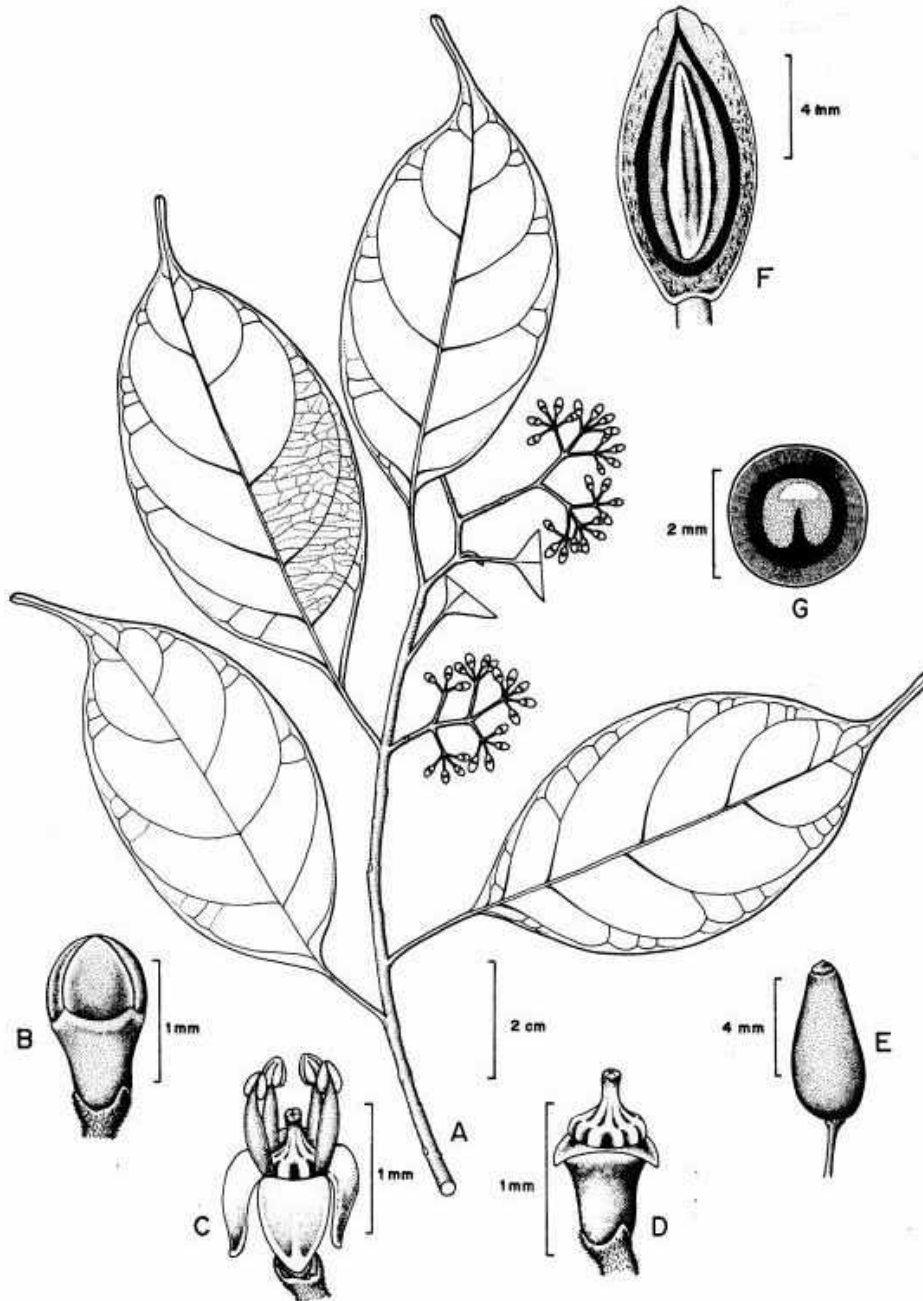
thin; persistent disc well-exposed and bulging or not; persistent calyx-lobes inconspicuous to slightly prominent. **Seeds** ovoid to ellipsoid, 1.3–2.9 x 0.4–1.4 cm.

**Key to varieties**

1. Inflorescence villous to woolly. Lateral veins looping to form marginal veins; intercostal veins distinct and prominent below.....2  
Inflorescence subglabrous to puberulous. Lateral veins not looping; intercostal veins not prominent below.....3

2. Twigs woolly. Leaves villous to woolly, thickly leathery. Flowers 4-merous.....  
var. **maingayi** (Clarke) Danser  
*l.c.* 63; Matthew *l.c.* (1976) 70, *l.c.* (1977) 93; Kochummen *l.c.* 54. Basionym: *M. maingayi* Clarke *l.c.* 746. Type: *Maingay* 2680 = *Kew Distr.* 711, Singapore (holotype K; isotypes BM, GH, L). Synonyms: *M. maingayi* Clarke var. *subtomentosa* King *l.c.* 75; *M. propinqua* Ridl., J. Fed. Mal. St. Mus. 4,1 (1909) 25.  
*Twigs woolly by short yellowish brown hairs. Leaf-stalk stout, 2–3.5 cm, woolly brown-hairy. Leaves 8.5–22 x 3.5–10.5 cm, thickly leathery, abaxial surface woolly brown-hairy, adaxial surface glabrous except the midrib and veins; lateral veins 5–6 pairs, prominently sunken above and raised below, forming marginal loops below; intercostal veins prominently sunken above and raised below. Inflorescences villous to woolly. Flowers 4-merous. Fruits with well-exposed persistent disc; persistent calyx-lobes 1.5–2 mm long.*  
Sumatra, Peninsular Malaysia, Borneo. In Sabah recorded from Lahad Datu, Ranau, Sipitang, and Tawau districts. In Sarawak, recorded from only Kapit (3rd Div.) and Ulu Lawas (5th Div.). In primary and secondary mixed dipterocarp forests, to 1500 m.

- Twigs subglabrous to velutinous. Leaves glabrous to subglabrous. Flowers 5-merous.....  
var. **korthalsiana** (Wangerin) Danser  
*l.c.* 63; Matthew *l.c.* (1976) 70, *l.c.* (1977) 93. Basionym: *M. korthalsiana* Wangerin *l.c.* (1907) 335. Type: *Korthals, s.n.*, E Borneo, Bandjermasin, G. Sakoembang (L).  
*Twigs subglabrous to velutinous. Leaf-stalks slender, 1.5–2 cm. Leaves 7–13 x 3–5 cm, glabrous to subglabrous; lateral veins 5–6 pairs, forming looped marginal veins below; intercostal veins prominent below. Inflorescences velutinous to woolly. Flowers 5-merous. Fruits with well-exposed persistent disc; persistent calyx-lobes to 1 mm long.*  
Sumatra and Borneo (Sabah and Kalimantan). In Sabah, recorded from Kota Belud, Lahad Datu, Sandakan, Sipitang, and Tawau districts. No record from Sarawak. In primary mixed dipterocarp forest, from low altitude to 1100 m.



**Fig. 1.** *Mastixia rostrata* subsp. *caudatifolia*. A, flowering leafy twig; B, flower bud; C, open flower; D, open flower with petals and stamens removed; E, fruit; F, fruit in longitudinal section; G, fruit in cross section. (A–D from SAN 30572, E–G from S. 36376.)

3. Leaves 9–24 x 4–12 cm, margin not wavy after drying, under surface not pale yellow when dry. Twigs and leaves (sub)glabrous. Fruits with persistent disc well-exposed and bulging.....

var. **rhynchocarpa** Danser.

*l.c.* 64; Matthew *l.c.* (1976) 71, *l.c.* (1977) 93. Type: *Endert 4769*, E Borneo, East Coast, near Long Hoet, 150 m (lectotype L; isolectotypes A, BO, K). Synonyms: *Mastixia trichotoma* Blume var. *benculuana* Danser *l.c.* 64; *Mastixia trichotoma* Blume var. *simalurana* Danser *l.c.* 65.

Twigs subglabrous. *Leaf-stalks stout, 1.5–2 cm long.* Leaves 9–24 x 4–12 cm, thickly leathery, subglabrous, *under surface not pale yellow when dry; lateral veins 5–15 pairs, not looping near the margin; intercostal veins faintly visible below.* Inflorescences subglabrous to puberulous. Flowers 4-merous. Fruits crowned by bulging, well-exposed persistent disc; persistent calyx-lobes to 0.5 mm long.

Sumatra, Java, Borneo, Celebes, and the Moluccas. In Sabah widely distributed. In Sarawak in Ulu Mujong (3rd Div.), Lawas (5th Div.), and Kapit (7th Div.). In primary mixed dipterocarp forests, to 1800 m.

- Leaves 7.5–15 x 2.5–6 cm, margin wavy after drying, under surface pale yellow when dry. Twigs and leaves covered with powdery tomentum. Fruits not so.....

var. **clarkeana** (King) Danser

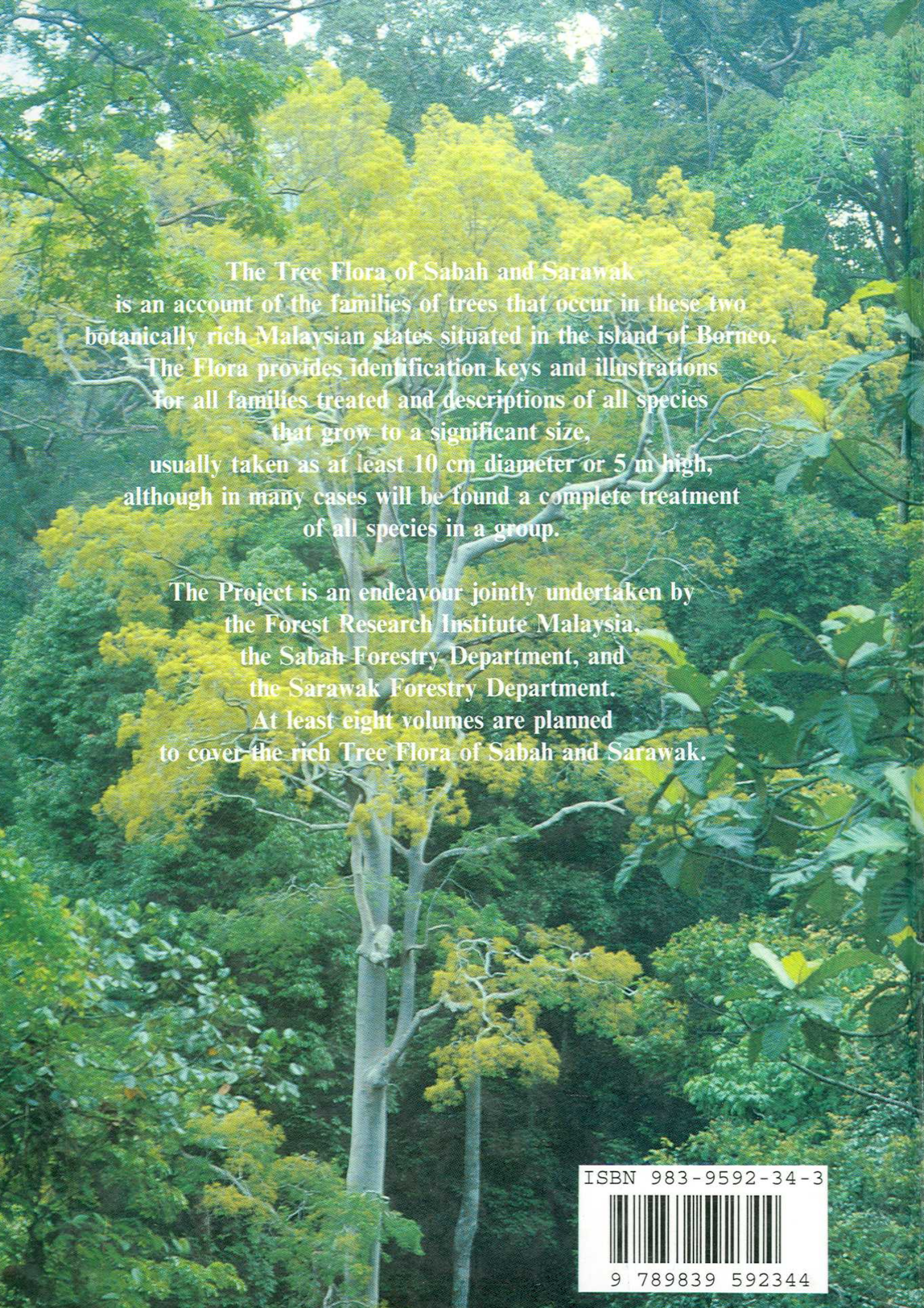
*l.c.* 62; Matthew *l.c.* (1976) 72, *l.c.* (1977) 93; Kochummen *l.c.* 54. Basionym: *Mastixia clarkeana* King *l.c.* 72. Type: *Scortechini 869*, Perak (lectotype K; isolectotypes CAL, G, L, P). Synonyms: *Mastixia clarkeana* King var. *macrophylla* King *l.c.* 72; *Mastixia korthalsiana* Wangerin var. *macrophylla* Wangerin *l.c.* (1907) 336; *Vitex premnoides* Elmer *l.c.* 2874; *Mastixia premnoides* (Elmer) Hallier f. *l.c.* 42; *Mastixia trichotoma* Blume var. *tenuis* Danser *l.c.* 61.

Twigs covered with pale brown powdery tomentum. *Leaf-stalks slender, 1–1.5 cm long.* Leaves elliptic, 7.5–15 x 2.5–6 cm, *under surface pale yellow on drying; lateral veins 5–7 pairs, not looping near the margin; intercostal veins faintly visible below.* Inflorescences subglabrous to puberulous. Flowers 4-merous. Fruits without well-exposed persistent disc; persistent calyx-lobes prominent, 0.5–1 mm long.

Pattani (Peninsular Thailand), Sumatra, Peninsular Malaysia, Borneo, and Mindanao (Philippines). Uncommon in Borneo, recorded only from Kuching and Mt. Penrissen (1st. Div.) in Sarawak. No record from Sabah. In primary mixed dipterocarp forest, from low altitude to 1100 m.

**Vernacular names.** Sabah—*bantis* (Dusun Kinabatangan), *medang kanigara* (Malay). Sarawak—*itan beruang* (Kelabit), *medang kanigara* (Malay), *priabu* (Murut).

**Taxonomy.** Of the five varieties recognised by Matthew *l.c.*, four occur in Sabah and Sarawak.



The Tree Flora of Sabah and Sarawak  
is an account of the families of trees that occur in these two  
botanically rich Malaysian states situated in the island of Borneo.  
The Flora provides identification keys and illustrations  
for all families treated and descriptions of all species  
that grow to a significant size,  
usually taken as at least 10 cm diameter or 5 m high,  
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