

MYRISTICACEAE

肉豆蔻科 rou dou kou ke

Li Bingtao (李秉滔 Li Ping-tao)¹; Thomas K. Wilson²

Evergreen trees, with tawny or red juice in bark or around heart wood. Leaves simple, alternate, entire, exstipulate, with pinnate veins, often pellucid punctate, spirally or distichously arranged. Inflorescences axillary, paniculate, racemose, capitate, or cymose; flowers fascicled, in various racemose arrangements or clusters; bracts caducous; bracteoles inserted on pedicels or at base of perianth. Plants monoecious or dioecious. Flowers small, unisexual. Perianth gamophyllous; lobes (2 or)3–5, valvate. Stamens 2–40 (often 16–18 in China); filaments connate into a column (staminal column) or peltate disk (staminal disk), apex with anthers connivent or connate into disciform, globose, or elongate synandrium; anthers 2-locular, extrorse, dehiscent longitudinally, adnate to column abaxially, or free. Ovary superior, sessile, 1-locular, anatropous ovule 1, inserted near base; style short or lacking; stigma 2-lobed or lobes connate into a disk, with 2 fissures or with lacerate margin. Fruit with pericarp leathery-fleshy, or near woody, dehiscent into 2 valves. Seed 1, large, arillate; aril fleshy, entire or shallowly or deeply lacerate; testa of 3 or 4 layers, outer layer crustose, middle layer often woody and rather thick, inner layer membranous; endosperm often with volatile oil, ruminate or wrinkled, containing fat (mainly 14C fatty acid) and little amyllum; embryo near base. Pollen often with slender reticulate pattern. $x = 9, 21, 25$.

About 20 genera and ca. 500 species: tropical Asia to Pacific islands, also in Africa and tropical America; three genera and 11 species (one introduced) in China.

Li Yan-hui. 1979. Myristicaceae. *In*: Tsiang Ying & Li Ping-t'ao, eds., *Fl. Reipubl. Popularis Sin.* 30(2): 176–205.

- 1a. Pedicel without bracteole; male inflorescences complex panicles; aril entire or shallowly lacerate at apex 3. *Horsfieldia*
1b. Pedicel with bracteole; male inflorescences with flowers arranged in dense raceme or subumbellate; aril entire, lacerate at apex, or deeply lacinate almost to base.
2a. Inflorescences unbranched (or bifurcate); filaments connate into a peltate disk, anthers short; stigmas discoid, shallowly bifid or margin dentate or lacerate; aril entire or lacerate at apex 1. *Knema*
2b. Inflorescences dichotomously branched; filaments connate into a column, anthers slender; stigmas shallowly bifid; aril deeply lacinate almost to base 2. *Myristica*

1. KNEMA Loureiro, *Fl. Cochinch.* 2: 604. 1790.

红光树属 hong guang shu shu

Evergreen trees. Leaf blade papery to leathery, abaxially often papillose and glaucous and rusty tomentose; tertiary veins parallel. Inflorescences short, unbranched or bifurcate, stout, tuberculate by scars of fallen pedicels; flowers densely racemose or subumbellate; bracts caducous; bracteoles inserted on pedicels. Plants dioecious. Flowers red in China. Male flowers often rather large, subglobose or urceolate, with long pedicels. Perianth of 3(or 4) tepals. Filaments connate into stipitate peltate disk; anthers 8–20, short, with bases adnate to margin of disk. Ovary pubescent; style short, stout; stigma lobes connate into a disk with 2 shallow fissures or with lacerate margin. Fruit often with dense tomentum. Aril entire or lacerate at apex.

About 85 species: S Asia from E India to the Philippines, Papua New Guinea; six species in China.

Knema yunnanensis Hu (*J. Roy. Hort. Soc.* 63: 387. 1938), described from Yunnan, could not be treated here because no material was seen by the present authors.

- 1a. Leaf blade large, widest part more than 7 cm, apex acuminate, base rounded or cordate.
2a. Leaf blade broadly lanceolate or oblong-lanceolate, rarely oblanceolate, (15–)30–55(–70) × (7–)8–15 cm, base cordate or rounded, lateral veins 24–35 pairs; fruit with hairs 1–3 mm 1. *K. tenuinervis*
2b. Leaf blade oblanceolate, (15–)24–40 × 7–13 cm, widened at middle, base rounded, lateral veins 20–25 pairs; fruit with hairs 0.5–1 mm 2. *K. linifolia*
1b. Leaf blade smaller, widest part often less than 7 cm, apex acute, shortly acuminate, or acuminate, base cuneate or nearly rounded or subtruncate, never cordate.
3a. Anthers sessile; fruit with hairs 0.1–1 mm.
4a. Leaf blade with margins often not parallel, often early glabrescent abaxially; style ca. 1.5 mm; fruit small, less than 2 cm, with rusty nearly granular pubescence 3. *K. globularia*
4b. Leaf blade with margins nearly parallel, abaxial surfaces with stalked stellate pubescence, glabrous with age; style ca. 0.5 mm; fruit large, 2–3 cm, with rusty dendritic pubescence 4. *K. elegans*

¹ Dendrological Herbarium, College of Forestry, South China Agricultural University, Wushan, Tianhe, Guangzhou, Guangdong 510642, People's Republic of China.

² Willard Sherman Turrell Herbarium, Department of Botany, Miami University, 79 Upham Hall, Oxford, Ohio 45056, U.S.A.

Extensive contributions were also received from Willem J. J. O. de Wilde, Nationaal Herbarium Nederland, Leiden University branch, P.O. Box 9514, 2300 RA Leiden, Netherlands.

3b. Anthers nearly stalked; fruit with hairs 1–2 mm.

5a. Leaf blade often oblong-lanceolate, apex acute or acuminate, abaxial surface finely stellate hairy; fruit longer, usually more than 3 cm 5. *K. tonkinensis*

5b. Leaf blade often lanceolate or linear-lanceolate, apex acuminate or long acuminate, abaxial surface often pallid, early glabrescent, at first with minutely granular or powdery stellate hairs, persistent along midvein and lateral veins; fruit usually less than 3 cm 6. *K. lenta*

1. *Knema tenuinervia* W. J. de Wilde, Blumea 25: 405. 1979.

红光树 hong guang shu

Trees to 25 m tall, 20–30 cm d.b.h.; bark grayish white, with longitudinal streaks, easily cracking; branches drooping; twigs with dense rusty scurfy pubescence, glabrescent. Petiole stout, 1.5–2.5 cm, pubescent, glabrous when old; leaf blade broadly lanceolate or oblong-lanceolate, rarely oblanceolate, (15–)30–55(–70) × (7–)8–15 cm, subleathery, glabrous on both surfaces, juvenile leaves hairy on abaxial surface, base cordate or rounded, apex acuminate or long acuminate, tip often obtuse; lateral veins 24–35 pairs, prominent on both surfaces. Male inflorescences stout, 1–1.5 cm, axillary or arising from axils of deciduous leaves. Male flowers large, bud obovoid or pyriform, 6–7 × 4–6 mm; pedicels 0.7–1 cm, with rusty pubescence; bracteoles near base of perianth; perianth lobes 3(or 4); staminal disk slightly concave; anthers 10–13, sessile. Female flowers without or with short pedicel; perianth ca. 6 × 4 mm; ovary ovate, rusty pubescent; stigma many lobulate, concave at center. Infructescences short, often with 1 or 2 fruits; fruiting pedicel 3–5 mm. Fruit ellipsoid or ovoid, 3.5–4.5 × 2.5–3 cm, with dense rusty dendritic hairs 1–3 mm; pericarp thick, 4–5 mm. Seeds ellipsoid or ovoid-ellipsoid, 2–2.6(–3) × 1.2–1.4 cm, rounded at both ends; testa thinly leathery, tawny when dry, with dense irregular slender grooves; aril red, slightly tearing at apex; chalaza nearly apical, concave, close to micropyle with distinct aperture. Fl. Nov–Feb, fr. Jul–Sep.

Moist dense forests, mountains, ravines; 500–1000 m. Yunnan (Jinping, Xishuangbanna, Yingjiang) [NE India (Sikkim), Laos, Nepal, Thailand].

This species, which was formerly confused with *Knema furfuracea* (J. D. Hooker & Thomson) Warburg (*Myristica furfuracea* J. D. Hooker & Thomson) from Malaysia (e.g., in FRPS 30(2): 178. 1979), is close to *K. pierrei* Warburg from S Vietnam.

The seeds contain ca. 24% fat, which is used in industry. The bark and heart wood secrete red latex. The timber of this species is rather heavy, with coarse fiber.

2. *Knema linifolia* (Roxburgh) Warburg, Monogr. Myristic. 558. 1897.

大叶红光树 da ye hong guang shu

Myristica linifolia Roxburgh, Fl. Ind., ed. 1832, 3: 847. 1832; *Knema linifolia* var. *clarkeana* (King) Warburg; *M. clarkeana* King; *M. longifolia* Wallich ex Blume.

Trees to 20 m tall, 25–35 cm d.b.h.; bark rough, grayish brown; branches slightly drooping, arising at top, with dense rusty pubescence. Petiole 1–2 cm, with rusty powdery pubescence; leaf blade obovate-lanceolate, (15–)24–40 × 7–13 cm, widened at middle, papery or subleathery, finely hairy, glabres-

cent on both surfaces, base rounded, apex acuminate or long acuminate; lateral veins 20–25 pairs, prominent on both surfaces. Male inflorescences 0.8–1 cm. Male flowers 2–5-fascicled on short peduncle; buds ovoid or obovoid, 7–10 × 5–6 mm, with dense brown pubescence; pedicel 1.2–1.5 cm; bracteole inserted at about middle or in lower part of pedicel; perianth lobes 3; staminate disk concave; anthers 13–18, sessile. Female flowers 2–4-fascicled, ca. 6 mm; ovary broadly ovoid, pubescent; stigma bifid, each lobe again shallowly 2-lobulate. Infructescences short, often with 1 fruit. Fruit nearly sessile, ellipsoid or ovoid, 2.5–4 × 2.2–2.5 cm, with rusty hairs 0.5–1 mm; pericarp 2–3 mm thick. Aril red, lacinate at apex. Fl. Aug–Sep.

Moist dense forests, ravines; 800–900 m. SW Yunnan [Bangladesh, NE India, Myanmar].

3. *Knema globularia* (Lamarck) Warburg, Monogr. Myristic. 601. 1897.

小叶红光树 xiao ye hong guang shu

Myristica globularia Lamarck, Mém. Acad. Sci. (Paris) 1788: 162. 1791; *Knema corticosa* Loureiro; *K. corticosa* var. *tonkinensis* Warburg; *K. missionis* (Wallich ex King) Warburg; *K. sphaerula* (J. D. Hooker) Airy Shaw; *K. wangii* Hu; *M. corticosa* (Loureiro) J. D. Hooker & Thomson; *M. glaucescens* J. D. Hooker, p.p.; *M. lanceolata* Wallich; *M. missionis* Wallich ex King; *M. sphaerula* J. D. Hooker.

Trees to 15 m tall, 10–25 cm d.b.h.; bark grayish brown, ± flaking; branches spreading or slightly drooping, juvenile branches with pubescence of short stellate hairs ca. 0.5 mm or less, glabrescent, tawny or black. Petioles 8–15 mm, glabrescent; leaf blade oblong to lanceolate, 10–20(–24) × 2–4(–7) cm, abaxially pallid, adaxially lucid, papery, glabrous, sometimes along veins with nearly scurfy pubescence, base broadly cuneate to ± rounded, apex acute or acuminate; lateral veins 12–20 pairs. Male flowers (2–)6–9, tufted on tubercular peduncles 3–8 mm; pedicel 4–11 mm; buds globose, 3–5 mm in diam., with hairs 0.2–0.5 mm; perianth lobes 3; bracteole inserted halfway or higher on pedicel; anthers 10–16, sessile. Female inflorescences 0.5–1 cm. Female flowers ovoid-oblong, ca. 4 mm; pedicel 2–4 mm; bracteole subapical; style ca. 1.5 mm. Fruiting pedicel 3–10 mm. Fruits 1–5, ellipsoid, 1.5–2(–2.5) × 1–1.5 cm, with hairs ca. 0.5 mm or less, glabrescent, at base often with persistent perianth; pericarp 1–2 mm thick. Aril red, enclosing seed or at apex slightly open. Fl. Dec–Mar of next year and fr. Jul–Sep at low altitude, fl. and fr. Jul–Sep at high altitude.

Low hilly forests, moist mountain slopes; 200–1000 m. Yunnan (Cangyuan, Hekou, Pingbian, Xishuangbanna, Yingjiang) [Cambodia, Indonesia, Laos, Malaysia, Myanmar, Thailand, Vietnam].

The seeds contain ca. 27% fat, which is used in industry.

4. *Knema elegans* Warburg, Monogr. Myristic. 615. 1897.

假广子 jia guang zi

Knema siamensis Warburg.

Trees to 20 m tall; bark grayish brown; branches spreading, slightly drooping; juvenile branches and juvenile leaves with dense rusty or grayish brown pubescence, hairs 0.2–0.5 mm, late glabrescent. Petiole 0.6–1.7 cm, pubescent; leaf blade papery to nearly leathery, oblong-lanceolate to linear-lanceolate, 12–25(–32) × 3–6(–8) cm, margins nearly parallel, apex acute or shortly acuminate, base broadly cuneate or nearly rounded, abaxially with dense rusty or grayish brown stalked stellate pubescence; midvein sunken adaxially, lateral veins 15–32(–36) pairs, prominent on both surfaces. Male inflorescences axillary or arising from axils of deciduous leaves, with 4–8 flowers; peduncles 3–4 mm, pubescent. Male flower buds 3–5 mm, obovoid or subglobose; pedicel 5–9 mm; bracteole inserted at middle (or higher) of pedicel; perianth lobes 3(or 4), with hairs 0.2–0.5 mm; staminate disk flat or ± concave; anthers 8–13. Female flowers 3–8(–10)-clustered; peduncle short, cylindrical, 3–4 mm, pubescent; ovary ovate, ca. 3 mm; style half as long as ovary; stigma bifid, each lobe again shallowly 2-lobulate. Infructescences of 1 or 2 fruits; fruiting pedicel 0.5–1 cm, pubescent with hairs ca. 1 mm, glabrescent. Fruit ovoid or ellipsoid, 2.5–3.2 × 1.8–2 cm; perianth sometimes persistent; pericarp ca. 1 mm thick. Seeds ovoid-ellipsoid, 2–2.8 × 1.3–1.6 cm; aril orange-red to deep red, completely entire or at apex slightly open. Fl. Aug–Sep, fr. Apr–May.

Mountain slopes, low hills, ravines; 500–1700 m. Yunnan (Cangyuan, Jinghong, Luxi, Mengla, Ruili) [Cambodia, Myanmar, Thailand, Vietnam].

In FRPS (30(2): 182. 1979), this species was misidentified as *Knema erratica* (J. D. Hooker & Thomson) J. Sinclair (*Myristica erratica* J. D. Hooker & Thomson). True *K. erratica* is distributed in NE India.

The seeds contain ca. 20% fat, which is used in industry.

5. *Knema tonkinensis* (Warburg) W. J. de Wilde, Blumea 25: 381. 1979.

密花红光树 mi hua hong guang shu

Myristica conferta King var. *tonkinensis* Warburg, Monogr. Myristic. 581. 1897.

Trees to 12 m tall, to 25 cm d.b.h.; branches spreading and slightly drooping; juvenile branches cylindrical, with hairs ca. 0.3 mm, glabrescent, then bark grayish brown, longitudinally striate. Petiole 1.2–1.5 cm, pubescent, glabrescent; leaf blade oblong-lanceolate or narrowly elliptic, 13–24 × 4–6.5 cm, papery to nearly leathery, abaxially grayish white, with grayish brown stellate-dendroid pubescence, glabrescent with age, base broadly cuneate to nearly rounded, margins nearly parallel, apex acute or shortly acuminate; lateral veins 18–25 pairs. Male inflorescences 1–6 mm, stalked, 2–10-flowered. Male flowers: pedicel 6–10 mm; bracteole at about middle; perianth in bud obovoid, ca. 5.5 × 3.5 mm, lobes 3 or 4; staminal disk circular or subtriangular, ± flat; anthers ca. 10. Female flowers not

known. Fruiting pedicel 3–6 mm. Fruits 1–3, on 3–4 mm peduncle, ellipsoid or obovoid, 2.5–4 × 2–2.8 cm, with rusty pubescence, hairs 1–2 mm, late glabrescent; perianth ± persistent; pericarp ca. 2 mm thick when dry. Aril open at apex. Fl. Dec–Feb, fr. May–Jun.

Moist bamboo groves, slopes, ravines; 1100–1200 m. Yunnan (Cangyuan) [Laos, Vietnam].

In FRPS (30(2): 185. 1979), this species was misidentified as *Knema conferta* (King) Warburg (*Myristica conferta* King). True *K. conferta* is distributed in Indonesia, Malaysia, and Singapore.

Knema tonkinensis, as here conceived, may include specimens of *K. petelotii* Merrill (described from Tonkin, Vietnam); the latter species was regarded as distinct by de Wilde (Blumea 25: 375–377. 1979).

6. *Knema lenta* Warburg, Monogr. Myristic. 584. 1897.

狭叶红光树 xia ye hong guang shu

Trees to 20 m tall, 10–35 cm d.b.h.; juvenile branches with dense grayish brown scurfy or stellate pubescence, hairs ca. 0.1 mm, glabrescent. Petiole rather slender, 8–20 mm, with dense appressed rusty or tawny pubescence, glabrescent; leaf blade oblong-lanceolate or linear-lanceolate, 8–30 × 2–8.5 cm, papery, abaxially pale or glaucous, early glabrescent from minute 0.1–0.3 mm hairs, adaxially glossy, glabrous, base cuneate to rounded, apex acuminate or long acuminate; midvein and lateral veins with granular or powdery stellate pubescence, lateral veins 20–25 pairs, midvein prominent abaxially and sunken adaxially, ultimate venation very fine, prominent on both surfaces. Male inflorescences up to 5 mm, pedunculate, simple. Male flowers 3–15; pedicel 5–10 mm; bracteole at or above middle; perianth in bud globose, ca. 4 mm in diam., lobes 3; staminal disk flattish; anthers 8–16. Female inflorescences with 2 or 3 flowers. Female flowers: pedicel 3–6(–10) mm; perianth in bud ovoid-oblong, ca. 6 mm; ovary ovoid, with dense pubescence, hairs 0.5–1 mm; style short; stigma deeply 2-lobed and each lobe shallowly many lobulate. Fruiting pedicel short, 3–8(–12) mm. Fruits 1–3 per infructescence, ellipsoid, 2–3.5 × 1.5–2 cm, base rounded, apex acute or rounded; perianth persistent, with dense pubescence of shaggy hairs 1–2 mm, partly glabrescent; pericarp ca. 1.5 mm thick. Seeds ellipsoid, 2–2.2 × 1.4–1.6 cm, base rounded, apex oblique, slightly pointed; aril thin, completely enclosing seeds or only at apex slightly open. Fl. Oct, fr. Apr–May.

Mountain slopes, ravines; 500–1200 m. Yunnan (Mengla, Ruili) [Bangladesh, India (including Andaman Islands), Myanmar, Thailand, Vietnam].

In FRPS (30(2): 187. 1979), this species was misidentified as *Knema cinerea* (Poiret) Warburg var. *glauca* (Blume) Y. H. Li (*K. glauca* (Blume) Petermann; *Myristica glauca* Blume). True *K. cinerea* var. *glauca* is distributed in Indonesia, Malaysia, and Peninsular Thailand.

Knema lenta resembles *K. andamanica* (Warburg) W. J. de Wilde (*K. cinerea* var. *andamanica* (Warburg) J. Sinclair; *K. glauca* var. *andamanica* Warburg), from SE India (Andaman and Nicobar Islands). *Knema andamanica* differs in having obovoid male flower buds and fruit with hairs 1 mm or less in length.

2. MYRISTICA Gronovius, Fl. Orient. 141. 1755, nom. cons.

肉豆蔻属 rou dou kou shu

Evergreen trees, sometimes with aerial roots at base. Leaf blade papery, abaxial surface white papillose or with rusty pubescence; midvein often sunken adaxially, lateral veins nearly parallel or curving, connected at margin, tertiary veins not parallel, reticulate, sunken adaxially. Inflorescences often axillary or arising from axils of deciduous leaves, tuberculate or with smooth peduncle at apex often dichotomous or trichotomous; flowers densely racemose or subumbellate, at apex of peduncle; bracts caducous; bracteole at base of perianth, rarely deciduous. Flowers urceolate or bell-shaped, rarely tubular, pedicellate. Perianth (2 or)3-lobed. Filaments connate into staminal column; anthers slender, 7–30, connate abaxially; synandrium often longer than basal stalk. Ovary glabrous or hairy; style almost absent; stigma bifid. Pericarp thickly leathery, glabrous or pubescent. Aril red, lacinate to base.

About 150 species: S Asia from E India to the Philippines, New Guinea, Pacific islands (W Polynesia); two species (one introduced) in China.

In addition to the relatively widely cultivated crop *Myristica fragrans* (nutmeg and mace), the following three species, all native to the Philippines, are very locally cultivated in China for medicine and ornament: *M. cagayanensis* Merrill (*M. heterophylla* Hayata; *M. philippensis* Kanehira & Sasaki) is cultivated in Taiwan (Lan Yu, Taibei); *M. guatterifolia* A. Candolle is cultivated in Hong Kong; and *M. simiarum* A. Candolle (*M. discolor* Merrill) is cultivated off SE coast of Taiwan (Lan Yu).

- 1a. Leaf blade large, lateral veins more than 16 pairs; male inflorescences stout, dichotomous or trichotomous, flowers terminal, subumbellate; fruit ellipsoid, hairy 1. *M. yunnanensis*
 1b. Leaf blade small, lateral veins less than 16 pairs; male inflorescences slender, simple or dichotomous, flowers racemose; fruit broadly pyriform or globose, glabrescent; cultivated 2. *M. fragrans*

1. *Myristica yunnanensis* Y. H. Li, Acta Phytotax. Sin. 14(1): 94. 1976.

云南肉豆蔻 yun nan rou dou kou

Trees to 30 m tall, 30–70 cm d.b.h., with few aerial roots at base; bark grayish brown; juvenile branches and buds with dense rusty minute pubescence, soon glabrescent; old branches sometimes tubercled, brown. Petioles 2.2–3.5(–4) cm, glabrous; leaf blade oblong-lanceolate or oblong-oblong-lanceolate, (24–)30–38(–45) × 8–14(–18) cm, papery, abaxially with dense rusty minute dendritic hairs, partly glabrescent, adaxially glossy, glabrous, base cuneate to nearly rounded, apex shortly acuminate; lateral veins 20–32 pairs, prominent abaxially, sunken adaxially, tertiary veins obscure. Male inflorescences 2.5–4 cm, with 3–5 flowers, axillary to deciduous leaves, shortly pedunculate, dichotomous or trichotomous, flowers in terminal umbels; peduncle stout, 1.6–1.8 cm, pubescent. Male flowers: pedicel ca. 4 mm; bracteole ovate-elliptic, inserted at base of perianth, tightly enclosing flower; perianth urceolate, 5–6 × 4–5 mm, 3-lobed, lobes triangular-ovate, with dense rusty minute tomentum, darkish purple inside; stamens 7–10; sterile apex of synandrium slightly produced, base of column hairy. Female flowers not known. Infructescences axillary to deciduous leaves; peduncle rather strong, short, densely rusty tomentose, with 1 or 2 fruits; fruiting pedicel ca. 6 × 5 mm. Fruit ellipsoid, 4–5.5 × ca. 3 cm, base with ringlike perianth-scar, 1.5–2.5 mm wide, densely lanose hairy, apex oblique; pericarp 4–5 mm thick when dry. Seeds dark brown when dry, ovoid-ellipsoid, 3.5–4.2 × 2.2–2.4 cm, base subtruncate, apex rounded; aril red. Fl. Sep–Dec, fr. Mar–Jun.

Dense forests on mountain slopes or in ravines; 500–600 m. S Yunnan [N Thailand].

The seeds contain only 6%–7% fat.

2. *Myristica fragrans* Houttuyn, Nat. Hist. 2(3): 333. 1774.

肉豆蔻 rou dou kou

Small trees, to 10 m tall; branches slender, minutely pubescent, early glabrescent. Petiole 6–12 mm; leaf blade elliptic or elliptic-lanceolate, 4–8 cm, nearly leathery, both surfaces glabrous, base broadly cuneate or nearly rounded, apex shortly acuminate; lateral veins 6–10 pairs. Male inflorescences 2.5–5 cm, glabrous, shortly peduncled, simple or forked, with 4–8 or more flowers on slender branches. Male flowers: pedicel 10–15 mm; bracteole caducous; perianth trigonous-ovoid, 5–7 mm, lobes 3(or 4), with minute tomentum outside; anthers 9–12; synandrium ca. 5 mm, column ca. 2 mm, sterile apex ca. 0.5 mm. Female inflorescences 1- or few flowered. Female flowers: pedicel 8–12 mm; bracteole inserted on base of perianth, leaving ringlike scar after abscission; perianth ca. 6 × 4 mm; ovary ellipsoid, with dense rusty pubescence; style extremely short; stigmas 2, minute. Fruiting pedicel 10–15 mm. Fruits 1 or 2, orange or yellow, pyriform or subglobose, 3.5–5 cm in diam. Seeds ellipsoid, 2–3 × ca. 2 cm; aril red, irregularly deeply lacerate; cotyledons short, curled, connate at base.

Cultivated. Guangdong, Taiwan, Yunnan [native to Indonesia (Moluccas); widely cultivated in the tropics].

This species is a famous spice (nutmeg and mace) and medicinal plant. The seeds contain 40%–73% fat and are used in industry. Other parts are used medicinally to treat, for example, dysentery and rheumatic pains and can be used as insect repellent.

3. HORSFIELDIA Willdenow, Sp. Pl. 4: 872. 1806.

风吹楠属 feng chui nan shu

Endocomia W. J. de Wilde.

Evergreen trees. Leaves dispersed or distichous, papery or thinly leathery, often glabrous, abaxially not glaucous; tertiary veins

reticulate, often obscure. Plants monoecious or dioecious. Male inflorescence often compound panicle; flowers often aggregated into clusters; bracts caducous; bracteole absent. Flowers pedicellate, sometimes shortly so, small. Perianth lobes (2 or)3–5; anthers 4–30, connate abaxially into globose or clavate sessile or stipitate synandrium sometimes concave at apex. Ovary ovoid, glabrous or hairy; style absent. Pericarp often rather thick, glabrous or glabrescent. Aril entire, rarely lacerate at apex; testa thinly woody; cotyledons connate at base.

About 100 species: S Asia, from India to the Philippines, Papua New Guinea; three species in China.

- 1a. Monoecious; twigs (when dry) pale, usually paler than petioles; perianth lobes 3–5, inside papillose hairy; synandrium stipitate, anthers 4–6 (thecae 8); aril lacinate 1/5–1/3 deep, seed variegated 3. *H. prainii*
 1b. Dioecious; twigs brown, as petioles; perianth lobes 2 or 3(or 4), inside glabrous; synandrium sessile, anthers 10–20 (thecae 20–40); aril (almost) closed, seed not variegated.
 2a. Ovary pubescent; male perianth 2.5–3.5 mm in diam., pubescent, anthers 12–20 2. *H. kingii*
 2b. Ovary glabrous; male perianth 1.5–2.3 mm in diam., soon glabrescent, anthers 8–15 1. *H. amygdalina*

1. *Horsfieldia amygdalina* (Wallich) Warburg, Monogr. Myr. 310. 1897.

风吹楠 feng chui nan

Myristica amygdalina Wallich, Pl. Asiat. Rar. 1: 79. 1830; *Horsfieldia prunoides* C. Y. Wu; *H. tonkinensis* Lecomte.

Trees to 25 m tall, 20–40 cm d.b.h.; bark grayish white; branches spreading, rarely drooping; twigs brown, nearly glabrous, with light brown ovate lenticels. Leaves distichous or in 3–5 rows; petioles 1–2 cm, pubescent, glabrescent; leaf blade narrowly elliptic or oblong-lanceolate, 9–23 × 2.5–7.5 cm, papery, both surfaces early glabrescent, base attenuate to broadly cuneate, apex acute or acuminate; lateral veins 7–14 pairs, tertiary veins obscure. Plants dioecious. Male inflorescences axillary or in axils of deciduous leaves, panicle, 8–15 cm, nearly glabrous; bracts elliptic, minute, pubescent, caducous. Male flowers nearly clustered; buds (sub)globose, 1.5–2 mm in diam., as long as pedicels, glabrous; perianth 2- or 3(or 4)-lobed, at anthesis cleft to ca. 1/2; synandrium globose or depressed globose, sessile; anthers 8–15, free. Female inflorescences often inserted on older branches, 3–6 cm, glabrous; peduncles stout. Female flowers ellipsoid, 2–3 mm; ovary ovoid, glabrous; style absent; stigma lobes rounded. Infructescences 5–10 cm. Fruit orange, ovoid or ellipsoid, 3–3.5(–4) × 1.5–2.5 cm, base sometimes narrowed; pericarp fleshy, 2–3 mm thick. Seeds glossy, light reddish brown when dry, ovoid, smooth; aril orange, completely enclosing seeds, sometimes very shortly imbricately lacinate. Fl. Aug–Oct, fr. Mar–May of following year.

Dense forests on mountain slopes and in ravines, sparse hilly forests; 100–1200 m. Guangxi, Hainan, Yunnan [Bangladesh, India, Laos, Myanmar, Thailand, Vietnam].

In FRPS (30(2): 204. 1979), this species was misidentified as *Horsfieldia glabra* (Blume) Warburg (*Myristica glabra* Blume). True *H. glabra* is distributed in Indonesia.

The above description and distribution apply to *Horsfieldia amygdalina* var. *amygdalina*. Two other varieties occur outside of China: var. *lanata* W. J. de Wilde in Cambodia and Thailand and var. *macrocarpa* W. J. de Wilde in Thailand.

The seeds contain 29%–33% fat, which is used in industry.

2. *Horsfieldia kingii* (J. D. Hooker) Warburg, Monogr. Myr. 308. 1897.

大叶风吹楠 da ye feng chui nan

Myristica kingii J. D. Hooker, Fl. Brit. India 5: 106. 1886; *Horsfieldia hainanensis* Merrill; *H. tetratopala* C. Y. Wu & W. T. Wang.

Trees to 12 m tall; twigs hollow, smooth or with small lenticels, puberulent to glabrous, dark brown. Leaves in (3–)5 rows; petioles 2.5–4 cm, with deep groove, glabrous; leaf blade obovate or oblanceolate, (12–)28–55 × 5–15 cm, papery, both surfaces glabrous except sometimes midvein pubescent, base narrowed and then acute, or broadly cuneate, apex acute or shortly acuminate, sometimes blunt; lateral veins 14–18 pairs, midvein raised abaxially, sunken adaxially, tertiary veins sparse, nearly parallel, obscure. Plants dioecious. Male inflorescences axillary or arising from axils of deciduous leaves, 9–15 cm, tomentulose to nearly glabrous. Male flowers: pedicel slender, 1–2 mm, nearly as long as flowers; bud globose, 3- or 4-angled, leathery when dry, lobes (2 or)3 or 4(or 5), splitting bud to ca. 3/4; anthers 12–20, connate into globose synandrium. Female inflorescences 3–7 cm, branched. Female flowers: buds nearly globose or obovoid, ca. 5 mm, larger than male, not clustered, lobes 2 or 3; ovary obovoid, pubescent; stigmas sessile. Fruit ovoid to oblong-ellipsoid, 4–4.5 × ca. 2.5 cm, narrowed at ends, early glabrescent; perianth persistent; pericarp thick, leathery. Seeds ovoid, with slightly pointed apex; testa thick, brown and glossy; aril thin, entire. Fl. Apr–Aug, fr. Oct–Dec.

Dense forests in ravines; 800–1200 m. Guangxi, Hainan, Yunnan [India (Assam, Sikkim), N Thailand].

3. *Horsfieldia prainii* (King) Warburg, Monogr. Myr. 292. 1897.

云南风吹楠 yun nan feng chui nan

Myristica prainii King, Ann. Roy. Bot. Gard. Calcutta 3: 299. 1891; *Endocomia macrocoma* (Miquel) W. J. de Wilde subsp. *prainii* (King) W. J. de Wilde; *Horsfieldia longipedunculata* Hu; *H. pandurifolia* Hu.

Trees to 25 m tall; trunk to 50 cm d.b.h.; twigs terete, pubescent, glabrescent, gray or brown, lenticellate or not, glabrous, longitudinally striate, sometimes cracking. Leaves distichous (?always); petioles short or long, (5–)10–30 mm, glabrescent; leaf blade obovate-oblong, rarely ovate-oblong, widest at or above middle, 20–35 × 8–13 cm, papery or leathery, base shortly to long attenuate or cuneate, sometimes rounded, or slightly decurrent on petiole, apex subobtusate to subacute or rounded; nerves 9–20 pairs, average 20 pairs, raised

on both surfaces, lateral veins parallel, distinctly interarching; leaf bud 20–25 × ca. 4 mm, ferruginous pubescent. Inflorescences situated just behind leaves, condensed to lax, usually much branched, often purple, 8–30 cm, rusty stellate pubescent or tomentulose, glabrescent. Plants monoecious. Male flowers: pedicel slender, 1.5–2.5 mm; bud ellipsoid or subglobose, 1–2 mm in diam., yellowish or greenish inside, leathery, lobes 3 or 4(or 5), splitting bud to 3/4, diverging; synandrium stipitate, subglobose, ca. 0.5 mm in diam.; anthers 4–6, column ca. 0.5 mm. Female flowers usually a few mixed among male flowers; female bud ovoid-globose, 2.5–3 × 2.5–2.8 mm, split to 3/4; ovary ovoid, ca. 2 mm in diam., glabrous; stigma 2-lobed, each

lobe finely lobulate. Fruiting pedicel 5–20 mm. Fruit ellipsoid to ovoid, 3–4.5 × 1.2–2.5 cm; dry pericarp 1–2.5 mm thick. Seeds 2–3.2 cm, apex acute or shortly beaked; testa variegated; aril orange, at apex either almost entirely closed or lacinate 1/5–1/3 deep.

Primary forests, forests in ravines, valleys; 500–1100 m. S Yunnan [India (Andaman Islands), Indonesia, Papua New Guinea, Philippines, Thailand].

In China, this species has been misidentified as *Horsfieldia valida* (Miquel) Warburg (*Myristica valida* Miquel). True *H. valida* is distributed in Indonesia (Sumatra).