

## SAPOTACEAE

山榄科 shan lan ke

Lee Shu-kang<sup>1</sup>; T. D. Pennington<sup>2</sup>

Trees or shrubs, usually producing latex. Leaves spirally arranged or alternate and distichous, rarely ± opposite, sometimes crowded at apex of branchlets; stipules early deciduous or absent; leaf blade margin entire. Flowers bisexual or unisexual, usually in sessile axillary clusters, rarely solitary; cluster pedunculate or in racemelike inflorescence, bracteolate. Calyx 1 whorl of usually 4–6 sepals, or 2 whorls each with 2–4 sepals. Corolla lobes 1 or 2 × as many as sepals, usually entire, rarely with 2 lacerate or lobular appendages. Stamens inserted at corolla base or at throat of corolla tube, as many as and opposite corolla lobes to many and in 2 or 3 whorls; staminodes when present alternate with stamens, scaly to petal-like. Ovary superior, 4- or 5-locular, placentation axile; ovules 1 per locule, anatropous. Style 1, often apically lobed. Fruit a berry or drupe, 1- to many seeded. Seed coat hard, shiny, rich in tannin; endosperm usually oily; seed scar lateral and linear to oblong or basal and rounded.

About 1100 species and 53 genera: pantropical; 11 genera and 24 species (six endemic) in China.

Lee Shu-kang. 1987. Sapotaceae. Fl. Reipubl. Popularis Sin. 60(1): 47–83.

- 1a. Sepals usually 4 or 6 in 2 whorls.
  - 2a. Sepals usually 4 ..... 1. *Madhuca*
  - 2b. Sepals usually 6.
    - 3a. Corolla appendages present; stamens 6; staminodes present ..... 2. *Manilkara*
    - 3b. Corolla appendages absent; stamens 12–18; staminodes absent ..... 3. *Palaquium*
- 1b. Sepals 4 or 5 in 1 whorl.
  - 4a. Corolla appendages present ..... 4. *Eberhardtia*
  - 4b. Corolla appendages absent.
    - 5a. Staminodes absent.
      - 6a. Stamens 5–10; stipules absent ..... 5. *Chrysophyllum*
      - 6b. Stamens 16–18; stipules present ..... 6. *Diploknema*
    - 5b. Staminodes present.
      - 7a. Filaments with a cluster of villous hairs on both sides, rarely at only 1 side at base; staminodes awned; plant usually spiny ..... 7. *Xantolis*
      - 7b. Filaments without hairs; staminodes not awned; plant not spiny.
        - 8a. Seed scar lateral.
          - 9a. Fruit 2.5–4.5 cm; seed scar oblong or ovate ..... 8. *Pouteria*
          - 9b. Fruit less than 2.5 cm; seed scar narrow ..... 9. *Planchonella*
        - 8b. Seed scar basal.
          - 10a. Leaves spirally arranged, not stipulate; ovary 5-locular; berry ovoid or globose, pericarp thick ..... 10. *Sinosideroxylon*
          - 10b. Leaves opposite or subopposite, stipulate; ovary 1- or 2-locular; fruit drupelike, ellipsoid, pericarp very thin ..... 11. *Sarcosperma*

### 1. MADHUCA Hamilton ex J. F. Gmelin, Syst. Nat. 2: 799. 1791.

紫荆木属 zi jing mu shu

Trees producing latex. Leaves spirally arranged, often closely clustered at end of branchlets; stipules small to very large, usually early deciduous; leaf blade leathery to almost leathery. Flowers solitary or clustered in axils, sometimes terminal, usually with a long pedicel. Sepals 4(–6) in 2 whorls, inner ones often with margin membranous and ciliate, outer sepals usually hirsute. Corolla cylindric, with hairs at throat; lobes (5–)8(–18), usually woolly pubescent between stamens, appendages absent. Stamens in 1–3 whorls, inserted in corolla throat and alternate with lobes, glabrous or tomentose, sessile or subsessile; staminodes absent. Ovary usually pubescent, 6–8(–12)-locular. Style subulate, persistent. Berry globose to ellipsoid, with enlarged persistent brown calyx, 1–4-seeded. Seed scar linear to oblong or elliptic.

About 100 species: Australia, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; two species in China.

- 1a. Leaf blade apex acuminate to acute, glabrous; corolla yellowish green, 5–7.5 mm; sepals 3–6 mm; stamens (16–)18–22(–24) ..... 1. *M. pasquieri*
- 1b. Leaf blade apex rounded and retuse, abaxially reddish sericeous tomentose when young; corolla white,

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10–12 mm; sepals 6.5–8 mm; stamens 28–30 ..... 2. *M. hainanensis*



**1. Madhuca pasquieri** (Dubard) H. J. Lam, Bull. Jard. Bot. Buitenzorg, sér. 3, 7: 182. 1925.

紫荆木 *zi jing mu*

*Dasillipe pasquieri* Dubard, Ann. Inst. Bot.-Géol. Colon Marseille, sér. 3, 1: 92. 1913; *Bassia pasquieri* Lecomte; *Madhuca subquincuncialis* H. J. Lam & Kerpel.

Trees to 30 m tall. Trunk to 60 cm d.b.h., bark blackish. Branchlets densely lenticellate, rust colored tomentose, glabrescent. Leaves scattered or more often closely clustered at end of branchlets; stipules lanceolate-linear, ca. 3–1 mm, early deciduous; petiole slender, 1.5–3.5 cm, rust colored to grayish pubescent; leaf blade obovate to obovate-oblong, 6–16 × 2–6 cm, glabrous, base broadly acuminate to abruptly acute; lateral veins 13–22(–26) pairs. Flowers several, axillary, fascicled. Pedicel 1.5–3.5 cm, rust colored to grayish pubescent. Sepals 4(or 5), 3–6 × 3–5 mm, rust colored to grayish pubescent. Corolla yellowish green, 5–7.5 mm, glabrous; lobes 6–11. Stamens (16–)18–22(–24). Ovary ovoid, 1–2 mm, 6-locular, densely rust colored pubescent. Style subulate, 8–10 mm, densely rust colored pubescent. Fruit ellipsoid to globose, with elongated style, 2–3 × 1.5–2 cm, rust colored tomentose but glabrescent; pericarp fleshy; 1–5-seeded. Seeds ellipsoid, 1.8–2.7 × 1–1.2 cm, with oblong scar. Fl. Jul–Sep, fr. Oct–Jan.

Forests; below 1100 m. SW Guangdong, S Guangxi, SE Yunnan [Vietnam].

The seeds contain 30% edible oil. The plants are a source of valuable timber.

**2. Madhuca hainanensis** Chun & How, Acta Phytotax. Sin. 7: 71. 1958.

海南紫荆木 *hai nan zi jing mu*

Trees 9–30 m tall. Bark dark grayish brown, rust colored and shining villous when young. Leaves often closely clustered at end of branches; stipules ca. 3–1 mm, tomentose, early deciduous; petiole 1.5–3 cm, gray tomentose; leaf blade oblong-obovate to oblong-oblancheolate, 6–12 × 2.5–4 cm, abaxially rust colored sericeous when young but glabrescent, adaxially glabrous and shiny, apex rounded and usually retuse; lateral veins 20–30 pairs, slender, conspicuous. Flowers 1–3, axillary, nodding. Pedicel 2–3 cm, densely rust colored sericeous. Sepals elliptic to ovate-triangular, 1.5–8(–12) × 5.5–6.5 mm, both surfaces densely rust colored velutinous, apex obtuse. Corolla white, 1–1.2 cm, glabrous, 8–10-lobed. Stamens 28–30 in 3 whorls. Ovary ovoid-globose, rust colored sericeous, 6–8-locular. Style ca. 1.2 cm, base sericeous. Fruiting peduncle thick, 3–4.5 cm. Fruit greenish yellow, ovoid-globose to globose, 2.5–3 × 2–2.8 cm, pubescent, 1–5-seeded. Seeds oblong-ellipsoid, compressed, 2–2.5 × 0.8–1.2 cm, brown, shiny, scar elliptic. Fl. Jun–Sep, fr. Sep–Dec.

\* Common in evergreen forest; ca. 100 m. Hainan.

The seeds contain 55% oil, and the timber is used for boats and bridges.

## 2. MANILKARA Adanson, Fam. Pl. 2: 166. 1763, nom. cons.

铁线子属 *tie xian zi shu*

Trees or shrubs. Leaves leathery to subleathery, densely lateral veined; stipules early deciduous. Flowers axillary, clustered. Sepals 6, in 2 whorls. Corolla lobes 6, each with 2 lobular appendages outside. Stamens 6; staminodes 6, alternate with corolla lobes, ovate, apex acuminate, irregularly serrate, fimbriate to lobate. Ovary 6–14-locular. Fruit a berry, 1–6-seeded. Seeds compressed, scar lateral and elongated.

About 65 species: tropical America, Africa, Asia, Pacific Islands; one species in China.

**1. Manilkara hexandra** (Roxburgh) Dubard, Ann. Inst. Bot.-Géol. Colon. Marseille, sér. 3, 3: 9. 1915.

铁线子 *tie xian zi*

*Mimusops hexandra* Roxburgh, Pl. Coromandel 1: 16. 1795.

Shrubs or trees 3–12 m tall. Bark gray. Branchlets glabrous. Leaves alternate, often closely clustered at end of branchlets, with conspicuous scars; petiole 0.8–2 cm; leaf blade obovate to obovate-elliptic, 5–10

3–7 cm, glabrous, base broadly cuneate to obtuse, apex retuse; midrib raised abaxially, lateral veins

slender, parallel, veinlets dense. Flowers axillary, fascicled. Pedicel thick, 1–1.8 cm. Sepals ovate-triangular, 3–4 mm, outside yellowish gray tomentose. Corolla white or light yellow, ca. 4 mm; lobes oblong, ca. 3 mm. Stamens ca. 5 mm; staminodes 2-parted, lobes linear, ca. 3 mm. Ovary ovoid, ca. 2 mm, 6-locular, tomentose. Berry obovoid-oblong to ellipsoid, 1–1.5 cm, 1- or 2-seeded. Seeds ca. 8–10 mm. Fl. Aug–Dec.

Thickets; low altitudes. S Guangxi, SW Hainan [Cambodia, India, Sri Lanka, Thailand, Vietnam].

The seeds contain 25% edible oil and are of medicinal value.

## 3. PALAQUIUM Blanco, Fl. Filip. 403. 1873.

胶木属 jiao mu shu

Trees with latex. Branchlets with terminal scaly bud. Leaves often clustered; stipules small to very large, usually early deciduous; leaf blade leathery. Bracts conspicuous at peduncle base. Flowers axillary, solitary or fascicled, sometimes in short terminal inflorescence. Sepals (4–)6(or 7), in 2 whorls. Corolla 4–6-lobed, imbricate or twisted. Stamens (8–)12–18(–36), in 2 or

3 whorls, inserted in corolla throat; filaments long; staminodes absent. Ovary (5 or)6(-11)-locular, villous; ovules pendulous. Fruit a berry, oblong to ellipsoid, 1-4-seeded. Seeds with scar covering half of surface.

About 110 species: Cambodia, India, Indonesia, Malaysia, New Guinea, Pacific Islands, Philippines, Sri Lanka, Thailand, Vietnam; one species in China.

**1. Palaquium formosanum** Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30: 184. 1911.

台湾胶木 tai wan jiao mu

*Palaquium hayatae* H. J. Lam.

Trees 5-7(-20) m tall. Bark dark brown. Branchlets terete, reddish brown tomentose or glabrous, with distinct leaf scars. Leaves alternate, closely clustered at end of branchlets; stipules lanceolate, grayish tomentose abaxially, early deciduous; petiole 7-12 mm, yellowish puberulent; leaf blade thick leathery, ovate-oblong, obovate, or spatulate, 10-17 × 4.5-7.5 cm, glabrous or with clustered white hairs on veins, cinnamon colored puberulent on veins when young, base broadly cuneate, apex rounded to cordate; lateral veins 10-12

pairs. Flowers axillary, solitary or in clusters of 3-6. Pedicel angular, 7-12 mm, thickened in fruit and to 2.8 cm, yellowish rust colored tomentose. Sepals broadly ovate, 4-4.5 4-5 mm, outside brownish tomentose, enlarged in fruit and to ca. 6 5 mm. Corolla pale yellowish gray, 6-lobed. Stamens 12-15, included. Ovary 6-locular. Fruit ellipsoid, often oblique, 4-5 1.5-2 cm, apex rounded to subtruncate. Style persistent, ca. 1.5 cm. Seeds fusiform, compressed, ca. 3.5 1.1 0.9 cm.

Forests; low altitudes. Taiwan [Philippines].

No specimen has been seen by the authors. The description is based on the original protolog and Royen (Blumea: 10: 472. 1960).

The wood is used for timber, and the fruit are edible.

#### 4. EBERHARDTIA Lecomte, Bull. Mus. Natl. Hist. Nat. 26: 345. 1920.

梭子果属 suo zi guo shu

Trees evergreen. Leaves alternate; stipules early deciduous leaving distinct scars. Flowers axillary, fascicled, rust colored tomentose. Sepals (2-)4 or 5(or 6), imbricate. Corolla tubular, 5-merous; lobes linear, thick, each with 2 membranous appendages on back. Stamens 5, opposite to corolla lobes; staminodes 5, alternate with petal, thick, longer than stamens, abortive anther sagittate, margin irregularly denticulate. Ovary 5-locular. Style short. Fruit drupaceous with remnant of style at apex, globose, glabrous or tomentose, 1-5-seeded. Seed scar oblong; endosperm oily.

About three species: Laos, Vietnam; two species in China.

The seeds of all species are rich in oil.

- 1a. Branchlets and petioles densely tomentose; leaf blade base broadly cuneate; stipe of fruit ca. 1 cm; fruit 2.5-3.5 cm ..... 1. *E. aurata*  
1b. Branchlets and petioles sparsely tomentose; leaf blade base narrowly cuneate; stipe of fruit ca. 1.5 cm; fruit 4-4.5 cm ..... 2. *E. tonkinensis*

**1. Eberhardtia aurata** (Pierre ex Dubard) Lecomte, Bull. Mus. Natl. Hist. Nat. 26: 348. 1920.

锈毛梭子果 xiu mao suo zi guo

*Planchonella aurata* Pierre in Dubard, Notul. Syst. (Paris) 2: 134. 1911.

Trees 7-15 m tall. Trunk 20-40 cm d.b.h., bark dark gray. Branchlets rust colored tomentose. Petiole 2-3.5 cm, densely rust colored tomentose; leaf blade oblong, obovate-oblong, or elliptic, 12-24 × 4.5-9.5 cm, subleathery, abaxially densely rust colored tomentose, adaxially glabrous, base cuneate to subrounded, apex abruptly acuminate; lateral veins 16-23 pairs. Flowers aromatic. Pedicel rust colored tomentose. Sepals 2 or 3(or 4), 5-7 2-3 mm, outside rust colored tomentose, inside gray tomentose. Corolla white, glabrous, lobes 2-3 mm; appendages 4-5 mm, petal-like. Stamens ca. 2 mm; staminodes ca. 3 mm. Ovary gray tomentose. Fruit with persistent calyx, subglobose, 2.5-3.5 cm, 5-ribbed, 3-5-seeded, rust colored tomentose; stipe ca. 1 cm. Seeds flat, 2-2.3 1-1.5 cm,

shiny; scar from adaxial side extended to end. Fl. Mar, fr. Feb-Dec.

Evergreen forests or mixed forests; 700-1300 m. Guangdong, Guangxi, Yunnan [N Vietnam].

The seed oil is edible or used for making soap, and the timber is of high quality.

**2. Eberhardtia tonkinensis** Lecomte, Bull. Mus. Natl. Hist. Nat. 26: 346. 1920.

梭子果 suo zi guo

Trees 8-20(-25) m tall. Trunk 20-40 cm d.b.h., bark brown. Branchlets sparsely reddish sericeous tomentose when young, glabrescent. Stipules triangular, ca. 1 cm, tomentose; petiole 2-4 mm thick; leaf blade elliptic, oblong, or obovate, 15-30 × 7-12 cm, subleathery, shiny, tomentose when young, reddish sericeous tomentose only adaxially when mature, base cuneate, apex acute to acuminate; lateral veins 16-25 pairs. Pedicel ca. 4 mm, rust colored tomentose. Sepals (2-) 4(or 5), oblong, ca. 6 × 2 mm, outside rust colored tomentose, inside glabrous. Corolla 3-3.5 mm, lobes 2-2.5 mm; appendages petal-like, 3.5-4 mm. Filaments thick, enlarged at base; staminodes enlarged at base. Ovary glabrous. Style 1.5-2 mm.

Fruit globose to ovoid, 4–4.5 cm, greenish brown to brown, 5-seeded, rust colored tomentose, ribbed; stipe 1.2–1.5 cm;

persistent sepals triangular, ca. 6 mm. Seeds flat, shiny, 3.5–4 × 2–2.3 cm; scar at adaxial side.

Forests; 400–1800 m. SE Yunnan [Laos, Vietnam].

## 5. CHRYSOPHYLLUM Linnaeus, Sp. Pl. 1: 192. 1753.

金叶树属 jin ye shu shu

Shrubs or trees. Leaves alternate; stipules absent. Flowers small, 2 to many, fascicled, axillary, pedicellate or sessile. Sepals 5 (or 6), usually glabrous or inside tomentose. Corolla tube campanulate, usually extended, (4 or) 5–11-lobed. Stamens (4 or) 5–10 in 1 whorl, inserted in throat, opposite corolla lobes; staminodes absent. Ovary 1–10-locular, villous or glabrous. Style longer to shorter than ovary. Fruit 1–8-seeded, exocarp thick to very thin. Seed coat papery to crusty; scar narrow to wide, lateral, sometimes almost covering entire seed.

About 70 species: tropical and subtropical America, tropical Africa and Asia, Madagascar; one species in China.

**1. Chrysophyllum lanceolatum** (Blume) A. de Candolle var. **stellatocarpon** P. Royen in Vink, Blumea 9: 32. 1958.

金叶树 jin ye shu

Trees 10–20 m tall. Branchlets yellow pubescent. Petiole 2–7 mm; leaf blade oblong to oblong-lanceolate, rarely obovate, 5–12 cm, 1.7–4 cm, papery, rust colored tomentose when young but soon glabrescent except on midrib, base obtuse to cuneate and usually slightly oblique, apex obtuse, acuminate, or caudate; lateral veins many pairs, closely spaced, slender. Flowers fascicled. Pedicel 3–6 mm, rust colored pubescent to subglabrous. Sepals 5, rust colored pubescent or glabrous when young, margin fimbriate. Corolla broadly campanulate, 1.8–3 mm, glabrous; 5-lobed, margin

fimbriate. Stamens 5. Ovary subglobose, ca. 0.6 mm, 5-locular, 5-ribbed, rust colored tomentose. Style ca. 1.5 mm, glabrous. Fruit brown to purplish black, subglobose, 5-ribbed into a stellate shape, 1.5–2(–4) cm in diam., rust colored tomentose when young but glabrescent, (1–) 4- or 5-seeded. Seeds compressed obovoid, 1.1–1.3 cm × 6–7 mm; seed coat thick; scar oblong to oblanceolate. Fl. May, fr. Oct.

Forests; middle altitude. Guangdong, Guangxi [Cambodia, Indonesia, Laos, Malaysia, Myanmar, Singapore, Sri Lanka, Thailand, Vietnam].

The roots and leaves are used medicinally, and the fruit are edible.

*Chrysophyllum lanceolatum* var. *lanceolatum* occurs in Indonesia.

## 6. DIPLOKNEMA Pierre, Arch. Néerl. Sci. Exact. Nat. 19: 104. 1884.

藏榄属 zang lan shu

*Mixandra* Pierre.

Trees. Leaves spirally arranged, usually closely clustered at apex of branchlets; stipules persistent; petioles usually thickened at base. Inflorescences axillary, clustered. Sepals (4 or) 5 (or 6), ovate. Corolla pale yellow, 7–16-lobed. Stamens (10–) 16–40(–90) in 1 or 2 whorls, inserted in throat, sometimes all becoming petal-like staminodes. Ovary glabrous or pubescent, 5–14-locular; disc present or absent. Style short, truncate. Fruit a berry, 1–3(–5)-seeded. Seeds large with a broad scar; seed coat thin to thick, woody to crusty.

About 10 species: Bhutan, Cambodia, India, Indonesia, Myanmar, Nepal, Philippines, Thailand; two species in China.

1a. Corolla 2–2.4 cm; 12- or 13-lobed; stamens 80–90 or more numerous ..... 1. *D. yunnanensis*  
1b. Corolla 0.8–1 cm; 8–10-lobed; stamens 20–40 ..... 2. *D. butyracea*

**1. Diploknema yunnanensis** D. D. Tao, Z. H. Yang & Q. T. Zhang, Acta Bot. Yunnan. 10: 257. 1988.

云南藏榄 yun nan zang lan

Trees 25–30 m tall. Branchlets pilose. Petiole 2–5 cm; leaf blade oblong-obovate or lanceolate-obovate, 25–55 × 10–17 cm, leathery, abaxially appressed puberulent, adaxially glabrous, base cuneate, apex short acuminate; lateral veins 21–24 pairs, tertiary veins conspicuously reticulate. Flowers aromatic, 16–25 on apical part of branchlet. Pedicel 5–6 cm, densely rust colored pubescent. Sepals 5 or 6, yellow-green, ovate, inner ones smaller. Corolla 2–2.4 cm; lobes 12 or 13, ovate-oblong, 8–10 mm, apex rounded or truncate. Stamens 80–90 or more numerous, filaments 2–3 mm, finely hairy;

anthers 5–6 mm, light brown, sagittate. Ovary discoid, rust colored villose, 2–3 mm, 10–12-locular. Style 2–2.5 cm. Fl. Sep, fr. unknown.

\* Forests or beside trails; 1000–1300 m. Yunnan.

**2. Diploknema butyracea** (Roxburgh) H. J. Lam, Bull. Jard. Bot. Buitenzorg, sér. 3, 7: 186. 1925.

藏榄 zang lan

*Bassia butyracea* Roxburgh, Asiat. Res. 8: 477. 1808.

Trees to 25 m tall. Branchlets thick, terete to subterete, striate and with lenticels, yellowish brown or brown pubescent to subglabrous. Stipules lanceolate, ca. 5 mm, brown to pale yellow pubescent, early deciduous; leaf blade elliptic-oblong,

ovate, or ovate-oblong, (6-)17-35 × (3-)8-17 cm, leathery, yellowish brown to brown pubescent, base cuneate, apex obtuse to obtuse-acuminate. Flowers axillary, clustered, 1-6. Pedicel 2-4.5 cm, to 5 cm in fruit, pubescent. Sepals (4 or)5(or 6), ovate, 0.9-1.5 × 0.6-1 cm, outside pubescent, inside sparsely lanate, apex obtuse. Corolla 1.5-2 cm; lobes 8-10, oblong, ovate, or narrowly obovate, (7-)8-10 (4-)5-8 mm, apex obtuse to acute, margin usually irregularly crenulate. Stamens (18-)20-40, 0.9-1.2 cm, glabrous or brown lanate; anthers sagittate, apex awned. Ovary

conical, ca. 2-5 mm, rust colored sericeous, 7-12-locular. Style 1.5-5 cm, glabrous. Fruit ovoid-globose to oblong, 2-2.5-1-1.5 cm, smooth, apex acute; exocarp fleshy; 1-3(-5)-seeded. Seeds brown, oblong-obovoid, ca. 1.3-1-0.6 cm, smooth, shiny; scar lanceolate.

About 1600 m. SE Xizang (on border with Bhutan) [Bhutan, India, Nepal].

No specimens have been seen by the authors. The description is based on Royen (Blumea 9: 82. 1958).

## 7. XANTOLIS Rafinesque, Sylva Tellur. 36. 1838.

刺榄属 ci lan shu

Trees or shrubs, usually spiny. Leaves alternate, sometimes closely clustered at end of branchlets; not stipulate. Flowers axillary, solitary or fascicled, 5-merous; bracts small. Calyx short tubular; sepals usually lanceolate, persistent. Corolla lobes longer than tube, hairy inside. Stamens usually inserted at base of corolla lobes; filaments usually with a cluster of rust colored villous hairs on each side, rarely on 1 side or at base; anthers sagittate, with long connective; staminodes petal-like, margin fimbriate, rarely dentate or entire, apex usually long awned. Ovary (4 or)5-locular, densely hirsute. Style longer than corolla. Fruit drupaceous, 1- or 2(or 3)-seeded. Seeds compressed, ellipsoid to subglobose; seed coat crusty, scar ovate to linear, ca. 2/3 as long to as long as seed or small and rounded.

About 14 species: Cambodia, India, Laos, Myanmar, Philippines, Thailand, Vietnam; four species in China.

- 1a. Seeds ± globose, 7-8 mm in diam.; leaves 2-4 cm, lateral veins numerous ..... 3. *X. longispinosa*  
 1b. Seeds oblong to ellipsoid, 18-30 mm long; leaves 5-15 cm, lateral veins few.  
 2a. Corolla pale yellow, lobes fimbriate at base; sepals 3-4 × 2.5-4 mm, with yellowish brown hairs on inside; seeds ca. 18 mm ..... 4. *X. shweliensis*  
 2b. Corolla white, lobes entire; sepals 4-6 × 1.5-3 mm, with gray or white hairs on inside; seeds 20-30 mm.  
 3a. Leaf blade lanceolate to oblanceolate, lateral veins 13-17 pairs; corolla lobes lanceolate; ovary with dense reddish-brown hairs ..... 1. *X. stenosepala*  
 3b. Leaf blade ovate to obovate, lateral veins 9-13 pairs; corolla lobes rounded; ovary with silky white hairs ..... 2. *X. boniana*

### 1. *Xantolis stenosepala* (Hu) P. Royen, Blumea 8: 216. 1957.

滇刺榄 dian ci lan

Trees 6-15(-20) m tall. Bark grayish brown. Branchlets gray, pale yellowish brown tomentose or glabrous. Petiole 0.8-1.8 cm; leaf blade lanceolate, oblanceolate, or oblong-lanceolate, (5-)7-15 × 2.5-6 cm, base broadly cuneate, apex acuminate; lateral veins 15-17 pairs. Flowers solitary or in several-flowered clusters. Pedicel 6-10 mm, gray sericeous. Sepals 5, lanceolate, ovate-lanceolate, or ovate, 4-6 × 1.5-3 mm, outside gray sericeous, inside rust colored sericeous. Corolla white, tube short; lobes 5, lanceolate, ovate-lanceolate, or oblong, 5-6.5 × 2-2.5 mm. Stamens 5, 3-5 mm, with a cluster of villous hairs on each side at base; staminodes 5, lanceolate, ca. 4 mm, apex acuminate and awned, margin densely pubescent. Ovary ovoid-globose, 1-2 mm, base villous, glabrous toward apex. Style 4-2 mm. Fruit brown, oblong-ovate, 3-4 × 1.7-2.2(-3) cm, rust colored sericeous to pubescent or subglabrous, with persistent calyx and style, 1(-3)-seeded. Seeds ellipsoid, compressed, 2-2.5 × ca. 1.2 cm, both ends rounded; scar narrowly oblong.

\* 1100-1800 m. Yunnan (Xishuangbanna Zhou).

1a. Sepals lanceolate to ovate-lanceolate; fruit

rust colored, sericeous to pubescent .... 1a. var. *stenosepala*

1b. Sepals ovate; fruit subglabrous 1b. var. *brevistylis*

### 1a. *Xantolis stenosepala* var. *stenosepala*

滇刺榄(原变种) dian ci lan (yuan bian zhong)

*Adinandra stenosepala* Hu, Bull. Fan. Mem. Inst. Biol. 8: 146. 1938; *Planchonella stenosepala* (Hu) Hu.

Sepals lanceolate to ovate-lanceolate, 4-6 × 1.5-3 mm. Corolla lobes lanceolate, ca. 6.5 × 2 mm. Style 1-1.2 cm. Fruit rust colored, sericeous to pubescent. Fl. and fr. throughout the year.

\* Forests or around villages; 1100-1800 m. Yunnan (Xi shuangbanna Zhou).

The fruit are edible.

### 1b. *Xantolis stenosepala* var. *brevistylis* C. Y. Wu, Fl. Yunnan. 1: 309. 1977.

短柱滇刺榄 duan zhu dian ci lan

Sepals ovate, 3-4 × 2-3 mm. Corolla lobes oblong, ca. 5 × 2.5 mm. Style 4-7 mm, base glabrous. Fruit subglabrous. Fl. Apr.

\* Dense forest in valleys; ca. 1100 m. Yunnan (Xishuangbanna Zhou).

**2. *Xantolis boniana*** (Dubard) P. Royen var. **rostrata** (Merrill) P. Royen, *Blumea* 8: 213. 1957.

啄果刺榄 zhuo guo ci lan

*Sideroxylon rostrata* Merrill, *Philipp. J. Sci.* 21: 351. 1922; *Planchonella rostrata* (Merrill) H. J. Lam.

Trees 10–20 m tall. Branchlets terete to compressed apically, rust colored sericeous when young, glabrescent. Petiole 0.8–1.5 cm, rust colored sericeous, glabrescent; leaf blade elliptic, ovate, or obovate, 6–15 × 3–6 cm, almost leathery, both surfaces yellowish rust colored lanate when young, glabrescent and shiny or rust colored tomentose along veins when mature, base cuneate, apex obtuse to acuminate; lateral veins 9–13 pairs. Flowers white. Pedicel 6–10 mm, rust colored tomentose, glabrescent. Sepals ovate-lanceolate, 4–5.5 × 2–3 mm, both surfaces white appressed tomentose, margin membranous. Corolla glabrous. Stamines broadly triangular. Ovary ovoid, 2–3 mm, white sericeous. Style terete, 0.9–1.1 cm. Fruit black, oliviform, 2–4 × 1.4–2.2 cm, base with persistent calyx, apex rostrate, pale yellow pubescent, 1- or 2-seeded; pericarp woody. Seeds oblong to ellipsoid, 2–3 × 0.8–1.5 cm, shiny, yellowish brown; scar oblong, as long as seed. Fl. Jan–Feb.

\* Forests in ravines; 2000–2400 m. Hainan.

No flowering specimens have been seen by the authors. The description of flowers is based on P. Royen (*Blumea* 8: 213. 1957).

*Xantolis boniana* var. *boniana* occurs in Laos and Vietnam.

**3. *Xantolis longispinosa*** (Merrill) H. S. Lo, *Fl. Hainan*. 3: 157. 1974.

琼刺榄 qiong ci lan

*Sideroxylon longispinosum* Merrill, *Lingnan Sci. J.* 13: 66. 1934; *S. embeliifolium* Merrill; *Xantolis embeliifolia* (Merrill) P. Royen.

Shrubs or trees 8–9(–13) m tall. Bark grayish yellow to grayish black. Branchlets glabrous, sometimes spiny; spines 1.5–3.5 cm, erect, hard, cuspidate. Petiole 1–3 mm; leaf blade usually obovate, 2–4(–8) × 1–2.3(–3) cm, base cuneate, apex rounded to obtuse; lateral veins ca. 10 pairs. Flowers solitary or

in several-flowered clusters. Pedicel 3–5(–8) mm, rust colored pubescent. Sepals 5, ovate, 5–6 mm, both surfaces rust colored pubescent. Corolla white; lobes 5, outside pubescent on middle part but glabrescent, inside sparsely villous. Stamens 5; filaments thick with a cluster of rust colored villous hairs on each side at base; staminodes 5, lanceolate to ovate, margin yellowish brown pubescent. Ovary subglobose, ca. 1.5 mm, densely rust colored pubescent. Style ca. 3 mm, ca. 1.2 cm in fruit. Fruit green becoming pale brown, subglobose to subellipsoid, ca. 1.2 cm, glabrous or appressed rust colored tomentose, with enlarged calyx; stalk 8–10 mm, glabrous. Seeds subglobose, slightly compressed, ca. 8 mm in diam., glossy, brown; scar elliptic. Fl. Oct–Feb, fr. Jun–Oct.

\* Forest at low to middle altitudes. Hainan.

**4. *Xantolis shweliensis*** (W. W. Smith) P. Royen, *Blumea* 8: 210. 1957.

瑞丽刺榄 rui li ci lan

*Sideroxylon shweliensis* W. W. Smith, *Notes Roy. Bot. Gard. Edinburgh* 12: 223. 1920.

Shrubs 1–2 m tall. Branchlets gray, striate, white tomentose or glabrous. Petiole 5–8 mm, white sericeous when young but soon glabrescent; leaf blade lanceolate to elliptic, 5–10 × 1.3–2.5 cm, papery, abaxially glabrous or scattered villous, adaxially shiny and glabrous or sparsely villous along midrib, base narrowly cuneate, apex obtuse to acuminate; lateral veins 9–12 pairs. Flowers solitary or in several-flowered clusters, pendent. Pedicel 3–4 mm, yellowish brown tomentose. Sepals 5, imbricate, ovate to triangular, 3–4 × 2.5–4 mm, outside villous toward apex, inside yellowish brown tomentose. Corolla pale yellow, 7.5–9 mm; lobes 5, ovate-lanceolate, 5–6 × 2–2.5 mm, margin fimbriate at base. Stamens 5 with a cluster of villous hairs on each side at base; staminodes lanceolate, 3–4 × 1–2 mm, apex acute. Ovary conical, 5-locular, grayish yellow pubescent. Fruit ovoid, slightly beaked, ca. 3 cm. Seeds compressed-ellipsoid, ca. 1.8 × 1.2 cm, glossy, brown, scar elliptic, ca. 14 × 6 mm.

\* Mixed forest; 2400–3000 m. Yunnan.

No specimen has been seen by the authors. The description is based on Royen (*Blumea* 8: 210. 1957) and information given by reviewers.

## 8. **POUTERIA** Aublet, *Hist. Pl. Guiane Fr.* 1: 85. 1775.

桃榄属 tao lan shu

Trees or shrubs. Branchlets glabrous or pubescent but glabrescent. Leaves usually alternate, not stipulate; leaf blade papery to leathery, both surfaces usually pubescent when young but glabrescent when mature, sometimes abaxially glabrous and adaxially appressed pubescent, lateral veins conspicuous. Flowers in axillary clusters, sometimes with 2–4 bractlets. Sepals (4 or)5(or 6), outside pubescent, inside glabrous or sericeous, early deciduous or persistent in fruit. Corolla tubular to campanulate, 4- or 5–8-lobed, appendages absent. Stamens (4 or)5(–8), inserted in throat of corolla; staminodes less than 5 or 5–8, opposite sepals, lanceolate to subulate, sometimes scalelike to petal-like. Ovary conical, sometimes with cupular disc at base, 5(or 6)-locular, ± villous. Fruit globose, glabrous or tomentose, sometimes setose; pericarp thin to thick, sometimes very hard when dry. Seed coat shiny, scar oblong to broadly ovate, covering half to nearly whole surface of seed.

About 50 species: tropical areas, mostly in America; two species in China.

- 1a. Leaf blade reddish brown pubescent when young; pedicel and outside of sepals rust colored pubescent; inner sepals entire; ovary glabrous; fruit purple ..... 1. *P. annamensis*  
1b. Leaf blade glabrous when young; pedicel and outside of sepals pale yellow pubescent; inner sepals with fringed margin; ovary pale yellow villous; fruit yellow ..... 2. *P. grandifolia*

**1. *Pouteria annamensis*** (Pierre) Baehni, Candollea 9: 311. 1942.

桃榄 tao lan

*Planchonella annamensis* Pierre in Dubard, Notul. Syst. (Paris) 2: 83. 1911; *Sideroxylon annamense* (Pierre) Lecomte; *S. hainanense* Merrill.

Trees (10–)15–20 m tall. Bark gray. Branchlets slightly reddish brown pubescent at apex. Leaves scattered; petiole 1.5–3.5(–4.5) cm; leaf blade lanceolate, oblong-obovate, or elliptic-lanceolate, 6–17 × 2–5 cm, densely reddish brown pubescent when young, glabrescent, adaxially shiny, base cuneate, apex rounded, obtuse, or rarely retuse; lateral veins 5–9(–11) pairs. Flowers usually in clusters of 1–3 with a short peduncle. Pedicel 1–3 mm, rust colored pubescent. Sepals rounded, 2–2.5 mm, outside rust colored pubescent. Corolla white, lobes rounded. Stamines subulate. Ovary subglobose; disc densely rust colored villous. Style 2–2.5 mm, glabrous. Fruit a juicy berry, green becoming purple-red, 2–5-seeded, sessile or subsessile, globose, 2.5–4.5 cm, apex obtuse; pericarp thick, glabrous. Seeds ovoid, ca. 1.8 cm, compressed; seed coat pale yellow; scar lateral, narrowly oblong, almost as long as seed. Fl. May.

Forests, occasionally beside trails near villages; middle altitudes. Guangxi, Hainan [N Vietnam].

The fruit are fleshy, juicy, and good tasting. The bark is used medicinally, and the plant is a source of timber.

**2. *Pouteria grandifolia*** (Wallich) Baehni, Candollea 9: 332. 1942.

龙果 long guo

*Sideroxylon grandifolium* Wallich in Roxburgh, Fl. Ind. 2: 348. 1824.

Trees to 40 m tall. Bark pale gray. Branchlets yellowish white tomentose or glabrous. Leaves alternate; petiole 1.4–4 cm, glabrous; leaf blade oblong-obovate, (10–)17–30 × (4–)6–10 cm, thin leathery, glabrous, shiny, base cuneate, apex obtuse-acuminate to rarely rounded to obtuse; midrib abaxially conspicuously raised, lateral veins 6–12 pairs. Flowers axillary in clusters of 3–10. Pedicel 2–3 mm, pale yellow pubescent. Sepals rounded to broadly ovate, 2.5–3 mm, outside pale yellow pubescent, inside glabrous, inner sepals with membranous and fimbriate margin. Corolla green, becoming white, 2.5–4.5 mm. Stamens 1–1.5 mm; staminodes linear, ca. 1 mm, pale yellow pubescent. Disc densely pale yellow villous. Style ca. 2.8 mm. Fruit green to greenish brown, becoming yellow, globose, 2–5-seeded, 4–5 cm, glabrous, apex rounded; pericarp fleshy. Seeds fusiform, compressed, 2.5–3 × 1.2–1.3 cm; scar oblong. Fl. and fr. throughout the year.

Rain forests, thickets; 500–1200 m. Yunnan (Xishuangbanna Zhou) [NE India, Myanmar, Thailand].

The fruit are sweet and edible.

## 9. *PLANCHONELLA* Pierre, Not. Bot. 1: 34. 1890, nom. cons.

山榄属 shan lan shu

Trees or shrubs. Branchlets pubescent but glabrescent. Leaves alternate or opposite, sometimes closely clustered at end of branchlets or with flowers on dwarf shoots. Flowers bisexual or seldom unisexual, 1 to several in axillary clusters, usually bracteate, (4 or)5(or 6)-merous. Calyx 5-lobed, tube short, lobes imbricate or twisted. Corolla glabrous, rarely pubescent outside. Stamens 5, inserted in throat and opposite corolla lobes; staminodes petal-like, alternate to corolla lobes. Disc absent or cupular, ringlike, usually pubescent. Ovary (4 or)5(or 6)-locular. Fruit a berry, sometimes woody, 1–6-seeded. Seeds compressed ellipsoid; scar narrowly oblong, lateral.

About 100 species: South America, Australia, Cambodia, India, Indonesia, Japan, Malaysia, New Caledonia, New Guinea, New Zealand, Pakistan, Philippines, Seychelles, Thailand, Vietnam; two species in China.

*Planchonella* may not be sufficiently distinct from *Pouteria*.

- 1a. Leaf blade usually obovate to almost circular, rarely lanceolate, 1.5–15 cm wide; pedicel and outside of sepals pubescent; fruit 1–1.5 cm wide ..... 1. *P. obovata*  
1b. Leaf blade oblanceolate to elliptic-lanceolate, 0.8–2.5 cm wide; pedicel and sepals glabrous; fruit 0.6–0.7 cm wide ..... 2. *P. clemensii*

**1. *Planchonella obovata*** (R. Brown) Pierre, Not. Bot. 1: 36. 1890.

山榄 shan lan

*Sersalisia obovata* R. Brown, Prodr. 530. 1810; *Pouteria obovata* (R. Brown) Baehni; *Sideroxylon ferrugineum* Hooker & Arnott.

Shrubs or trees to 40 m tall, usually shorter. Bark brown. Branchlets angulate, rust colored sericeous to

tomentose when young, glabrescent. Leaves scattered; petiole 0.5–5 cm; leaf blade obovate to lanceolate, 6–24 1.5–15 cm, membranous, papery, or leathery, abaxially rust colored, blackish tomentose, or sericeous but glabrescent, adaxially shining and glabrous, base narrowly to broadly cuneate, apex rounded to acuminate; lateral veins 7–18 pairs. Flowers pistillate or bisexual, green to white, several in axillary clusters, 5- or 6-merous. Pedicel 2–10 mm, rust colored and white tomentose. Sepals 5 (or 6), rounded or broadly ovate, 2–3 2–3 mm, outside white, yellow, or rust colored tomentose, inside glabrous, margin membranous, ciliate, or fimbriate. Corolla campanulate, 3–5 mm; lobes 5, broadly ovate to oblong. Stamens 2.5–3.5 mm, sometimes absent or abortive; staminodes lanceolate to triangular, sometimes absent. Ovary conical to obovoid, rust colored hirsute, 5–10-locular. Style conical, 1.5–2 mm, 5-ribbed. Fruit white, yellow, red, or blue when fresh, 1–5-seeded, obovoid to globose, 1–1.5 1–1.5 cm; pericarp membranous, glabrous. Seeds oblique fusiform, 8–12 2–3.5 mm, yellow; scar narrowly elliptic. Fr. Oct–Dec.

Thickets; low altitudes. Hainan, Taiwan [Cambodia, India, Indonesia, Japan (Bonin and Ryukyu Islands), New Guinea, Pakistan, Philippines, Vietnam; Australia].

## 10. SINOSIDEROXYLON (Engler) Aubréville, *Adansonia*, n. s., 3: 32. 1963.

铁榄属 tie lan shu

*Sideroxylon* Linnaeus sect. *Sinosideroxylon* Engler, Bot. Jahrb. Syst. 12: 518. 1890.

Trees or rarely shrubs. Leaves alternate; stipules absent; leaf blade leathery. Flowers small, in axillary clusters, sometimes racemose. Sepals 5 (or 6), imbricate, rounded to ovate-rounded, apex obtuse to rarely acuminate. Corolla broadly to narrowly campanulate, tube short; lobes 5 (or 6), apex obtuse to acuminate. Stamens 5 (or 6), inserted in throat, opposite corolla lobes; anthers ovoid to lanceolate; staminodes 5 (or 6), linear, scalelike to petal-like, entire or serrate, inserted in throat and alternate with corolla lobes. Ovary glabrous or villous, 5-locular. Fruit a berry, ovoid to globose, 1(–5)-seeded; pericarp usually thick, sometimes fleshy. Seed scar basal, sometimes lateral.

Four species: Vietnam; three species in China.

*Sinosideroxylon* may not be sufficiently distinct from *Sideroxylon*.

- 1a. Flowers 1 or 2–5 in axillary clusters; fruit ellipsoid, 1–1.5 cm ..... 1. *S. wightianum*  
 1b. Flowers in a raceme or pedunculate umbel; fruit ovoid, ca. 2.5 cm.  
 2a. Inflorescences umbels on peduncles 0.2–0.6 cm; leaf blade oblanceolate ..... 2. *S. yunnanense*  
 2a. Inflorescences a raceme of panicles, 1–3 cm overall; leaf blade elliptic-lanceolate to ovate ..... 3. *S. pedunculatum*

**1. *Sinosideroxylon wightianum*** (Hooker & Arnott) Aubréville, Fl. Cambodge, Laos & Vietnam 3: 68. 1963.

革叶铁榄 ge ye tie lan

*Sideroxylon wightianum* Hooker & Arnott, Bot. Beecher Voy. 196. 1837; *Mastichodendron wightianum* (Hooker & Arnott) P. Royen; *S. wightianum* var. *balansae* Lecomte;

Trees or rarely shrubs, (2–)4–8(–15) m tall. Branchlets and leaves rust colored tomentose when young, glabrescent. Petiole 0.7–1.5(–2) cm; leaf blade elliptic, lanceolate, or oblanceolate, (5–)7–10(–17) × (1.5–)2.5–3.7(–9.5) cm, leathery, base narrowly cuneate, apex acute to obtuse; lateral

The wood is reddish brown, hard, and thick, and the leaves are used medicinally.

**2. *Planchonella clemensii*** (Lecomte) P. Royen, *Blumea* 8: 375. 1957.

狭叶山榄 xia ye shan lan

*Sideroxylon clemensii* Lecomte, Fl. Indo-Chine 3: 890. 1930; *Pouteria clemensii* (Lecomte) Baehni.

Trees 5–20 m tall. Bark dark brown. Branchlets gray sericeous, glabrescent. Leaves often closely clustered at end of branchlets; petiole ca. 1 cm; leaf blade narrowly oblanceolate to elliptic-lanceolate, 7–16 × 0.8–2.5 cm, leathery, glabrous, base cuneate, margin usually recurved, apex acute to obtuse; lateral veins 10–16 pairs. Flowers several, in axillary clusters. Pedicel angulate, 5–10 mm. Sepals 2.5–3.5 mm, glabrous. Corolla white; lobes 5, subrounded, 2–2.5 × ca. 1.5 mm. Staminodes lanceolate, 1–1.5 mm. Ovary ovoid, ca. 1 × 2 mm, scattered rust colored tomentose, 5-locular; disc irregularly lobed. Style ca. 2 mm, 5-ribbed. Fruit oblique obovoid to ovoid, 1–3-seeded, 8–10 × 6–7 mm, with remnant of style and persistent calyx; pericarp membranous, black when ripe. Seeds oblique fusiform, 6–9 × 3–4 mm; scar brownish, narrow, slightly shorter than seed. Fl. Feb–May, fr. Oct.

Beside streams; 400–500 m. Hainan [Vietnam].

veins 12–17 pairs. Flowers 1 or 2–5 in axillary clusters, greenish white, aromatic. Pedicel 4–10 mm, pale yellow tomentose. Sepals 5, ovate to lanceolate, 2–2.5(–4) × 1.5–2.5 mm, outside pale yellow tomentose, inside glabrous. Corolla 4–5 mm, lobes lanceolate to ovate. Staminodes lanceolate to subtriangular, petal-like, 2.5–3 mm. Ovary ovoid, ca. 2 mm, 5-locular, base rust colored hirsute. Style 2–4 mm, glabrous. Fruit green, becoming dark purple, ellipsoid, 1–1.5(–1.8) cm × 5–8 mm, glabrous. Seeds 1, ellipsoid, compressed; scar basal to lateral-basal. Fl. May–Jun, fr. Aug–Oct.

Thickets and forests on limestone hill; 500–1500 m. Guangdong, Guangxi, S Guizhou, SE Yunnan [N Vietnam].

**2. *Sinosideroxylon yunnanense*** (C. Y. Wu) H. Chuang, Guihaia 3: 312. 1983.

滇铁榄 dian tie lan

*Planchonella yunnanensis* C. Y. Wu in C. Y. Wu & H. W. Li, *Yunnan Redai Yaredai Zhiwu Quxi Yanjiu Baogao* (Rep. Stud. Pl. Trop. Subtrop. Yunnan) 1: 26. 1965.

Trees 5–15 m tall. Young parts soon glabrescent. Branchlets striate, with small and dense lenticels. Leaves alternate; petiole 1–1.5 cm; leaf blade oblanceolate, 9–20 × 2–5 cm, leathery, glabrous, apex acuminate, veins conspicuous. Flowers in axillary panicles, usually umbellate, 12–20, closely clustered; peduncle 2–6 mm, rust colored pubescent. Calyx connate at base; lobes 5, ovate-triangular, ca. 2 × 1.5 mm, outside rust colored pubescent, inside glabrous. Corolla ca. 5 mm; lobes 5, ovate. Stamines 5, petal-like, ca. 3 mm, elongated after flowering. Fruit a berry, green becoming black, ovoid, ca. 2.4 cm, glabrous. Seeds 1, oblong-ovoid, ca. 2 cm; scar rounded, subbasal. Fl. May, fr. Nov.

\* Dense forests; 1000–1600 m. SE Yunnan.

The generic placement of *Sinosideroxylon yunnanense* follows Aubréville (Fl. Cambodge, Laos & Vietnam 3: 6. 1963), who emphasized seed characters in the generic delimitations within the Sapotaceae.

**3. *Sinosideroxylon pedunculatum*** (Hemsley) H. Chuang, Guihaia 3: 312. 1983.

铁榄 tie lan

Trees (5–)9–12 m tall. Branchlets rust colored pubescent, lenticellate. Leaves alternate, often closely clustered at end of branchlets; petiole 0.7–1.5 cm, rust colored tomentose or subglabrous; leaf blade ovate to ovate-lanceolate, (5–)7–9(–15) × 3–4 cm, base cuneate, apex acuminate; lateral veins 8–12 pairs. Flowers pale yellow, in 1–3-flowered clusters on axillary panicle; peduncle 1–3 cm; bractlets ovate-triangular. Pedicel 2–4 mm. Calyx campanulate; lobes 5, triangular or subovate, 2–3 × 1.5–2 mm. Corolla 4–5 mm; lobes (4 or)5, ovate-oblong,

1.5–2.5 × ca. 1 mm. Stamens (4 or)5; staminodes (4 or)5, petal-like, lanceolate, 1–2 mm, lacinate. Ovary subglobose, 4- or 5-locular, ca. 1 mm, glabrous. Style 2–3 mm, elongated in fruit. Fruit ca. 2.5 × 1.5 cm. Seeds 1, ellipsoid, compressed, ca. 1.6 × 0.9 cm; scar subrounded. Fl. May–Aug.

1000–1100 m. Guangdong, Guangxi, Hunan, Yunnan [Vietnam].

The generic placement of *Sinosideroxylon pedunculatum* is unsettled. Hemsley originally placed it, with uncertainty, in *Sarcosperma*, but the two genera are quite different in vegetative and floral characters. Lam and Kerpel's (Blumea 3: 285. 1939) transfer to *Planchonella* was followed by Wu and Li [*Yunnan Redai Yaredai Zhiwu Quxi Yanjiu Baogao* (Rep. Stud. Pl. Trop. Subtrop. Yunnan) 1: 26. 1965], who drew attention to the seeds with copious endosperm and leafy cotyledons. However, the racemose or sometimes paniculate inflorescences and rounded basal seed scar suggest exclusion from *Planchonella*. Based on the alternate leaves, 1-seeded berry, and seed characteristics, it is here included within *Sinosideroxylon*.

- 1a. Leaf blade glabrous on both surfaces ..... 3a. var. *pedunculatum*  
1b. Leaf blade adaxially sericeous, abaxially glabrescent ..... 3b. var. *pubifolium*

**3a. *Sinosideroxylon pedunculatum* var. *pedunculatum***

铁榄 (原变种) tie lan (yuan bian zhong)

*Sarcosperma pedunculata* Hemsley in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 68. 1889; *Planchonella pedunculata* (Hemsley) H. J. Lam & Kerpel.

Leaf blade glabrous on both surfaces. Fl. Jul–Aug.

Forests, limestone hills; 1000–1100 m. Guangdong, Guangxi, Hunan, Yunnan [Vietnam].

**3b. *Sinosideroxylon pedunculatum* var. *pubifolium*** H. Chuang, Guihaia 3: 312. 1983.

毛叶铁榄 mao ye tie lan

Shoots and young leaves rust colored sericeous. Leaf blades abaxially sericeous, adaxially glabrescent. Fl. May

\* Top of limestone hills. Guangxi (Longzhou Xian).

## 11. SARCOSPERMA J. D. Hooker in Bentham & J. D. Hooker, Gen. Pl. 2: 655. 1876.

肉实树属 rou shi shu shu

Trees evergreen. Leaves opposite, subopposite, or rarely spirally arranged; stipules small, early deciduous and leaving conspicuous scars on petiole, sometimes subpersistent; leaf blade subleathery. Flowers small, solitary or clustered on axillary racemes or panicles; bracts small, triangular. Sepals 5, rounded, imbricate. Corolla broadly campanulate; lobes 5, ovate. Stamens 5, inserted on corolla tube, opposite lobes; staminodes 5, subulate to triangular, inserted in throat, alternate with corolla lobes. Ovary 1- or 2-locular, glabrous. Style short; stigma 2-lobed. Fruit a drupe, ellipsoid, 1- or 2-seeded; pericarp very thin. Seed scar small, rounded.

About eight or nine species: India, Indonesia, Malaysia, Myanmar, Philippines, Thailand, Vietnam; four species in China.

*Sarcosperma* has been placed in its own family, Sarcospermaceae, but it is more usually regarded as member of the Sapotaceae.

- 1a. Leaves with slender stipules at top of petiole ..... 1. *S. kachinense*  
1b. Leaves without stipules.

- 2a. Leaf blade abaxially with glandular pits in axils of most main lateral veins ..... 2. *S. arboreum*  
 2a. Leaves without glandular pits.  
 3a. Leaf blade lanceolate, (1.5-)2-4(-5.5) cm wide ..... 3. *S. griffithii*  
 3b. Leaf blade obovate to oblanceolate, 3-6 cm wide ..... 4. *S. laurinum*

**1. *Sarcosperma kachinense*** (King & Prain) Exell, J. Bot. 69: 100. 1931.

绒毛肉实树 rong mao rou shi shu

Trees (3-)6-10(-15) m tall. Bark grayish white. Leaves subopposite; stipules 2, subulate, 4-7 mm, densely rust colored tomentose, early deciduous; petiole 0.5-1.5 cm, with 2 subulate appendages at petiole apex, densely rust colored tomentose; leaf blade oblong, elliptic, or obovate-elliptic, 10-26 × 4-9 cm, papery, abaxially yellow or rust colored pubescent especially on veins but glabrescent, adaxially glabrous or sparsely rust colored pubescent when young, base cuneate, sometimes obtuse, or rounded, apex acuminate; lateral veins 6-11 pairs. Racemes axillary, single or forming complex panicle, 4-8(-17) cm. Flowers clustered, aromatic. Pedicel 3-5 mm, densely tomentose. Sepals 2-3 mm, broadly ovate, outside densely tomentose, inside glabrous. Corolla white, 3.5-5 mm; lobes ovate to subrounded, 1.5-2 mm, glabrous. Stamens ca. 1 mm. Ovary ovoid, 1-2 mm, 2-locular. Style short, thick; stigma 2-cleft. Fruit green, becoming red, oblong, 2-2.8 ca. 1 cm, 1-seeded; calyx persistent. Fl. Oct-Feb.

100-1500 m. Guangxi, Hainan, S and SE Yunnan [N Vietnam].

- 1a. Branchlets and petioles densely tomentose ..... 1a. var. *kachinense*  
 1b. Branchlets and petioles glabrous ..... var. *simondii*

**1a. *Sarcosperma kachinense* var. *kachinense***

绒毛肉实树 (原变种) rong mao rou shi shu (yuan bian zhong)

*Combretum kachinense* King & Prain, J. Asiatic Bot. 16: 2, Nat. Hist. 69: 169. 1900.

Branchlets densely rust colored tomentose. Petiole and inflorescences densely rust colored to yellow tomentose. Stamens subulate-triangular. Fl. Oct-Feb.

Forests; 100-1500 m. Guangxi, Hainan, S and SE Yunnan [Vietnam].

The fruit contains a dye, and the plant is a source of timber.

**1b. *Sarcosperma kachinense* var. *simondii*** (Gagnepain) H. J. Lam & P. Royen, Blumea 7: 151. 1952.

光序肉实树 guang xu rou shi shu

*Sarcosperma simondii* Gagnepain, Bull. Mus. Natl. Hist. Nat., sér. 2, 20: 294. 1948.

Young branchlets and petioles glabrous. Leaf blade pubescent when young but abaxially glabrescent, sometimes with glandular pits in axils of lateral veins. Inflorescences slightly pubescent. Stamens subulate to sometimes lanceolate-linear, inflexed, carinate. Fl. Oct-Feb.

Dense forests in valleys; 600-1000 m. S Yunnan [N Vietnam].

**2. *Sarcosperma arboreum*** Buchanan-Hamilton ex C. B. Clarke in J. D. Hooker, Fl. Brit. India 3: 535. 1882.

大肉实树 da rou shi shu

Trees 20(-28) m tall. Trunk to 40(-50) cm d.b.h.; bark grayish brown. Young branchlets sparsely rust colored tomentose. Leaves opposite or subopposite, sometimes alternate; stipules subulate, 3-4 mm, early deciduous; petiole 1-2(-3) cm, without appendages; leaf blade oblong or rarely elliptic, 10-18(-35) × 4-8(-13) cm, glabrous, base cuneate and usually oblique, apex acuminate to acute; lateral veins (7 or)8-11(-13) pairs, with conspicuous glandular pits in axils. Flowers in panicles, rarely racemes, rust colored tomentose, aromatic. Sepals ovate, 2-3 × 1.5-2.5 mm, margin membranous, outside rust colored tomentose, inside glabrous. Corolla green, becoming white, 4-5 mm; lobes obovate to oblong, 2.5-3 mm, glabrous. Stamens narrowly triangular to subulate, 0.5-1 mm. Ovary subglobose, ca. 1.5 mm, glabrous, apex acuminate. Stigma 3-cleft. Drupe green-purple, oblong, 1.5-2.5 0.7-1.5 cm, glabrous, 1-seeded. Fl. Sep-Apr, fr. Mar-Jun.

Forests; 500-2500 m. Guangxi, Guizhou, Yunnan [NE India, Myanmar, Thailand].

**3. *Sarcosperma griffithii*** J. D. Hooker ex C. B. Clarke in J. D. Hooker, Fl. Brit. India 3: 536. 1882.

小叶肉实树 xiao ye rou shi shu

Trees to 7.5 m tall. Trunk to 25 cm d.b.h. Leaves subopposite; petiole (0.4-)1(-1.3) cm, without appendages; leaf blade lanceolate, (5.5-)8-14(-20) × (1.5-)2-4(-5.5) cm, subglabrous, base cuneate, apex acuminate; lateral veins 6-8(or 9) pairs, without or with very few glandular pits. Inflorescences panicles or rarely racemes, axillary, 3.2-6.8 cm. Flowers pale green. Pedicel 2-3 mm, brown tomentose. Sepals ovate, ca. 2 mm, outside brown tomentose except membranous margin, inside glabrous. Corolla 3-4 mm; lobes subrounded, 1.5-2 mm. Stamens ca. 1 mm; stamens triangular to subulate-triangular. Ovary ovoid to subglobose, 1-1.5 mm, glabrous, 2-locular. Fruit not seen. Fl. autumn.

Mixed forests; ca. 1900 m. Yunnan (Xishuangbanna Zhou) [NE India].

**4. *Sarcosperma laurinum*** (Benth) J. D. Hooker in Benth & J. D. Hooker, Gen. Pl. 2: 655. 1876.

肉实树 rou shi shu

*Reptonia laurina* Benth, Fl. Hongk. 208. 1861.

Trees 6-15(-26) m tall. Trunk 6-20 cm d.b.h., conspicuously buttressed; bark grayish brown, thin, smooth. Branchlets angulate, glabrous. Leaves mostly alternate, some opposite, some whorled at end of

branchlets; stipules subulate, 2–3 mm; petiole 1–2 cm, without appendage; leaf blade usually obovate to oblanceolate, rarely narrowly elliptic, 7–16(–19) 3–6 cm, subleathery, glabrous, adaxially dark and shiny green, base cuneate, apex usually acute, sometimes obtuse to obtuse-acuminate; lateral veins 6–9 pairs. Racemes or panicles axillary, 2–13 cm. Flowers aromatic. Pedicel 1–5 mm, yellow-brown tomentose. Sepals 2–3 mm, broadly ovate to subrounded, outside yellow-brown tomentose, inside glabrous. Corolla green, becoming pale yellow; lobes broadly obovate to

subrounded, 2–2.5 mm. Staminodes subulate, longer than stamens. Ovary ovoid, 1–1.5 mm, 1-locular, glabrous. Style thick, ca. 1 mm. Drupe green, becoming red and finally black, oblong to ellipsoid, 1.5–2.5 × 0.8–1 cm, base with recurved persistent calyx, pericarp very thin. Seeds 1, ca. 1.7 × 0.8 cm. Fl. Aug–Sep, fr. Dec–Jan.

Forests in valleys or along streams; 400–500 m. Fujian, Guangxi, Hainan, Zhejiang [N Vietnam].