

ILLICIAEAE

八角科 ba jiao ke

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Trees or shrubs, evergreen, glabrous or very rarely young twigs obscurely puberulent. Perules (vegetative bud scales) imbricate, usually caducous. Young twigs with oily or resinous cells, aromatic. Stipules absent. Leaves alternate, usually fascicled near twig apex or sometimes pseudovercillate or subopposite, simple, petiolate; leaf blade leathery or papery, margin entire and slightly reflexed, midvein abaxially prominent or flat and usually adaxially impressed, secondary veins pinnate. Flowers axillary or supra-axillary, often appearing subterminal near twig apex, rarely cauliflorous, usually solitary, rarely 2–5-clustered, bisexual. Tepals 7–33(–55), yellow or red, rarely white, spirally arranged, distinct, imbricate, usually glandular; outer tepals small, sometimes bractlike; inner tepals large, tongue-like and membranous or ovate to suborbicular and slightly fleshy. Stamens generally numerous, spirally arranged; filaments tongue-like to subterete; anthers 2-celled, basifixed, introrse to introrse-lateral, longitudinally dehiscent. Carpels (5–)7–15(–21), in 1 whorl, distinct; ovary 1-loculed; ovule anatropous, ventral or near basal; style short, subulate. Fruit a star-shaped follicetum of single-seeded follicles, dehiscent along ventral suture. Seeds elliptic to ovate, laterally compressed, glossy; endosperm abundant, oily; embryo small.

One genus and ca. 40 species: mostly in E and SE Asia, a few in SE North America and tropical America; 27 species (18 endemic) in China.

Law Yuwu. 1996. Illiciaceae. In: Law Yuwu, ed., Fl. Reipubl. Popularis Sin. 30(1): 198–231, 271.

1. ILLICIUM Linnaeus, Syst. Nat., ed. 10, 2: 1042, 1050, 1370. 1759.

八角属 ba jiao shu

Morphological characters and geographical distribution are the same as those of the family.

- 1a. Inner tepals thin, membranous, ± open when flowering, narrowly oblong, tongue-like, or lanceolate; flower buds ovoid; pollen grains tricolpate.
- 2a. Leaf blade midvein adaxially prominent; flower peduncle 0.5–3 cm.
- 3a. Flower peduncle 2–3 cm; style and ovary subequal in length; fruit peduncle 3–4 cm 1. *I. jiadifengpi*
- 3b. Flower peduncle 0.5–2 cm; style distinctly longer than ovary; fruit peduncle 1.2–3.5 cm.
- 4a. Leaf blade secondary veins abaxially conspicuously prominent; tepals (17–)22–33; stamens 22–25 2. *I. angustisepalum*
- 4b. Leaf blade secondary veins abaxially flat or slightly prominent; tepals 10–21; stamens 16–23.
- 5a. Carpels 6–8(–10); fruit with 6–8(–10) follicles 3. *I. philippinense*
- 5b. Carpels 12 or 13; fruit with (8–)12 or 13 follicles 4. *I. tashiroi*
- 2b. Leaf blade midvein adaxially impressed; flower peduncle 0.2–1 cm.
- 6a. Perules small, inconspicuous; tepals 16–19; stamens 12 or 13; fruit with 6–8 follicles 5. *I. tsaii*
- 6b. Perules large, largest 0.4–1.5 cm; tepals 18–32; stamens 16–35; fruit with 8–13 follicles.
- 7a. Largest perules 1.2–1.5 cm; leaf blade papery 6. *I. burmanicum*
- 7b. Largest perules 0.4–1.3 cm; leaf blade leathery.
- 8a. Stamens 28–35; fruit follicles 2.5–2.8 cm 7. *I. wardii*
- 8b. Stamens 16–28; fruit follicles 1.1–2 cm.
- 9a. Leaf blade 5–10 × 1.5–3.5 cm; tepals 18–23(–26), largest tepal 0.9–1.5 cm; carpels 8–13; style and ovary subequal in length 8. *I. simonsii*
- 9b. Leaf blade 8–13(–14) × 2.5–5.5(–6.5) cm; tepals 27–32, largest tepal 1.5–2.5 cm; carpels 13 or 14; style distinctly longer than ovary 9. *I. macranthum*
- 1b. Inner tepals fleshy to papery, only slightly open when flowering, usually ovate to suborbicular; flower buds globose; pollen grains trisyncolpate.
- 10a. Carpels 4–10(–12); fruit with 2–10 follicles.
- 11a. Style and ovary subequal in length.
- 12a. Tepals greenish yellow to pale yellow; stamens 4–7 24. *I. oligandrum*
- 12b. Tepals red to orangish red; stamens 8–19.
- 13a. Stamens 14–19; carpels 3.5–4.5 mm, with 1.8–2.5 mm style 25. *I. merrillianum*
- 13b. Stamens 8–14; carpels 2.3–3.2 mm, with 1–1.5 mm style.
- 14a. Tepals (14–)17–21; fruit follicles 0.9–1.4 cm 26. *I. micranthum*
- 14b. Tepals 10–13; fruit follicles 1.4–1.5 cm 27. *I. petelotii*

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- 11b. Style distinctly longer than ovary.
 15a. Perules large (largest 8–12 mm).
 16a. Leaf blade 0.8–1.2(–2.7) cm wide; stamens (11–)19–24(–31); carpels 2.5–3.5 mm, with 1.4–2 mm style 17. *I. dunnianum*
 16b. Leaf blade 1.5–4.5 cm wide; stamens 7–10; carpels 3–5.5 mm, with 2–3.8 mm style 20. *I. tsangii*
 15b. Perules small (largest to 5 mm).
 17a. Flower peduncle 0.3–0.5 cm; fruit peduncle ca. 1 cm 21. *I. pachyphyllum*
 17b. Flower peduncle 1.5–5 cm; fruit peduncle 1.5–5.5 cm.
 18a. Tepals 10–15, largest 7–10 × 4–8.5 mm; seeds 6.5–7.5 mm 22. *I. henryi*
 18b. Tepals 7–12, largest 9–12 × 8–12 mm; seeds 7–10 mm 23. *I. verum*
 10b. Carpels (9 or)10–16; fruit with 9–14 follicles.
 19a. Style distinctly longer than ovary.
 20a. Tepals 25 or 26 16. *I. griffithii*
 20b. Tepals 10–20.
 21a. Carpels 2.5–3.5 mm; seeds 4–5 mm 17. *I. dunnianum*
 21b. Carpels 3.9–5.5 mm; seeds 6–8 mm.
 22a. Leaf blade with 4–7 secondary veins on each side of midvein; petiole 1.3–2.5 cm; tepals (11–)15–17(–20); stamens (14–)20–23; fruit peduncle 1–4 cm 18. *I. difengpi*
 22b. Leaf blade with 6–10 secondary veins on each side of midvein; petiole 0.7–1.5 cm; tepals 10–15; stamens 6–11; fruit peduncle 6–8 cm 19. *I. lanceolatum*
 19b. Style and ovary subequal in length or style shorter than ovary.
 23a. Stamens 14–21.
 24a. Perules large (largest 1–2 cm); flower peduncle 1.8–4.5(–6) cm 10. *I. majus*
 24b. Perules small (largest < 1 cm); flower peduncle 0.8–1.7 cm.
 25a. Leaves in clusters of 2 or 3 at distal nodes; petiole 4–7 mm; tepals ca. 19, greenish yellow; style and ovary subequal in length 11. *I. modestum*
 25b. Leaves in clusters of 3–5 at distal nodes; petiole 6–20 mm; tepals 9–11, pale red; style shorter than ovary 12. *I. brevistylum*
 23b. Stamens 22–41.
 26a. Tepals 21–23 13. *I. leiophyllum*
 26b. Tepals 10–21.
 27a. Tepals 10–14; stamens 22–30 14. *I. ternstroemioides*
 27b. Tepals 14–21; stamens 39–41 15. *I. arborescens*

1. *Illicium jiadifengpi* B. N. Chang, Acta Bot. Yunnan. 4: 47. 1982.

假地枫皮 jia di feng pi

Illicium jiadifengpi var. *baishanense* B. N. Chang & S. H. Qu.

Trees to 20 m tall. Perules ovate to lanceolate, 3–5 mm. Leaves in clusters of 3–5 at distal nodes; petiole 1.5–3 cm; leaf blade narrowly elliptic, 7–16 × 2–4.5 cm, midvein adaxially conspicuously prominent, secondary veins 5–8 on each side of midvein and on both surfaces flat or slightly prominent, base decurrent along petiole, apex caudate to acuminate. Flowers axillary or subterminal. Flower peduncle 2–3 cm. Tepals 33–55, white or pale yellowish, narrowly tongue-like, 14–17 × ca. 3 mm (largest), thinly papery, submembranous, or fleshy. Stamens 28–32, 2.7–3 mm; filaments ca. 2 mm; connective shape unknown; anthers ca. 1 mm; pollen grains tricolpate. Carpels 12–14, 3.5–4 mm; ovary 1.5–2 mm; style 1.5–2 mm. Fruit peduncle 3–4 cm. Fruit with 12–14 follicles; follicles 15–19 × 5–8 × 2–4 mm. Seeds ca. 8 × 4–5 × 2–3 mm. Fl. Mar–Jun, fr. Aug–Oct.

• Forests; 1000–2000 m. N Guangdong, NE Guangxi, Hubei, S Hunan, Jiangxi, Sichuan, Zhejiang (Qingyuan).

The fruit can cause serious poisoning.

2. *Illicium angustisepalum* A. C. Smith, Sargentia 7: 36. 1947.

大屿八角 da yu ba jiao

Illicium jiadifengpi B. N. Chang f. *minwanense* (B. N. Chang & S. D. Zhang) Q. Lin; *I. minwanense* B. N. Chang & S. D. Zhang; *I. wuyishanum* Q. Lin.

Trees to 11 m tall. Perules oblong to ovate, to 7 mm. Leaves in clusters of 3–6 at distal nodes; petiole 1–2.5 cm; leaf blade oblong-elliptic to elliptic, (5.5–)7–12(–20) × 2–4(–7.5) cm, thinly leathery to leathery, midvein adaxially slightly prominent, secondary veins 6–9 on each side of midvein, abaxially prominent, and adaxially prominent or slightly impressed, base attenuate or decurrent along petiole, apex subacute to acuminate. Flowers axillary or subterminal. Flower peduncle 0.5–2 cm. Tepals (17–)22–33, white or pale yellowish, elliptic (outer) to elliptic-oblong (largest), 14–16 × 3–3.5 mm (largest), thinly papery to submembranous. Stamens 22–25, 2.5–3.2 mm; filaments 1.2–2 mm; connectives truncate to slightly cuspidate; anthers 1.1–1.6 mm; pollen grains tricolpate. Carpels 11–16, 3.5–4 mm; ovary 1.3–1.7 mm; style 1.5–3 mm. Fruit peduncle 1.2–3 cm. Fruit with 11–16 follicles; follicles 1–2.2 × 0.5–1.5 × 0.3–0.8 cm. Seeds 5–8.5 × 4–6 × 2–4 mm. Fl. Feb–Apr, fr. Sep–Oct.

• Sides of ravines, forest margins; 1000–1900 m. Anhui, Fujian, Guangdong.

3. *Illicium philippinense* Merrill, Philipp. J. Sci., C, 4: 254. 1909.

白花八角 bai hua ba jiao

Illicium anisatum Linnaeus var. *leucanthum* Hayata; *I. arborescens* Hayata var. *oblongum* Hayata; *I. daibuense* Yamamoto; *I. leucanthum* (Hayata) Hayata; *I. philippinense* var. *daibuense* (Yamamoto) S. S. Ying.

Shrubs or trees, to 8 m tall. Perules oblong, to 5 mm. Leaves in clusters of 3 or 4 at distal nodes; petiole 0.7–1.5 cm; leaf blade lanceolate to narrowly oblong-elliptic, 5–10 × 2–4 cm, leathery, midvein adaxially prominent, secondary veins 5–7 on each side of midvein and on both surfaces inconspicuous or slightly prominent, base attenuate, apex acute to acuminate. Flowers axillary or subterminal. Flower peduncle 5–14 mm. Tepals 15–21, white, elliptic to obovate-oblong (outer and inner) to narrowly oblong to tongue-like (largest), 7–12 × 4–7 mm (outer), 11–17 × 3–5 mm (largest), 7–12 × 4–7 mm (inner), thinly papery (outer and inner) to membranous (middle). Stamens 16–23, 2.5–3.5 mm; filaments 1.3–2.5 mm; connectives slightly emarginate to obtuse-cuspidate; anthers 1–1.7 mm; pollen grains tricolpate. Carpels 6–8(–10), 3.5–5 mm; ovary 1.5–2 mm; style 2–3.3 mm. Fruit peduncle sometimes to 2.5 cm. Fruit with 6–8(–10) follicles; follicles 13–16 × 5–7 × 3–4 mm. Seeds 6–6.5 × 3.5–4 × 2.5–3 mm. Fl. Dec–Mar, fr. May–Nov.

Forests; 1000–2400 m. Taiwan [Philippines].

4. *Illicium tashiroi* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg, Sér. 3, 32: 479. 1888.

峦大八角 luan da ba jiao

Illicium anisatum Linnaeus var. *tashiroi* (Maximowicz) E. H. Walker; *I. randaiense* Hayata.

Shrubs or small trees. Perules elliptic, to 4 mm. Leaves in clusters of 3–5 at distal nodes; petiole 0.8–1.7 cm; leaf blade lanceolate-elliptic, 6–11 × 2–4.2 cm, thinly leathery to leathery, midvein abaxially slightly prominent or toward base slightly impressed, secondary veins 5–8 on each side of midvein and on both surfaces flat or slightly prominent, base attenuate, apex acuminate. Flowers axillary. Flower peduncle 1–2 cm. Tepals 10–20, white, narrowly oblong, 11–15 × 1.5–4 mm, membranous. Stamens 17–20, 2.7–3.2 mm; filaments 1.3–2 mm; connectives truncate to obtuse; anthers 1–1.3 mm; pollen grains tricolpate. Carpels 12 or 13, 4–4.7 mm; ovary 1.8–2 mm; style 2–2.7 mm. Fruit peduncle 1.2–3.5 cm. Fruit with (8–)12 or 13 follicles; follicles 15–17 × 7–8 × 3.5–4 mm. Seeds 7–7.5 × 4.5–5 mm. Fl. Apr–Aug.

Forests; ca. 2000 m. Taiwan [Japan (Ryukyu Islands)].

5. *Illicium tsaii* A. C. Smith, Sargentia 7: 27. 1947.

文山八角 wen shan ba jiao

Shrubs or trees, to 10 m tall. Perules small, inconspicuous. Leaves in clusters at distal nodes; petiole 1–1.3 cm; leaf blade oblong-lanceolate, 5–9 × 1.5–3 cm, subleathery, midvein adaxially inconspicuously impressed, secondary veins 6–8 on each

side of midvein and inconspicuous, base narrowly cuneate, apex acuminate and mucronate. Flowers subterminal. Flower peduncle 2.5–4 mm. Tepals 16–19, white, oblong (outer), narrowly oblong-elliptic (largest), to lanceolate-tongue-like (inner), 6–7 × 2.5–4.5 mm (outer), 8–12 × 2.5–4.5 mm (largest), 7–12 × 1.5–3 mm (inner), papery (outer) to membranous (middle). Stamens 12 or 13, 2.8–4 mm; filaments 1.3–2.7 mm; connectives obtuse to cuspidate; anthers 1.2–1.5 mm; pollen grains tricolpate. Carpels ca. 8, 3–4.5 mm; ovary 1.2–1.8 mm; style 1.8–2.8 mm. Fruit peduncle 8–9 mm. Fruit with 6–8 follicles; follicles 15–17 × 3–4 × ca. 3 mm. Seeds ca. 7 × 4 × 2 mm. Fl. Feb, fr. Sep.

• Forests; 1800–2000 m. SE Yunnan.

6. *Illicium burmanicum* E. H. Wilson, J. Arnold Arbor. 7: 238. 1926.

中緬八角 zhong mian ba jiao

Shrubs or trees, to 12 m tall. Perules lanceolate-ovate, largest 1.2–1.5 cm. Leaves in clusters of 4–10 at distal nodes; petiole 1.5–3 cm; leaf blade oblong-lanceolate, obovate-oblong, or sometimes lanceolate, 7–12 × 2.5–4 cm, papery, midvein adaxially impressed, secondary veins 8–12 on each side of midvein, abaxially prominent, and adaxially prominent or ± flat, base broadly cuneate, apex cuspidate to shortly acute. Flowers axillary. Flower peduncle 3–10 mm. Tepals 20–27, white or ± purple, elliptic to oblong-elliptic (outer and inner) to oblong-obovate (largest), 13–15 × 3–5.5 mm (largest), papery (outer and largest) to gradually shorter and narrower (inner). Stamens 20–24, 3.8–4.2 mm; filaments 1.2–1.6 mm; connectives truncate to slightly extended and obtuse; anthers 2.1–2.7 mm; pollen grains tricolpate. Carpels 8–12, 4–5 mm; ovary 1.5–2.5 mm; style 2–3 mm. Fruit peduncle length unknown. Fruit with 8–10 follicles; follicles ca. 2 × 0.8–0.9 × ca. 0.4 cm. Seed size unknown. Fl. Apr–Nov, fr. Aug.

Forests; 2300–2700 m. W Yunnan [Myanmar].

7. *Illicium wardii* A. C. Smith, Sargentia 7: 20. 1947.

貢山八角 gong shan ba jiao

Trees to 10 m tall. Perules oblong, largest 0.8–1.3 cm. Leaves in clusters of 3 or 4 at distal nodes; petiole 1.2–2 cm; leaf blade narrowly oblong-elliptic, 8–12 × 2.5–5 cm, leathery, midvein adaxially impressed, secondary veins 8–13 on each side of midvein, abaxially ± prominent, and adaxially impressed or flat, base narrowly cuneate, apex cuspidate to shortly acuminate. Flowers axillary. Flower peduncle 6–10 mm. Tepals 27–30, pale yellow, white, or sometimes pinkish, oblong (outer), oblong-tongue-like (largest), to tongue-like-lanceolate (inner), 10–11 × 6–8 mm (outer), 14–17(–21) × 2.5–4.5 mm (largest), (5–)8–11 × 1.5–2 mm (inner), thinly papery (outer and largest). Stamens 28–35, 3.5–4.5 mm; filaments 1.5–2.5 mm; connectives obtuse to cuspidate; anthers 1.9–2.5 mm; pollen grains tricolpate. Carpels 12 or 13, 4–6 mm; ovary 1.5–2 mm; style 2.3–4 mm. Fruit peduncle 0.8–1.5 cm. Fruit with 12 or 13 follicles; follicles 2.5–2.8 × 1–1.1 × 0.2–0.3 cm. Seed size unknown. Fl. Mar, fr. Jul–Sep.

Forests; 1800–2700 m. NW Yunnan [Myanmar].

8. *Illicium simonsii* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg, Sér. 3, 32: 480. 1888.

野八角 ye ba jiao

Illicium fargesii Finet & Gagnepain; *I. fargesii* subsp. *szechuanense* (W. C. Cheng) Q. Lin; *I. fargesii* var. *szechuanense* (W. C. Cheng) Q. Lin; *I. griffithii* J. D. Hooker & Thomson var. *yunnanense* Franchet; *I. jiadifengpi* B. N. Chang var. *szechuanense* (W. C. Cheng) Y. W. Law & B. N. Chang; *I. szechuanense* W. C. Cheng; *I. yunnanense* (Franchet) Franchet ex Finet & Gagnepain.

Trees to 9(–15) m tall. Perules ovate to lanceolate, largest 4–10 mm. Leaves in clusters of 3–5 at distal nodes; petiole 0.7–2 cm; leaf blade lanceolate to elliptic, 5–10 × 1.5–3.5 cm, leathery, midvein adaxially impressed, secondary veins 6–10(–12) on each side of midvein, abaxially slightly prominent, and adaxially flat or slightly prominent, base attenuate to cuneate and decurrent along petiole, apex acute to shortly acuminate. Flowers axillary or subterminal. Flower peduncle 2–8 mm. Tepals 18–23(–26), pale yellow, sometimes creamy or white, or rarely pink, elliptic-oblong (outer), oblong-lanceolate to tongue-like (largest), or tongue-like (inner), 5–11 × 4–7 mm (outer), 9–15 × 2–4 mm (largest), 7–15 × 1–3 mm (inner), thinly papery (outer) to membranous (middle). Stamens 16–28, 2.5–4.2 mm; filaments 1–2.2 mm; connectives rounded to shortly cuspidate; anthers 1.4–2.4 mm; pollen grains tricolpate. Carpels 8–13, 3–4.5 mm; ovary 1.2–2 mm; style 1.5–2.5 mm. Fruit peduncle 0.5–1.6 cm. Fruit with 8–13 follicles; follicles 11–20 × 6–9 × 2–4 mm. Seeds 6–7 × 4–5 × 2–2.5 mm. Fl. nearly all year but mostly Feb–May, fr. Jun–Oct.

Thickets, forests, open fields, ravines, along rivers, wet places; 1700–3200(–4000) m. W Guizhou, SW Sichuan, Yunnan [NE India, N Myanmar].

The leaves, flowers, and fruit are very poisonous.

9. *Illicium macranthum* A. C. Smith, Sargentia 7: 21. 1947.

大花八角 da hua ba jiao

Shrubs or trees, to 8 m tall. Perules lanceolate, to 1 cm. Leaves in clusters of 2–4 at distal nodes; petiole 1–2.5 cm; leaf blade oblong to obovate-elliptic, 8–13(–14) × 2.5–5.5(–6.5) cm, leathery, midvein adaxially impressed, secondary veins 7–12 on each side of midvein, abaxially slightly prominent near margin, and adaxially slightly impressed or flat, base narrowed to acute, apex acuminate. Flowers axillary or subterminal. Flower peduncle 6–10 mm. Tepals 27–32, white to slightly greenish, oblong (outer) to narrowly tongue-like (largest), 7–17 × 4–7 mm (outer), 1.5–2.5 cm × 2–4 mm (largest), 1.5–2.1 cm × 1–2.5 mm (inner), submembranous (outer) to membranous (middle). Stamens 21–26, 3.2–4.7 mm; filaments 1.3–2.5 mm; connectives cuspidate; anthers 1.5–2.5 mm; pollen grains tricolpate. Carpels 13 or 14, 4–5.5 mm; ovary 1.5–2 mm; style 2.5–3.5 mm. Fruit peduncle length unknown. Fruit with ca. 11 follicles; follicles 16–20 × 6–9 × 3–4 mm. Seed size unknown. Fl. Jan–Mar, fr. Jul–Nov.

• Forests, slopes; 1600–2800 m. S and W Yunnan.

The leaves, flowers, and fruit are very poisonous.

10. *Illicium majus* J. D. Hooker & Thomson in J. D. Hooker, Fl. Brit. India 1: 40. 1872.

大八角 da ba jiao

Badianifera major (J. D. Hooker & Thomson) Kuntze; *Glochidion cavaleriei* H. Léveillé; *Illicium cavaleriei* (H. Léveillé) H. Léveillé; *I. spatulatum* Y. C. Wu.

Trees to 20 m tall. Perules oblong-elliptic, largest 1–2 cm. Leaves in clusters of 3–6 at distal nodes; petiole 1–2.5 cm; leaf blade oblong-lanceolate to oblanceolate, 10–20 × 2.5–7 cm, subleathery, midvein adaxially slightly impressed, secondary veins 6–9 on each side of midvein, abaxially inconspicuous or slightly prominent, and adaxially flat or slightly prominent, base cuneate, apex acuminate. Flowers axillary or subterminal. Flower peduncle 1.8–4.5(–6) cm. Tepals 15–21, elliptic to obovate-oblong (inner), 6–15 × 3–9 mm (inner), fleshy. Stamens 12–21, 2.3–4.3 mm; filaments 1.1–2.8 mm; connectives truncate to slightly emarginate; anthers 1–1.5 mm; pollen grains trisyncolpate. Carpels (9–)11–14, 4–5.5 mm; ovary 1.5–2.5 mm; style 2–3 mm. Fruit peduncle 1.8–4.5(–6) cm. Fruit with 10–14 follicles; follicles 1.2–2.5 × 0.5–1.5 × 0.3–0.5 cm. Seeds 6–10 × 4.5–7 × 2–3 mm. Fl. Apr–Jun, fr. Jul–Oct.

Mixed forests, thickets, rocky slopes, along riverbanks; 300–2500 m. Guangdong, Guangxi, Guizhou, Hunan, Yunnan [S Myanmar, Vietnam].

The fruit and bark are poisonous.

11. *Illicium modestum* A. C. Smith, Sargentia 7: 51. 1947.

滇南八角 dian nan ba jiao

Shrubs or trees, to 3 m tall. Perules small, inconspicuous. Leaves in clusters of 2 or 3 at distal nodes; petiole 4–7 mm; leaf blade narrowly oblong-elliptic, 5–7.5 × 1.5–2.5 cm, leathery, midvein adaxially impressed, secondary veins 5–7 on each side of midvein and on both surfaces slightly prominent near margin, base narrowly cuneate, apex shortly acuminate. Flowers subterminal. Flower peduncle 0.9–1.7 cm. Tepals ca. 19, greenish yellow, elliptic to oblong-elliptic (largest), 8–9 × 5–6 mm (largest), papery. Stamens ca. 17, 2.7–3 mm; filaments 1.5–1.8 mm; connectives inconspicuously truncate; anthers 1.2–1.3 mm; pollen grains trisyncolpate. Carpels ca. 12, 2.8–3.2 mm; ovary 1.4–1.6 mm; style nearly as long as ovary. Fruit peduncle length unknown. Fruit with ca. 12 follicles; follicle size unknown. Seed size unknown. Fl. Jun.

• Forests, slopes; ca. 1900 m. S Yunnan.

12. *Illicium brevistylum* A. C. Smith, Sargentia 7: 50. 1947.

短柱八角 duan zhu ba jiao

Shrubs or trees, to 15 m tall. Perules lanceolate, largest 5–8 mm. Leaves in clusters of 3–5 at distal nodes; petiole 0.6–2 cm; leaf blade narrowly oblong-elliptic to oblanceolate, 5–8(–14) × 1.5–4.5 cm, thinly leathery, midvein adaxially impressed, secondary veins 5–8 on each side of midvein and inconspicuous, base attenuate and decurrent along petiole, apex acute to shortly caudate. Flowers axillary or subterminal. Flower peduncle 0.8–1.6 cm. Tepals 9–11, pale red, suborbicular (largest), 6–11 × 6–11 mm (largest), papery (outer) to fleshy

(inner). Stamens 14–20, 1.9–3.4 mm; filaments 0.9–1.9 mm; connectives truncate; anthers 0.8–1.6 mm; pollen grains trisyncolpate. Carpels 12 or 13, 2.3–3.4 mm; ovary 1.5–2.2 mm; style 0.8–1.2 mm. Fruit peduncle 1.6–3.5 cm. Fruit with 11–13 follicles; follicles 13–17 × 6–10 × 3–4 mm. Seeds 6–7 × 4.5–5 × 2.5–3 mm. Fl. Apr–May and Oct, fr. Oct–Nov and Apr–May.

• Forests, thickets, on rocks; 700–1700 m. Guangdong, Guangxi, S Hunan, Yunnan.

13. *Illicium leiophyllum* A. C. Smith, *Sargentia* 7: 54. 1947.

平滑八角 ping hua ba jiao

Shrubs to 4 m tall. Perules ovate, to 5 mm. Leaves in clusters of 3–5 at distal nodes; petiole 0.8–1.7 cm; leaf blade oblong-elliptic, (6–)8–13 × (2–)2.5–4 cm, leathery, midvein adaxially conspicuously impressed, secondary veins 6–9 on each side of midvein and on both surfaces inconspicuous or slightly prominent, base attenuate and decurrent along petiole, apex acuminate. Flowers axillary or subterminal. Flower peduncle short. Tepals 21–23, suborbicular-triangular (outer), 4–5 × 4–5 mm (outer), papery with membranous margin (outer) to fleshy (inner). Stamens 29 or 30, length unknown; connectives obtuse to slightly emarginate; anthers 0.8–1 mm; pollen grains trisyncolpate. Carpels 11 or 12, length unknown; style nearly as long as ovary. Fruit peduncle 2–2.5 cm. Fruit with 11 or 12 follicles; follicles 11–19 × 5–7 × 3–4 mm. Seed size unknown.

• Rock crevices. Hong Kong.

14. *Illicium ternstroemioides* A. C. Smith, *Sargentia* 7: 58. 1947.

厚皮香八角 hou pi xiang ba jiao

Trees to 12 m tall. Perules small, inconspicuous. Leaves in clusters of 3–5 at distal nodes; petiole 0.7–2 cm; leaf blade oblong-elliptic, oblanceolate, or narrowly obovate, 7–13 × 2–5 cm, leathery, midvein adaxially slightly impressed, secondary veins 6–9 on each side of midvein and inconspicuous, base broadly cuneate, apex acuminate to long acuminate. Flowers axillary or subterminal. Flower peduncle 0.7–3 cm. Tepals 10–14, red, broadly elliptic to suborbicular (largest), 7–12 × 7–12 mm (largest), papery to slightly fleshy. Stamens 22–30, 1.8–3.4 mm; filament lengths unknown; connectives truncate to slightly emarginate; anthers 0.7–1 mm; pollen grains trisyncolpate. Carpels 12–14, 2.5–4 mm; ovary 1.3–2.5 mm; style 1.1–2 mm. Fruit peduncle 2.5–4.5 cm. Fruit with 12–14 follicles; follicles 13–20 × 6–9 × 3–5 mm. Seeds 6–7 × 4–4.5 × 2–3 mm. Fl. Jan–Aug, fr. Apr–Nov. $2n = 28^*$.

• Forests, ravines, along rivers; 800–1700 m. Fujian, Hainan.

The fruit are poisonous.

15. *Illicium arborescens* Hayata, *Icon. Pl. Formosan.* 2: 105. 1912.

台湾八角 tai wan ba jiao

Trees to 15 m tall. Perules oblong, to 3 mm. Leaves in clusters of 3–5 at distal nodes; petiole 0.8–1.7 cm; leaf blade narrowly oblong, lanceolate, or obovate-elliptic, 6–12 × 2–4.5 cm, thinly leathery to leathery, midvein adaxially impressed, secondary veins 5–8 on each side of midvein, abaxially slightly

prominent, and adaxially flat or slightly prominent, base cuneate, apex acuminate. Flowers axillary or subterminal. Flower peduncle 0.5–2.2 cm. Tepals 14–21, red to pale red, obovate-oblong (largest), 8–12 × 5–9 mm (largest), papery to fleshy. Stamens 39–41, 2–3 mm; filaments 1.2–1.7 mm; connectives truncate and slightly emarginate; anthers 1–1.5 mm; pollen grains trisyncolpate. Carpels 12–16, 2–3.8 mm; ovary 1–1.8 mm; style 1–2 mm. Fruit peduncle 1.5–3 cm. Fruit with (10–)12–14 follicles; follicles 15–18 × 6–7 × 3–4 mm. Seeds 6–9 × 4.5–6 × 1.5–2 mm. Fl. Jan–Apr, fr. Oct.

• Broad-leaved forests; 300–2500 m. Taiwan.

The fruit are poisonous.

16. *Illicium griffithii* J. D. Hooker & Thomson, *Fl. Ind.* 1: 74. 1855.

西藏八角 xi zang ba jiao

Ternstroemia khasyana Choisy.

Trees to 30 m tall. Perules small, inconspicuous. Leaves in clusters of 3–5 at distal nodes; petiole 0.7–1.7 cm; leaf blade oblong-elliptic to narrowly obovate-elliptic, 7–13 × 2–5.5 cm, leathery, midvein adaxially conspicuously impressed, secondary veins 7–10 on each side of midvein, abaxially prominent, and adaxially ± impressed to slightly raised, base narrowly cuneate, apex acuminate. Flowers axillary or subterminal. Flower peduncle 1–2 cm. Tepals 25 or 26, oblong-obovate (inner), 4–10 × 2.5–10 mm (inner), papery to thinly leathery (outer) to fleshy (inner). Stamens ca. 30, 2.3–2.7 mm; filaments 1.1–1.4 mm; connectives subtruncate; anthers 1–1.4 mm; pollen grains trisyncolpate. Carpels 12 or 13, 4–4.5 mm; ovary ca. 1.5 mm; style 2.5–3 mm. Fruit peduncle 1.5–4.7 cm. Fruit with 12 or 13 follicles; follicles 1.4–2 × 0.8–1 × 0.3–0.5 cm. Seeds ca. 7 × 5 × 2–2.5 mm. Fl. Apr–May, fr. Oct–Dec.

Forests; 1200–2300 m. S Xizang [Bhutan, NE India].

17. *Illicium dunnianum* Tutcher, *J. Linn. Soc., Bot.* 37: 62. 1905.

红花八角 hong hua ba jiao

Illicium dunnianum var. *latifolium* Q. Lin.

Shrubs to 2(–10) m tall. Perules lanceolate-elliptic, largest to 8 mm. Leaves in clusters of 3–8 at distal nodes; petiole 3–12 mm; leaf blade narrowly lanceolate to narrowly oblanceolate, 5–12 × 0.8–1.2(–2.7) cm, thinly leathery, midvein adaxially slightly impressed, secondary veins 5–9 on each side of midvein and on both surfaces inconspicuous or slightly prominent, base attenuate and decurrent along petiole, apex abruptly caudate to acuminate. Flowers axillary or subterminal. Flower peduncle 1–3.5 cm. Tepals 12–20, pink, red, or purplish red, elliptic to suborbicular (largest), 6–11 × 4–8 mm (largest), papery to slightly fleshy. Stamens (11–)19–24(–31), 1.7–3.3 mm; filament lengths unknown; connectives obtuse to slightly emarginate; anthers 0.8–1.5 mm; pollen grains trisyncolpate. Carpels 8–13, 2.5–3.5 mm; ovary 1.2–1.5 mm; style 1.4–2 mm. Fruit peduncle 2–5.5 cm. Fruit with 7 or 8(–13) follicles; follicles 9–15 × ca. 4 × 2–3 mm. Seeds 4–5 × 2.5–3.3 × 1.7–2.2 mm. Fl. Mar–Jul and Oct–Nov, fr. Jul–Oct.

• Along riverbanks, ravines, forests, wet slopes, rock crevices; 400–1000 m. S Fujian, Guangdong, Guangxi, S and SW Guizhou, W Hunan.

18. *Illicium difengpi* B. N. Chang, Acta Phytotax. Sin. 15(2): 76. 1977.

地枫皮 di feng pi

Shrubs to 3 m tall. Perules small, inconspicuous. Leaves in clusters of 3–5 at distal nodes; petiole 1.3–2.5 cm; leaf blade oblanceolate to long elliptic, (7–)10–14 × (2–)3–5 cm, leathery to thickly leathery, midvein adaxially impressed, secondary veins 4–7 on each side of midvein, abaxially slightly prominent, and adaxially inconspicuous, base cuneate, apex acute to subrounded. Flowers axillary or subterminal. Flower peduncle 1.2–2.5 cm. Tepals (11–)15–17(–20), purplish red to red, broadly elliptic to suborbicular (largest), ca. 1.5 × 1 cm (largest), fleshy. Stamens (14–)20–23, 3–4 mm; filaments ca. 2 mm; connective shape unknown; anthers 3–3.5 mm; pollen grains trisyncolpate. Carpels usually 13, 4.5–5.5 mm; ovary 2–2.5 mm; style 2.5–3.5 mm. Fruit peduncle 1–4 cm. Fruit with 9–11 follicles; follicles 12–16 × 9–10 × ca. 3 mm. Seeds 6–7 × ca. 4.5 × 1.5–2.5 mm. Fl. Apr–May, fr. Aug–Oct.

• Forests, limestone hills; 700–1200 m. E and NE Guangxi.

This species is used medicinally.

19. *Illicium lanceolatum* A. C. Smith, Sargentia 7: 43. 1947.

红毒茴 hong du hui

Shrubs or trees, to 10 m tall. Perules small, inconspicuous. Leaves in clusters at distal nodes; petiole 0.7–1.5 cm; leaf blade lanceolate, oblanceolate, or obovate-elliptic, 5–15 × 1.5–4.5 cm, leathery, midvein adaxially slightly impressed, secondary veins 6–10 on each side of midvein and inconspicuous, base narrowly cuneate, apex caudate to acuminate. Flowers axillary or subterminal. Flower peduncle 1.5–5 cm. Tepals 10–15, red to dark red, elliptic to oblong-obovate (largest), 8–13 × 6–8 mm (largest), fleshy. Stamens 6–11, 2.8–3.9 mm; filaments 1.5–2.5 mm; connectives apically inconspicuously truncate to slightly emarginate; anthers 1–1.5 mm; pollen grains trisyncolpate. Carpels 10–14, 3.9–5.3 mm; ovary 1.5–2 mm; style 2–3.3 mm. Fruit peduncle 6–8 cm. Fruit with (9 or)10–14 follicles; follicles 14–21 × 5–9 × 3–5 mm. Seeds 7–8 × ca. 5 × 2–3.5 mm. Fl. Apr–Jun, fr. Aug–Oct.

• Mixed forests, thickets; 300–1500 m. Anhui, Fujian, Guizhou, Hubei, Hunan, S Jiangsu, Jiangxi, Zhejiang.

Essential oil is extracted from the fruit and leaves, which are strongly aromatic. The roots and root bark are toxic, but they are used medicinally.

20. *Illicium tsangii* A. C. Smith, Sargentia 7: 61. 1947.

粤中八角 yue zhong ba jiao

Illicium micranthum Dunn subsp. *tsangii* (A. C. Smith) Q. Lin.

Shrubs to 3 m tall. Perules ovate, 1–1.2 cm. Leaves in clusters of 3 or 4 at distal nodes; petiole 0.8–1.5 cm; leaf blade

lanceolate to narrowly obovate-elliptic, 5–13 × 1.5–4.5 cm, thickly leathery, midvein adaxially conspicuously impressed, secondary veins 6–8 on each side of midvein and inconspicuous, base narrowly cuneate to attenuate and usually decurrent along petiole, apex shortly caudate. Flowers axillary or subterminal. Flower peduncle 1.4–3.2 cm. Tepals 14–17, red, shape, size, and texture unknown. Stamens 7–10, 2.5–3.7 mm; filaments 1.3–2 mm; connectives emarginate; anthers 1.2–1.7 mm; pollen grains trisyncolpate. Carpels 7–10, 3–5.5 mm; ovary 1–1.7 mm; style 2–3.8 mm. Fruit peduncle ca. 3 cm. Fruit with 7–10 follicles; follicles ca. 1.8 cm. Seed size unknown. Fl. Apr–May, fr. Jul–Aug.

• Thickets, at roadsides; 700–800 m. Guangdong.

21. *Illicium pachyphyllum* A. C. Smith, Sargentia 7: 64. 1947.

短梗八角 duan geng ba jiao

Shrubs to 3 m tall. Perules oblong-lanceolate, ca. 5 mm. Leaves in clusters of 4–7 at distal nodes; petiole 3–12 mm; leaf blade elliptic to narrowly elliptic, 6–9 × 1.5–3.5 cm, leathery, midvein adaxially impressed, secondary veins 6–9 on each side of midvein and inconspicuous, base attenuate, apex acuminate to shortly caudate. Flowers axillary or subterminal. Flower peduncle 3–5 mm. Tepals 9–12, pink, purplish red, or white, obovate to oblong (largest), 6–8.5 × 5–7 mm (largest). Stamens 13–17, 2.2–2.6 mm; filaments 1.5–1.7 mm; connectives truncate; anthers 0.8–0.9 mm; pollen grains trisyncolpate. Carpels 8–10, 4–4.3 mm; ovary 1.5–1.7 mm; style 2.5–2.7 mm. Fruit peduncle ca. 1 cm. Fruit with 8–10 follicles; follicles 11–13 × 6–7 × 4–5 mm. Seed size unknown. Fl. Dec–Mar, fr. Sep–Oct.

• Ravines, near water, shady places. S Guangxi.

22. *Illicium henryi* Diels, Bot. Jahrb. Syst. 29: 323. 1900.

红茴香 hong hui xiang

Illicium henryi var. *multistamineum* A. C. Smith; *I. pseudosimonsii* Q. Lin; *I. silvestrii* Pavolini.

Shrubs or trees, to 8(–12) m tall. Perules small, inconspicuous. Leaves in clusters of 2–5 at distal nodes; petiole 0.7–2 cm; leaf blade oblanceolate, long lanceolate, or obovate-elliptic, 6–18 × 1.2–5(–6) cm, leathery, midvein adaxially impressed, secondary veins 5–8 on each side of midvein and inconspicuous, base cuneate, apex long acuminate. Flowers axillary or subterminal. Flower peduncle 1.5–5 cm. Tepals 10–15, pink to dark red, oblong-elliptic to broadly elliptic (largest), 7–10 × 4–8.5 mm (largest). Stamens 11–14, 2.2–3.5 mm; filaments 1.2–2.3 mm; connectives inconspicuously truncate; anthers 0.9–1.2 mm; pollen grains trisyncolpate. Carpels 7–9(–12), 3–5 mm; ovary 1.5–2 mm; style 2–3.3 mm. Fruit peduncle 1.5–5.5 cm. Fruit with 7–9 follicles; follicles 12–20 × 5–8 × 3–4 mm. Seeds 6.5–7.5 × 5–5.5 × 2.5–3 mm. Fl. Apr–Jun, fr. Aug–Oct.

• Forests, hills, thickets, ravines, wet places; 300–2500 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Yunnan.

This species is grown as an ornamental and used medicinally. The fruit are poisonous.

23. *Illicium verum* J. D. Hooker, Bot. Mag. 114: t. 7005. 1888.

八角 ba jiao

Illicium san-ki Perrottet.

Trees to 15 m tall. Perules ovate, 2–3 mm. Leaves in clusters of 3–6 at distal nodes; petiole 0.8–2 cm; leaf blade obovate-elliptic, oblanceolate, or elliptic, 5–15 × 2–5 cm, leathery to thickly leathery, midvein adaxially slightly impressed, secondary veins 5–8 on each side of midvein and on both surfaces inconspicuous or slightly prominent, base attenuate to cuneate, apex cuspidate to shortly acuminate. Flowers axillary or subterminal. Flower peduncle 1.5–4 cm. Tepals 7–12, pink to dark red, broadly elliptic to broadly ovate (largest), 0.9–1.2 × 0.8–1.2 cm (largest). Stamens (11–)13 or 14(–20), 1.8–3.5 mm; filaments 0.5–1.6 mm; connectives truncate; anthers 1–1.5 mm; pollen grains trisyncolpate. Carpels usually 7–9(–11), 2.5–4.5 mm; ovary 1.2–2 mm; style longer than ovary. Fruit peduncle 2–5.5 cm. Fruit with ca. 8 follicles; follicles 1.4–2 × 0.7–1.2 × 0.3–0.6 cm. Seeds 7–10 × 4–6 × 2.5–3 mm. Fl. Mar–May and Aug–Oct, fr. Sep–Oct and Mar–Apr. $2n = 28^*$.

- Forests; 200–1600 m. S and W Guangxi.

This species is cultivated for perfume, medicines, and as a culinary spice in Fujian, Guangdong, Guangxi, Jiangxi, and Yunnan, as well as in Vietnam. It is uncertain if the plants in Guangxi are wild or naturalized and from where the species truly originates.

24. *Illicium oligandrum* Merrill & Chun, Sunyatsenia 5: 57. 1940.

少药八角 shao yao ba jiao

Illicium parvifolium Merrill subsp. *oligandrum* (Merrill & Chun) Q. Lin.

Trees to 12 m tall. Perules small, inconspicuous. Leaves in clusters of 3–5 at distal nodes; petiole 5–12 mm; leaf blade oblong-obovate to elliptic, 4–9 × 1.5–3.7 cm, leathery, midvein adaxially ± flat but slightly impressed toward base, secondary veins 4–6 on each side of midvein and inconspicuous, base narrowly cuneate, apex obtuse to rounded. Flowers axillary or subterminal. Flower peduncle 0.9–1.5 cm. Tepals 11–18, greenish yellow to pale yellow, reniform to suborbicular (outer) to elliptic to obovate-elliptic (largest), 5–7(–10) × 4.5–5.5(–9) mm (largest), papery (outer) to slightly fleshy (inner). Stamens 4–7, 2.5–3.2 mm; filaments 1.3–2 mm; connectives truncate to emarginate; anthers 1–1.2 mm; pollen grains trisyncolpate. Carpels 8 or 9, 2.5–3 mm; ovary 1.3–1.5 mm; style as long as ovary. Fruit and seeds not seen. Fl. May–Oct and Jan.

- Forests, thickets; 700–1200 m. Guangxi, Hainan.

This species is used for timber.

25. *Illicium merrillianum* A. C. Smith, Sargentia 7: 67. 1947.

滇西八角 dian xi ba jiao

Small trees. Perules lanceolate, 5–7 mm. Leaves in clusters of 3–5 at distal nodes; petiole 0.6–1.5 cm; leaf blade elliptic to lanceolate, 8–12.5 × 2–5 cm, leathery, midvein adaxially

conspicuously impressed, secondary veins 6–11 on each side of midvein and on both surfaces flat or slightly prominent, base narrowly cuneate, apex acuminate. Flowers axillary or subterminal. Flower peduncle 2–4 cm. Tepals 15–20, cherry red, elliptic (largest), 7–10 × 5–7.5 mm (largest). Stamens 14–19, 2.5–4 mm; filaments 1.5–2.7 mm; connectives inconspicuously truncate; anthers 1–1.3 mm; pollen grains trisyncolpate. Carpels ca. 8, 3.5–4.5 mm; ovary 1.5–2.2 mm; style 1.8–2.5 mm. Fruit peduncle length unknown. Fruit with (5–)8 follicles; follicles ca. 12 × 5 × 2 mm. Seeds 4–5 × 3–4 × ca. 2 mm. Fl. Dec–Jan and Mar–May, fr. Jul–Sep.

Forests, wet places; 1500–2900 m. W Yunnan [Myanmar].

26. *Illicium micranthum* Dunn, Hooker's Icon. Pl. 28: t. 2714. 1901.

小花八角 xiao hua ba jiao

Illicium jinyunense Chu Ho; *I. wangii* Hu.

Shrubs or trees, to 10 m tall. Perules small, inconspicuous. Leaves in clusters of 3–5 at distal nodes; petiole 4–12 mm; leaf blade obovate-elliptic, narrowly oblong-elliptic, or lanceolate, 4–11 × 1.3–4 cm, thinly leathery to leathery, midvein adaxially impressed, secondary veins 5–10 on each side of midvein and on both surfaces inconspicuous or slightly prominent, base cuneate, apex usually caudate-acuminate to acuminate. Flowers axillary or subterminal. Flower peduncle 0.7–2.8 cm. Tepals (14–)17–21, red to orangish red, elliptic (largest), 5–8 × 3.5–8 mm (largest). Stamens (8–)10–12, 2.5–3.5 mm; filament lengths unknown; connectives truncate to emarginate; anthers 0.8–1.3 mm; pollen grains trisyncolpate. Carpels 7 or 8, 2.3–3.2 mm; ovary 1.3–1.7 mm; style 1–1.5 mm. Fruit peduncle 2.8–3.5 cm. Fruit with 6–8 follicles; follicles 9–14 × 3–7 × 2–3.5 mm. Seeds 4.5–5 × 3–3.5 × ca. 2 mm. Fl. Apr–Jun, fr. Jul–Sep.

- Thickets, mixed forests, ravines; 500–2600 m. Guangdong, Guangxi, Guizhou, Hubei, Hunan, Sichuan, Yunnan.

27. *Illicium petelotii* A. C. Smith, Sargentia 7: 76. 1947.

少果八角 shao guo ba jiao

Shrubs or trees, to 6 m tall. Perules oblong, 3–5 mm. Leaves in clusters of 3–6 at distal nodes; petiole 0.5–1.5 cm; leaf blade oblong-elliptic to narrowly obovate, 6–14 × 1.8–4.2 cm, thinly leathery to papery, midvein adaxially slightly impressed, secondary veins 6–12 on each side of midvein and on both surfaces slightly prominent, base narrowly to broadly cuneate, apex acuminate to shortly caudate. Flowers axillary or subterminal. Flower peduncle 0.5–4.5 cm. Tepals 10–13, dark red, elliptic to obovate (largest), 6–8 × 4–6.5 mm (largest). Stamens 9–14, 2.2–3.5 mm; filaments 1.4–2.4 mm; connectives obtuse to emarginate; anthers 0.8–1.2 mm; pollen grains trisyncolpate. Carpels 4–8, 2.3–3.2 mm; ovary 1.2–1.8 mm; style 1–1.5 mm. Fruit peduncle length unknown. Fruit with (2–)5–7 follicles; follicles 14–15 × ca. 6 × ca. 3.5 mm. Seeds ca. 6 × 4.5 × 3 mm. Fl. Mar–Apr, fr. Aug–Sep.

Forests; 1500–2000 m. SE Yunnan [Vietnam].