

18. COFFEA Linnaeus, Sp. Pl. 1: 172. 1753.

咖啡属 ka fei shu

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Cafe Adanson.

Shrubs or small trees, unarmed, often resinous on young growth; lateral branches usually spreading horizontally. Raphides absent. Leaves opposite or rarely in whorls of 3, distichous at least on lateral branches, often with foveolate and/or pilosulous domatia; stipules persistent, shortly united around stem, generally triangular, sometimes aristate. Inflorescences axillary, in each axil with 1 to several capitate to fasciculate, 1- to several-flowered cymes, these sessile to shortly pedunculate, bracteate; bracts often fused in cupulate pairs (i.e., forming a calyculus). Flowers sessile or shortly pedicellate, bisexual, monomorphic. Calyx limb obsolete or occasionally truncate or 4–6-toothed. Corolla white or pink, salverform or funnellform, inside glabrous or villous in throat; lobes 4–9, convolute in bud. Stamens 4–8, inserted in corolla throat, exerted; filaments absent or short; anthers dorsifixed near base. Ovary 2-celled, ovules 1 in each cell, attached at middle of septum; stigma 2-lobed, exerted. Fruit red, yellow, orange, blue, or black, drupaceous, globose to ellipsoid, fleshy or infrequently dry, with calyx limb when developed persistent; pyrenes 2, each 1-celled, with 1 seed, plano-convex, leathery or papery, on ventral (i.e., adaxial) face with longitudinal groove; seeds medium-sized to large, longitudinally grooved on ventral face; radicle terete, basiscopic.

About 103 species: native to tropical Africa, Madagascar, and the Mascarene Islands, several species and hybrids cultivated in moist tropical regions worldwide; five species (all introduced) in China.

Several species of *Coffea* are widely cultivated as a source of the drink coffee, a leading world commodity. Species limits and identifications are often difficult for wild plants, due to the complexity of the genus, its evolutionary behavior, and its numerous reduced morphological features; and the taxonomy of cultivated plants is additionally complicated by extensive, sometimes poorly documented hybridization for crop improvement during several centuries. The genus is native to Africa, Madagascar, and the Mascarenes; plants found outside this region are cultivated. Cultivated plants of *Coffea* generally persist after active cultivation is abandoned but do not generally establish growing permanent populations or spread. Cultivated *Coffea* is surveyed usefully by Pursglove (Trop. Crops: Dicot. 451–492. 1968). *Coffea arabica* is the most valuable species, producing highest quality coffee; this is a tetraploid species (Stoffelen et al., Opera Bot. Belg. 7: 237–248. 1996). *Coffea canephora* is generally the most productive species, producing a lower quality coffee; this is a diploid species (Pursglove, loc. cit.: 482–488). *Coffea liberica* also produces a lower quality coffee than *C. arabica*, is also diploid (Pursglove, loc. cit.: 488–491), and is less often cultivated. W. C. Ko (in FRPS 71(2): 22–25. 1999) additionally treated two species, *C. congensis* and *C. stenophylla*, that have been hybridized with commercial coffee (Pursglove, loc. cit.: 458) and may persist from old plantations, but these are also two names that have been widely confused in cultivation with *C. arabica* and *C. canephora* (Davis et al., Bot. J. Linn. Soc. 152: 483, 497. 2006). Some frequently used synonymous names are included here for reference.

Coffea is similar to *Psilanthus* J. D. Hooker, and some species have been variously treated in each genus depending on the current circumscriptions. Davis et al. (Monogr. Syst. Bot. Missouri Bot. Gard. 104: 398–420. 2005) addressed this problem and concluded by separating the genera; in their circumscription *Psilanthus* is not known from China. Traditional *Coffea* descriptions often retain characters of *Psilanthus*, including that of W. C. Ko (loc. cit.: 20–25). *Coffea benghalensis* B. Heyne ex Schultes and *C. jenkinsii* J. D. Hooker were included in the Fl. Xizang. (4: 445–447. 1985). Davis et al. (loc. cit. 2006: 501) treated the first of these species as *P. benghalensis* (B. Heyne ex Schultes) J.-F. Leroy; Pursglove (loc. cit.: 458) listed it as a native species of SE Asia and Sumatra sometimes cultivated for coffee in India. Davis et al. (loc. cit. 2006: 504) treated *C. jenkinsii* as a species of *Nostolachma* T. Durand: *N. jenkinsii* (J. D. Hooker) Deb & Lahiri.

The fruit of *Coffea* are sometimes described informally as “berries” because of their size and fleshy texture, but morphologically they are similar to other drupes of Rubiaceae; thus, this technical terminology is used here. The fruit of *Coffea* are also commercially sometimes called “cherries.”

- 1a. Blades of outer, unshaded leaves larger, usually 15–40 × 6–22 cm, with apex acuminate to obtuse; fruit red.
 - 2a. Leaf blade without domatia or with glabrous foveolate domatia in abaxial vein axils; fruit ovoid-globose with length generally equal to width, 10–12 × 10–12 mm 2. *C. canephora*
 - 2b. Leaf blade with glabrous or pilosulous foveolate domatia in abaxial vein axils; fruit ellipsoid, longer than wide, 19–21 × 15–17 mm 4. *C. liberica*
- 1b. Blades of outer, unshaded leaves smaller, mostly shorter than or up to 15 × 7 cm, with apex acute to at least shortly acuminate; mature fruit red to black or bluish black.
 - 3a. Inflorescences with cymes 1 or 2 in each axil, each cyme 2–4-flowered; mature fruit black or bluish black; leaf blade narrowly elliptic-oblong to narrowly oblanceolate, 4–10 × 1.5–2.5 cm; corolla with 6–9 lobes 5. *C. stenophylla*
 - 3b. Inflorescences with cymes 1–4 per axil, each cyme 2–5-flowered; mature fruit red; leaf blade elliptic, elliptic-oblong, ovate-lanceolate, ovate, or lanceolate-elliptic, 3–8.5 cm wide; corolla with 4–6 lobes.
 - 4a. Stipules aristate at apex; leaves of unshaded outer branches with lateral veins 7–13 pairs, with glabrous foveolate domatia in abaxial vein axils; fruit smooth or usually drying with a shallow sulcus or indentation along septum 1. *C. arabica*
 - 4b. Stipules obtuse to acute at apex; leaves of unshaded outer branches with lateral veins 6–9 pairs,

with pilosulous domatia in abaxial vein axils; fruit drying smooth 3. *C. congensis*

1. *Coffea arabica* Linnaeus, Sp. Pl. 1: 172. 1753.

小粒咖啡 xiao li ka fei

Small trees or large shrubs, 5–8 m tall; branches flattened to subterete, glabrous. Petiole 8–15 mm, glabrous; leaf blade drying thinly leathery, elliptic, elliptic-oblong, or occasionally ovate-lanceolate, (2–)6–14(–22) × 3.5–5(–8.5) cm, glabrous on both surfaces, base cuneate to obtuse or rarely rounded, margins occasionally crisped-undulate, apex acuminate with tip usually 10–15 mm; secondary veins 7–10(–13) pairs, without domatia or with glabrous foveolate domatia; stipules broadly triangular, 3–8(–12) mm, aristate at least on youngest branches. Inflorescences with 1 to several cymes in each axil, each cyme subcapitate to fasciculate, (1 or)2–5-flowered, sessile to pedunculate with peduncles to 4 mm; bracts cupuliform, 1–2 mm; pedicels to 2 mm. Calyx glabrous; ovary portion ellipsoid, 1–3 mm; limb truncate to undulate or denticulate, 0.2–1 mm. Corolla white, funnellform, outside glabrous; tube 5–15 mm; lobes (4 or)5(or)6, spatulate-elliptic, 9–20 mm, obtuse. Drupe red, ellipsoid to subglobose, 11–16 × 9–14 mm, when dry smooth or sometimes weakly didymous, glabrous. Fl. Mar–Jul, fr. Oct–Jan.

Cultivated in moist, usually cool tropical regions; 200–700 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Sichuan, Taiwan, Yunnan [native to E Africa (Ethiopia, N Kenya, Sudan); cultivated worldwide].

This species is tetraploid and is the source of “Arabica Coffee.” It has been widely hybridized with several other *Coffea* species to produce commercial coffee plants; flower size varies markedly among many of these.

2. *Coffea canephora* Pierre ex Froehner, Notizbl. Königl. Bot. Gart. Berlin 1: 237. 1897.

中粒咖啡 zhong li ka fei

Coffea robusta L. Linden.

Small trees or shrubs, 4–8 m tall; branches flattened becoming subterete, glabrous. Petiole 10–20 mm, glabrous; leaf blade drying thickly papery, elliptic, elliptic-oblong, or occasionally ovate-oblong, (12–)15–30(–40) × (4.5–)6–12(–22) cm, glabrous on both surfaces, base cuneate to obtuse, margins flat or occasionally crisped-undulate, apex acuminate with tip 10–18 mm; secondary veins (8–)10–12(–17) pairs, without domatia or with glabrous foveolate domatia; stipules triangular, 6–18 mm, obtuse to acute, aristate. Inflorescences with cymes 1–3(–7) in each axil, each cyme subcapitate to fasciculate, 3–6-flowered, subsessile to pedunculate with peduncles to 7 mm; bracts cupular, 1–3 mm; pedicels to 2 mm. Calyx glabrous; ovary portion ellipsoid, 1–2 mm; limb reduced or denticulate, 0.1–0.5 mm. Corolla white to pink, funnellform, outside glabrous; tube 5–16 mm; lobes (4 or)5–7(or)8, spatulate to narrowly elliptic, 8–19 mm, obtuse to rounded. Drupe red, subglobose, 10–12 × 10–12 mm, smooth when dry, glabrous. Fl. Apr–Jun, fr. Oct–Dec.

Cultivated in moist, often warm tropical regions. Fujian, Guangdong, Hainan, Yunnan [widespread in tropical Africa; commonly cultivated worldwide].

ated worldwide].

This species is diploid and is cultivated as “Robusta Coffee.” It has been widely hybridized with several other species to produce commercial coffee plants.

3. *Coffea congensis* Froehner, Notizbl. Königl. Bot. Gart. Berlin 1: 235. 1897.

刚果咖啡 gang guo ka fei

Shrubs, 2–6 m tall; branches flattened, glabrous. Petiole 5–10 mm, glabrous; leaf blade drying thinly leathery, elliptic-oblong to ovate or lanceolate-elliptic, 8–15 × 3–7 cm, glabrous on both surfaces, base cuneate or obtuse to rounded, apex acute to shortly acuminate with tip 5–10 mm; lateral veins 6–9 pairs, usually with pilosulous domatia; stipules triangular to broadly triangular, 2–5 mm, obtuse to acute but not aristate. Inflorescences with cymes 1–4 in each axil, each cyme subcapitate to fasciculate, 2–4-flowered, sessile to pedunculate with peduncles to 4 mm; bracts cupuliform, 1–3 mm; pedicels to 3 mm. Calyx glabrous; ovary portion cylindrical-ellipsoid, 1–1.5 mm; limb reduced or undulate, 0.1–0.5 mm. Corolla white, funnellform, outside glabrous; tube 7–10 mm; lobes 5 or 6, spatulate to narrowly elliptic, 7–10 mm, obtuse to rounded. Drupe red, ellipsoid to ovoid-oblong, 10–12 × 8–10 mm, smooth when dry, glabrous. Fr. Dec.

Cultivated in moist forest regions. Hainan [native to Africa (Congo River basin: Democratic Republic of Congo, Republic of Congo), growing as rheophyte; widely planted in tropical regions, though perhaps not so often in recent decades].

This species is presumably diploid and has been occasionally hybridized with other species to produce commercial coffee (Purse-glove, Trop. Crops: Dicot. 458. 1968; Bridson, Fl. Trop. E. Africa, Rub. (Pt. 2), 703. 1988).

4. *Coffea liberica* W. Bull ex Hiern, Trans. Linn. Soc. London, Bot. 1: 171. 1876.

大粒咖啡 da li ka fei

Coffea dewevrei De Wildeman & T. Durand.

Small trees or large shrubs, 6–15 m tall; branches flattened to weakly angled, often rather stout, glabrous. Petiole 8–20 mm, often rather stout, glabrous; leaf blade drying thinly leathery to stiffly papery, elliptic to obovate or obovate-elliptic, 14–38 × 5.5–12(–20.5) cm, glabrous on both surfaces, base cuneate to obtuse, margins flat, apex obtuse to shortly acuminate with tip 4–10 mm; secondary veins 7–10(–13) pairs, without domatia or with glabrous to pilosulous foveolate domatia; stipules broadly triangular, 2–4.5 mm, obtuse to acute but not aristate. Inflorescences with cymes 1–3 per axil, each cyme fasciculate to subcapitate, 2–10-flowered, subsessile; bracts cupuliform, 1–3 mm; pedicels to 1 mm. Calyx glabrous; ovary portion ellipsoid-cylindrical, 1.5–3.5 mm; limb reduced or glandular-denticulate, to 0.2 mm. Corolla white, funnellform, outside glabrous; tube 4–13 mm; lobes 6–8, spatulate to lanceolate or narrowly elliptic, 8–16 mm, obtuse to rounded. Drupe red, ellipsoid, 19–21 × 15–17 mm, smooth when dry, glabrous. Fl. Jan–May, fr. presumably Aug–Nov.

Fl. China 19: 90–92. 2011.

Cultivated in moist, warm to cool regions. Fujian, Guangdong, Hainan, Yunnan [widespread in tropical Africa; widely but not intensively cultivated in tropical regions worldwide].

This species is diploid and is cultivated as “Liberica Coffee.” It has been hybridized with several other species to produce commercial coffee plants.

5. *Coffea stenophylla* G. Don, Gen. Hist. 3: 581. 1834.

狭叶咖啡 xia ye ka fei

Shrubs to small trees, 3–6 m tall; branches flattened to subterete, glabrous. Petiole 3–5 mm, glabrous; leaf blade drying thinly leathery, narrowly oblanceolate to narrowly elliptic-oblong, 4–10 × 1.5–2.5 cm, glabrous on both surfaces, base acute to cuneate, margins generally flat, apex acuminate with tip 10–20 mm; secondary veins 7–10 pairs, without domatia or with glabrous foveolate domatia; stipules broadly triangular, 2–3.5 mm, obtuse to acute and sometimes shortly mucronate. Inflorescences with cymes 1 or 2 per axil, each branched to subcapitate or fasciculate, 2–4-flowered, subsessile to pedunculate with peduncles to 2.5 mm; bracts cupuliform, 1–2 mm; pedicels to 6 mm. Flower buds resinous. Calyx glabrous; ovary ellipsoid, 1–1.5 mm; limb reduced, truncate. Corolla white or pale pink, funnelform, outside glabrous to puberulent; tube 6–8 mm; lobes 6–8(or 9), spatulate, 12–15 mm, obtuse. Drupe black or bluish black, subglobose to ovoid, 12–13 × 8–10 mm. Fl. Mar–Apr, fr. Dec.

Cultivated in moist, probably warm forest regions. Hainan (Chengmai) [native to W Africa; formerly occasionally cultivated in Old World tropics, apparently primarily in coffee research stations].

This species is diploid and is cultivated as “Highland Coffee of Sierra Leone.” It has been occasionally hybridized with other species to produce commercial coffee plants and reported as cultivated by older authors (Purseglove, Trop. Crops: Dicot. 459. 1968; Bridson, Fl. Trop. E. Africa, Rub. (Pt. 2), 703. 1988, with documentation).

Fl. China 19: 90–92. 2011.