

4. BRIDELIA Willdenow, Sp. Pl. 4: 978. 1806 [*Briedelia*], nom. cons.

土蜜树属 tu mi shu shu

Li Bingtao (李秉滔 Li Ping-tao); Stefan Dressler

Gentilia Beille.

Trees, shrubs, rarely woody lianas. Leaves simple, alternate, entire, pinnately veined, petiolate, stipulate. Flowers small, unisexual, monoecious, few to many flowers grouped into axile glomerules, pedicellate or sessile. Sepals 5, valvate. Petals 5, scale-shaped. Male flowers: stamens 5; filaments connate at base, forming staminal column, apical free and extended filaments surrounding rudimentary ovary; anthers dorsifixed, introrse, 2-loculed, parallel, longitudinally dehiscent; rudimentary ovary terete or obovate, sometimes conical, 2–4-fid at apex; disk cup-shaped or discoid. Female flowers: disk pulvinate or saucer-shaped lining flower with a conical or urceolate part, surrounding ovary, tearing as ovary expands; ovary 2-loculed; ovules 2 in each cell; styles 2, free or connate at base, bifid or entire at apex. Drupes or rarely capsules with fleshy epicarp, 1- or 2-celled (putamens). Seeds 1 or 2, with longitudinal groove; embryo curved; endosperm copious; cotyledons thin, large. $x = 13$.

About 60 species: tropical Africa, Asia, and Australia; seven species in China.

- 1a. Leaves brochidodromous (without a distinct fimbrial vein, secondary veins arching near margin); drupes 1-locular; seeds ellipsoid with longitudinal groove (*B.* subg. *Gentilia* (Beille) Jablonsky).
 - 2a. Flowers pedicelled, many (up to 50); branchlets, abaxial surface of leaves, and petioles usually pubescent; leaves membranous or papery, stipules more than 3.5 mm 6. *B. glauca*
 - 2b. Flowers (sub)sessile, fewer (up to 12); branchlets, leaves, and petioles glabrous; leaves stiffly papery or nearly leathery, margin often slightly revolute, stipules less than 3.5 mm 7. *B. balansae*
- 1b. Leaves craspedodromous (with a distinct fimbrial vein with secondary veins joining it); drupes 2-locular; seeds planoconvex (*B.* subg. *Bridelia*).
 - 3a. Woody lianas or scandent shrubs; calyx usually more than 6 mm in diam. 1. *B. stipularis*
 - 3b. Shrubs or trees; calyx usually less than 6 mm in diam.
 - 4a. Lateral veins in more than 15 pairs; inflorescence usually terminal, spikelike without normal leaves 2. *B. retusa*
 - 4b. Lateral veins in less than 15 pairs; inflorescence axillary, subtended by normal leaves.
 - 5a. Lateral veins usually 5–8 pairs; small sparingly branched shrubs; leaves broadly elliptic or slightly obovate, small, drying blackish 3. *B. parvifolia*
 - 5b. Lateral veins usually more than 8 pairs; erect shrubs or treelets; leaves lanceolate-elliptic, sometimes broadly elliptic, drying brownish and conspicuously bicolored with a lighter glaucous abaxial surface.
 - 6a. Calyx usually less than 4 mm in diam., greenish; leaf blade thinly papery; young branches often “whip-like” drooping 4. *B. tomentosa*
 - 6b. Calyx usually more than 4 mm in diam., reddish; leaf blade stiffly papery 5. *B. affinis*

1. *Bridelia stipularis* (Linnaeus) Blume, Bijdr. 597. 1826.

土蜜藤 tu mi teng

Clutia stipularis Linnaeus, Mant. Pl. 1: 127. 1767;
Bridelia scandens (Roxburgh) Willdenow; *Clutia scandens* Roxburgh.

Woody climbers or scandent shrubs, branches up to 15(–20) m, rarely small trees; branchlets usually markedly softly rufous tomentose or fulvous pubescent except for glabrous older branches, petals, ovary, and drupes. Stipules ovate-triangular, 3–9 × 2–4 mm, apex long acuminate, usually caducous; petiole 6–13 mm; leaf blade elliptic, obovate, or rotund, 4–17 × 2–11 cm, subleathery, base obtuse to rounded, apex acute or obtuse, rarely retuse; lateral veins 10–14 pairs. Inflorescences axillary, usually 2–6-flowered, sometimes grouped into many-flowered spikes or on terminal small-leaved branches. Male flowers 0.6–1 cm in diam.; pedicels very short, up to 1 mm; receptacle cup-shaped; sepals ovate-triangular, ca. 4 × 2.5 mm; petals spatulate, ca. 2 mm, 3–5-dentate; disk shallowly cup-shaped, 5–

6 mm in diam.; staminal column ca. 2 mm; free filaments ca. 1.5 mm; anthers ovoid, ca. 1 × 0.5 mm; rudimentary ovary terete, apex bipartite. Female flowers up to 12 mm in diam.; pedicels short and stout; receptacle nearly funnel-shaped; sepals ovate-triangular, ca. 4 × 2–3 mm; petals rhombic-spatulate, entire or shallowly bifid at apex; disk urceolate to lacerate when ovary expands, ca. 1.5 mm, hairy inside; ovary ovoid, 2–3 mm; styles 2, apex bifid, lobes linear. Drupes ovoid, 0.7–1.3 × 0.6–1.1 cm, bilocular. Seeds semiovoid, 6–8 × 3–6 mm, yellow to brown, smooth, adaxial surface flattened or slightly concave, abaxial surface slightly convex. Fl. and fr. almost throughout year.

Primary or secondary forests or riverside scrub; 100–1500 m. Guangdong, Guangxi, Hainan, Taiwan, Yunnan [Bhutan, Brunei, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Philippines, Singapore, Sri Lanka, Thailand, Timor, Vietnam].

The roots are used as medicine for reducing inflammation and as an astringent antidiarrheal; the fruits are used to induce vomiting and as an antitoxic.

2. *Bridelia retusa* (Linnaeus) A. Jussieu, Euphorb. Gen. 109.

1824.

大叶土蜜树 da ye tu mi shu

Clutia retusa Linnaeus, Sp. Pl. 2: 1042. 1753; *Bridelia cambodiana* Gagnepain; *B. fordii* Hemsley; *B. pierrei* Gagnepain; *B. spinosa* (Roxburgh) Willdenow; *Clutia spinosa* Roxburgh.

Trees up to 15 m tall, to 35 cm d.b.h.; branches fulvous pubescent, later glabrous except for pubescent to pilose abaxial leaf surface, bracts on both surfaces, pedicels and sepals exterior, sometimes with spines. Stipules ovate-triangular, ca. 2 mm, caducous, but linear stipular traces persistent at lateral base of petiole; petiole 0.7–1.2 cm, slightly stout; leaf blade obovate, sometimes elliptic, 8–25 × 4–13 cm, papery or thinly leathery, base obtuse, rounded, or shallowly cordate, apex rounded or truncate, rarely acute, sometimes with short acumen; lateral veins (13–)16–23 pairs, subparallel, reticulate veins prominent, subparallel, anastomosing lateral veins. Inflorescences many flowered, grouped into axillary spikes or 3–9-spiked and grouped into panicles at apex of branchlets, 10–20 cm; bracts ovate-triangular, 1.5–3 mm. Male flowers small, 4–6 mm in diam., yellow-green to reddish brown; pedicels ca. 1 mm; sepals ovate-triangular, ca. 2 × 1 mm; petals obovate to spatulate, 0.8–1.6 mm, 3–5-toothed; disk cup-shaped, up to 1.5 mm in diam.; staminal column ca. 1.2 mm; free filaments ca. 1 mm; anthers broadly ovoid; rudimentary ovary terete, apex undivided. Female flowers: sepals as in male but slightly larger; petals spatulate, ca. 1 mm at apex; disk pulvinate and urceolate, enclosing and as long as ovary; ovary globose to ovoid, up to 2 mm tall; styles 2, bifid. Drupes ovoid or depressed globose, 7–8 × 5–9 mm, black, 2-celled. Seeds semiglobose with an adaxial groove, ca. 5 mm in diam., reddish brown, smooth. Fl. Apr–Sep, fr. Aug–Jan.

Deciduous to evergreen primary or secondary forests; 100–1400 m. Guangdong, Guangxi, Guizhou, Hainan, Hunan, Yunnan [Bhutan, Cambodia, India, Indonesia (Sumatra), Laos, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam].

The durable wood is used in various ways; the bark contains up to 40% tannin.

3. *Bridelia parvifolia* Kuntze, Revis. Gen. Pl. 594. 1891.

圆叶土蜜树 yuan ye tu mi shu

Bridelia poilanei Gagnepain.

Small shrubs, 1–2(–3) m tall; branches lenticellate, glabrous throughout, shortly and sparingly branched, with some spines. Stipules lanceolate or oblong, ca. 2.5 mm, early caducous; petiole 2–5 mm; leaf blade usually broadly elliptic, sometimes rotund, 2–6 × 1.5–4 cm, leathery, glabrous, base shallowly cordate or rounded, apex rounded; lateral veins 5–8 pairs. Flowers axillary, solitary or fascicled; bracts triangular, 1–1.5 mm. Male flowers 2–5 mm in diam.; pedicels very short to absent; sepals triangular, ca. 2 × 1–1.5 mm; petals spatulate, apex rounded or lobulate; staminal column ca. 1 mm; anthers rotund or ovate; disk cup-shaped, surrounding staminal column and rudimentary ovary, 1.6–2 mm in diam. Female flowers: sepals triangular, 2–2.5 × 1.5–2 mm; petals rhomboid to spatulate, 0.8–1.2 × 0.6–1 mm, entire at apex; disk annular, ca.

0.5 mm high; ovary (semi)globose; styles 2, bifid. Drupes globose, 5–6 mm in diam., blackish, 2-celled. Seeds semiglobose with deep adaxial furrow, ca. 4.5 mm in diam., brown, pusticulate. Fl. May–Nov, fr. Sep–Dec.

Dune thickets, sandy soil. Hainan [Vietnam].

4. *Bridelia tomentosa* Blume, Bijdr. 597. 1826.

土蜜树 tu mi shu

Bridelia tomentosa var. *chinensis* Müller Argoviensis.

Erect shrubs or treelets, usually 2–5(–12) m tall, monoecious or dioecious; branches slender and elongate, “whip-like,” often overhanging, pubescent when young, glabrescent, older branches with some spines. Stipules ovate to linear-lanceolate, 2–7 mm, usually caducous, pubescent; petiole 3–5.5 mm, pubescent; leaf blade elliptic, lanceolate-elliptic, or obovate-elliptic, 3–9(–14) × 1.5–5(–6) cm, (thinly) papery, abaxially light greenish and usually pubescent, adaxially scabrous, base obtuse, rarely broadly cuneate or rounded, apex acute to obtuse; lateral veins 7–12(–15) pairs. Flowers axillary, yellow-green, up to 10(–20)-fascicled, sessile. Male flowers: sepals triangular, 0.8–1.2 × 0.5–1 mm; petals spatulate or obovate, entire or 3–5-toothed, ca. 1 × 0.8 mm; disk shallowly cup-shaped, 1–1.2 mm in diam.; staminal column ca. 0.7 mm; free filaments ca. 0.5 mm; rudimentary ovary conical. Female flowers usually 3–5-fascicled, subsessile; sepals triangular, 1–1.5 × 0.8–1.2 mm, glabrous to pubescent outside; petals as in male, shorter than sepals; disk pulvinate and urceolate, enclosing ovary for ca. 0.6 mm; ovary globose to ovoid, ca. 1 mm in diam.; styles 2, bipartite, lobes linear. Drupes subglobose, 4–7 × ca. 5 mm, 2-celled. Seeds semiovoid, 3–4 × 2–3 mm, brown-red, rugulate, adaxial surface compressed with longitudinal groove, abaxial surface slightly elevated with longitudinal stripes. Fl. and fr. almost throughout year.

Deciduous to evergreen primary or secondary forests or thickets; near sea level to 1000(–1500) m. Fujian, Guangdong, Guangxi, Hainan, Taiwan, Yunnan [Bangladesh, Bhutan, Cambodia, E India, Indonesia, Laos, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Singapore, Thailand, Vietnam; N Australia].

Since indumentum density varies widely, no varieties should be recognized based on this character (see Forster, *Austrobaileya* 5: 416. 1999). Merrill identified *Clutia monoica* Loureiro as this species and published the combination *Bridelia monoica* (Loureiro) Merrill, but Loureiro’s plant is not this species. The name “*Bridelia chinensis* Müller Argoviensis” also belongs here but was never validly published.

The leaves are used as medicine for traumatic injury; the roots are used to treat epidemic influenza and neurasthenia. The bark yields up to 8% tannin.

5. *Bridelia affinis* Craib, Bull. Misc. Inform. Kew 1911: 456. 1911.

硬叶土蜜树 ying ye tu mi shu

Bridelia colorata Airy Shaw; *B. henryana* Jablonsky.

Shrubs or small trees up to 5 m tall; young branches rufous puberulent. Stipules narrowly triangular, 4–5 × ca. 1 mm; petiole 4–6 mm, puberulent; leaf blade elliptic or rarely

obovate, 4–9(–15) × 2–4.5(–6) cm, papery, abaxially puberulent to pubescent, adaxially glabrous, base obtuse to acute, apex acute to obtuse; lateral veins 9–11(–15) pairs. Flowers axillary, up to 10-fascicled, (sub)sessile. Calyx conspicuously reddish; bracts small, triangular. Male flowers 4–6 mm in diam.; sepals triangular, 1.5–3 × 1–1.5 mm, pilose; petals irregularly rounded, base spatulate, apex lobulate, ca. 1 mm in diam.; staminal column ca. 1 mm; anthers ellipsoid, ca. 0.6 × 0.3 mm; rudimentary ovary cylindrical; disk cup-shaped, ca. 3 mm in diam. Female flowers: sepals and petals as in male; disk urceolate, enclosing ovary for ca. 1 mm; ovary ovoid, ca. 1.3 × 1 mm, 2-celled, tapering into 2 styles. Drupes depressed globose, apically bilobed, 5–7 mm tall, 2-celled.

Montane forest and thickets; [300–]1000–1500 m. Yunnan [Thailand].

This species is sometimes misidentified in Chinese herbaria as “*Bridelia yunnanensis* Pax & K. Hoffmann,” a name that was never validly published. W. Y. Chun and C. C. Chang (Fl. Hainanica 2: 143. 1965) recorded this species (as *B. henryana*) for Hainan but it has not been possible to confirm this record. Records of *B. montana* (Roxburgh) Willdenow in Chinese literature (e.g., Fl. Yunnan. 10: 74. 2006; Higher Pl. China 8: 22. 2001) are possibly based on material of this species.

6. *Bridelia glauca* Blume, Bijdr. 597. 1826.

膜叶土蜜树 mo ye tu mi shu

Bridelia pubescens Kurz.

Trees up to 15 m tall, glabrous except for rufous pubescent branchlets, stipules, abaxial leaf surface, pedicels, and sepals. Stipules linear-lanceolate to triangular, 4–6(–10) mm; petiole 4–10 mm; leaf blade elliptic-ovate, oblong, or obovate, 5–15 × 2.5–7.5 cm, membranous or thickly papery, base acute, obtuse, or often truncate, apex acute to acuminate; lateral veins 7–12(–18) pairs. Flowers monoecious, many-flowered fascicles with up to 50 flowers, axillary; bracts very small; pedicel distinct 1.5–5 mm. Male flowers white, 3.5–5 mm in diam., sepals lanceolate to triangular, up to 2 mm; petals obovate, lanceolate, or spatulate, ca. 0.8 mm, margin 3–5-toothed; disk pulvinate or saucer-shaped, to 2 mm in diam.; staminal column ca. 1 mm; filaments free for ca. 1 mm; anthers ovoid, 0.5–0.6 × 0.3–0.4 mm; rudimentary ovary conical. Female flowers: sepals triangular, up to 2.3 mm; petals obovate, shorter than sepals; disk urceolate enclosing ovary for ca. 0.5 mm, apex lacinate; ovary globose to ovoid; styles 2, ca. 1.2 mm, connate at base, bifid. Drupes ellipsoidal, 6–11 mm, base with persistent sepals, apex with mucro, 1-celled, stalk usually slender. Seeds ellipsoid with shallow lateral groove, 4–7 × 3–4.5 mm, light brown, rugulate. Fl. Mar–Sep, fr. Sep–Dec.

Sparsely forested slopes; 500–1600 m. Guangdong, Guangxi, Taiwan, Yunnan [India, Indonesia, Laos, Malaysia, Myanmar, New Guinea, Philippines, Thailand].

7. *Bridelia balansae* Tutcher, J. Linn. Soc., Bot. 37: 66. 1905.

禾串树 he chuan shu

Trees up to 17 m tall, ca. 30 cm in d.b.h., monoecious; bark fulvous, nearly smooth; branchlets glabrous with elevated lenticels. Stipules linear-lanceolate, 2–3 mm, yellowish or

brownish puberulent; petiole 3–8 mm; leaf blade elliptic or elliptic-lanceolate, 5–15 × 1.5–5.5 cm, leathery or nearly so, abaxially glabrous or only puberulent, adaxially glossy when dried, base cuneate, rarely obtuse, margin slightly revolute, apex acute, acuminate, or caudate-acuminate; lateral veins (5–)8–11(or 12) pairs. Glomerules axillary, up to 12-flowered, glabrous except for yellowish pubescent sepals and petals. Male flowers 3–4 mm in diam.; pedicel up to 2 mm; sepals triangular, 1.5–2 × 1.2–2 mm; petals elliptic to spatulate, 0.3–0.5 mm; disk shallowly

cup-shaped, 2–3 mm in diam.; staminal column ca. 1 mm; free filaments ca. 1 mm; anthers ovoid, 0.6–0.8 × 0.4–0.5 mm; rudimentary ovary ovoid-conical. Female flowers 4–5 mm in diam.; pedicels ca. 1 mm; sepals as in male; petals rhomboid-rounded, ca. 1 mm; disk urceolate ca. 1 mm enclosing ovary, lacerate when ovary expands; ovary globose to ovoid; styles 2, free, ca. 1.5 mm, bifid, lobes linear. Fruiting pedicel very stout, up to 3 mm; drupes oblong-ovoid, 8–12 × 5–8 mm, purple-black when mature, 1-celled. Seeds ellipsoid with deep lateral groove, 6–8 × 4–5 mm, brownish, smooth. Fl. May–Aug, fr. Sep–Nov.

Montane dense or sparse forests; 200–1000 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Sichuan, Taiwan, Yunnan [Japan (Ryukyu Islands), Laos, Vietnam].

Bridelia balansae has often been misidentified in Chinese floras as *B. insulana* Hance, which occurs from S Myanmar and S Thailand southward.

Collections from Yunnan tend to have wider and more chartaceous leaves and often more flowers per glomerule. Thus they intergrade morphologically with *Bridelia glauca*, which has many conspicuously pedicelled flowers and a more truncate leaf base, but is rarely collected in China.

The name “*Bridelia pachinensis* Hayata” belongs here but was never validly published.

Zhang and Qiu (Guihaia 19(3): 195. 1999) reported first records of *Bridelia harmandii* Gagnepain from China (Hainan). The second author (Dressler) has seen one of their cited vouchers (*S. K. Lau 4920*, A!, E!) which is *B. tomentosa*. Nevertheless, the species might occur in China given that it grows in nearby Indochina and Thailand. It resembles a small-leaved *B. stipularis* but differs by the much smaller flowers and being a small decumbent shrub; it also resembles a broad-leaved *B. tomentosa* but has stiffer, more leathery leaves, a strong indumentum in most parts, persistent subulate stipules, and fewer flowers per glomerule (see Dressler, Blumea 41: 281. 1996).

Fl. China 11: 174–177. 2008.