

### 3. ZIZIPHUS Miller, Gard. Dict. Abr., ed. 4. 1754.

枣属 zao shu

Shrubs or small to medium-sized trees, erect or straggling, often climbing, evergreen or deciduous, often spinose. Leaves alternate, petiolate, distinctly triplinerved or rarely pinnately veined; stipules usually transformed into 1 or 2, erect or ± recurved spines. Flowers yellow-green, small, bisexual, in axillary corymblike cymes, or axillary or terminal thyrses. Calyx tube shallow, patelliform to hemispherical. Sepals ovate-triangular or triangular, adaxially ± distinctly keeled. Petals clawed, obovate or spatulate, rarely absent. Disk shallow, fleshy, 5–10-lobed. Ovary superior, globose, 2- or 3(or 4)-loculed; style ± deeply branched, 2(–4)-fid. Fruit a single-stoned, (1 or)2- or 3-loculed, globose or oblong drupe, base with persistent calyx tube, apex mucronulate; mesocarp fleshy or soft corky; endocarp cartilaginous or woody, locules 1-seeded. Seeds without endosperm or rarely with endosperm; cotyledon thickening.

About 100 species: mainly in tropical and subtropical areas of Asia and the Americas, a few species in Africa and temperate regions; 12 species (six endemic) in China.

- 1a. Cymose racemes or terminal cymose panicles formed by cymes; drupe hairy, endocarp thin, early broken.
  - 2a. Shrubs or small trees; leaf blade broadly ovate or broadly elliptic, broad at middle, adaxially densely ferruginous or yellow-brown tomentose ..... 12. *Z. rugosa*
  - 2b. Scandent shrubs; leaf blade ovate-elliptic or ovate-oblong, broad at lower part, adaxially veins pubescent or glabrous.
    - 3a. Leaves adaxially on veins densely ferruginous hairy or sparsely pubescent; flowers without petals; drupe subglobose, not more than 1.5 cm, densely pubescent at first, ± glabrescent ..... 10. *Z. funगी*
    - 3b. Leaves adaxially only clustered hairy in vein axils; flowers with petals; drupe compressed-elliptic, ca. 2 cm, densely orange pilose ..... 11. *Z. attopensis*
- 1b. Axillary cymes; drupe glabrous, endocarp thick, stiffly cartilaginous, difficult to break.
  - 4a. Peduncles conspicuous, 2–16 mm.
    - 5a. Scandent or erect shrubs, with hooked-recurved spines or one erect spine and another recurved; leaf blade 3–5 × 2–4 cm; peduncles 2–5 mm; drupe 4–5 mm in diam., fruiting pedicels 2–3 mm ..... 8. *Z. laui*
    - 5b. Spinescent trees; leaf blade 5–14 × 3–6 cm; drupe ca. 10 mm in diam., fruiting pedicels 4–11 mm ..... 9. *Z. incurva*
  - 4b. Peduncles very short, not longer than 2 mm, or subsessile.
    - 6a. Leaves adaxially hairy at least on veins; branches with short spines less than 6 mm; drupe not more than 1.2 cm.
      - 7a. Branchlets, petioles, pedicels, and calyx sparsely pubescent or rarely glabrous; leaves adaxially sparsely pubescent on veins; flowers solitary or 2–4 in axillary cymes ..... 5. *Z. pubinervis*
      - 7b. Branchlets, petioles, pedicels, and calyx densely pubescent; flowers numerous in dichotomous cymes.
        - 8a. Scandent or erect shrubs; leaf blade ovate-oblong or ovate-lanceolate, broadest at lower part, apex acute or acuminate, adaxially ferruginous; drupe 5–6 mm in diam. .... 6. *Z. oenopolia*
        - 8b. Trees or shrubs; leaf blade oblong or elliptic, rarely suborbicular, broadest at middle, apex rounded, rarely acute, adaxially densely yellow or gray-white tomentose; drupe ca. 10 mm in diam. .... 7. *Z. mauritiana*
    - 6b. Leaves adaxially glabrous or subglabrous, or only at base of vein axils hairy, with 2 spines, long spine often more than 1 cm, rarely to 3 cm; drupe 1.2–3 cm in diam. (excluding *Z. jujuba* var. *spinosa* and *Z. jujuba* f. *tortuosa*).
      - 9a. Annual branches usually 2–7-fascicled on oblong reduced branches; pedicels and calyx glabrous; drupe oblong or narrowly ovoid, mesocarp thick, fleshy ..... 1. *Z. jujuba*
      - 9b. Plant without reduced branches; pedicels and calyx hairy; drupe globose or obovoid-globose, mesocarp thin, not fleshy.
        - 10a. Leaves solitary or 2 or 3 in fascicles, leaf blade 2–4 × 1.5–3 cm, apex obtuse or rounded; drupe 1.2–1.5 cm in diam. .... 2. *Z. xiangchengensis*
        - 10b. Leaves solitary, leaf blade 5–12.5 × 3–5.5 cm, apex acuminate to obtuse; drupe ca. 1.8 cm in diam.
          - 11a. Young branches glabrous; leaf blade ovate-lanceolate, apex acuminate; drupe endocarp thicker than mesocarp, basal margin thickening ..... 3. *Z. mairei*
          - 11b. Young branches and annual branches tomentose; leaf blade elliptic or ovate-elliptic, apex obtuse or subrounded; drupe mesocarp thicker than endocarp, basal margin not thickening ..... 4. *Z. montana*

1. *Ziziphus jujuba* Miller, Gard. Dict., ed. 8, *Ziziphus* no. 1. 枣 zao  
1768, nom. cons. prop.

Trees small, rarely shrubs, deciduous, to 10 m tall, spinose or unarmed. Bark brown or gray-brown, with long reduced branches, without buds; branchlets (new branches) purple-red or gray-brown, flexuose, smooth, with 2 stipular spines or not; long spines erect, to 3 cm, stout; short spines recurved, developed from old branches; annual branchlets pendulous, green, solitary or 2–7-fascicled on short shoots. Stipular spines slender, caducous; petiole 1–6 mm, or to 1 cm on long shoots, glabrous or sparsely puberulent; leaf blade abaxially pale green, adaxially dark green, ovate, ovate-elliptic, or elliptic-oblong, 3–7 × 1.5–4 cm, papery, abaxially ± puberulent on major veins or glabrous, adaxially glabrous, 3-veined from base, base slightly asymmetric, subrounded, margin crenate-serrate, apex obtuse or rounded, rarely acute, mucronulate. Flowers yellow-green, bisexual, 5-merous, glabrous, solitary or 2–8 crowded in axillary cymes, shortly pedunculate. Pedicel 2–3 mm. Sepals ovate-triangular, adaxially distinctly keeled. Petals obovate, ca. as long as stamens, clawed at base. Disk orbicular, thick, fleshy, 5-lobed. Ovary basally slightly immersed in disk; style 2-cleft to half. Drupe red at maturity, turning red-purple, oblong or narrowly ovoid, 2–3.5 cm, (0.5–)1.5–2 cm in diam.; mesocarp fleshy, thick, sweet- or sour-tasting; stone acute or obtuse at both ends, 2-loculed, 1- or 2-seeded; fruiting pedicel 2–5 mm or longer. Seeds compressed-orbicular, ca. 1 × 0.8 cm, Fl. May–Jul, fr. Aug–Oct.  $2n = 24^*$ ,  $36^*$ ,  $48^*$ .

• Mountains, hills, sunny dry slopes, plains, also widely cultivated; below 1700 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Yunnan, Zhejiang [cultivated in Africa, Asia, Europe, and North and South America].

Kirkbride et al. (Taxon 55: 1049–1050. 2007 [“2006”]) proposed the name *Ziziphus jujuba* for conservation against the paratautonym *Z. zizyphus*.

*Ziziphus jujuba* f. *tortuosa* C. Y. Cheng & M. J. Liu (J. Hebei Agric. Univ. 17(4): 7. 1994) is cultivated in gardens in Hebei, Henan, Jiangsu, S Shaanxi (Qin Ling), and Shandong. The plants are small trees with ascending, often tortuous branchlets without spines, long fruiting pedicels, and small drupes ca. 5 mm in diam. that resemble cucurbit fruits.

*Ziziphus jujuba* f. *lageniformis* (Nakai) Kitagawa (Lin. Fl. Manshur. 313. 1939; *Z. sativa* Gaertner var. *lageniformis* Nakai, Rep. Exped. Manchoukuo, Sect. IV, 1: 8. 1934) was recorded in FRPS (48(1): 136. 1982) from Hebei and (as cultivated) Beijing. However, it could not be treated here because no material was seen by the authors.

- 1a. Drupe 1.5–2 cm in diam., mesocarp sweet-tasting, stone acute at both ends.
  - 2a. Branches with spines ..... 1a. var. *jujuba*
  - 2b. Branches without spines ..... 1b. var. *inermis*
- 1b. Drupe less than 1.2 cm in diam., mesocarp sour-tasting, stone obtuse at both ends.
  - 3a. Branches erect, not tortuous, with spines ..... 1c. var. *spinosa*
  - 3b. Branches ascending, tortuous, without spines ..... f. *tortuosa* (see note above)

**1a. *Ziziphus jujuba* var. *jujuba***

枣(原变种) zao (yuan bian zhong)

*Rhamnus zizyphus* Linnaeus, Sp. Pl. 1: 194. 1753; *Ziziphus sativa* Gaertner; *Z. sinensis* Lamarck; *Z. vulgaris* Lamarck; *Z. zizyphus* (Linnaeus) H. Karsten, nom. rej. prop.

Branches with stipular spines. Drupe large, 1.5–2 cm in diam.; mesocarp sweet-tasting; stone acute at both ends. Fr. Aug–Oct.

• Mountains, hills, plains, also widely cultivated; below 1700 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Yunnan, Zhejiang [cultivated in Africa, Asia, Europe, and North and South America].

This taxon is an important honey plant. The fruit is edible, rich in vitamin C, and often preserved or candied. The fresh fruit is used medicinally.

**1b. *Ziziphus jujuba* var. *inermis* (Bunge) Rehder, J. Arnold Arbor. 3: 220. 1922.**

无刺枣 wu ci zao

*Ziziphus vulgaris* var. *inermis* Bunge, Enum. Pl. China Bor. 14: 1833; *Z. sativa* var. *inermis* (Bunge) C. K. Schneider.

Branches long, without stipular spines. Drupe 1.5–2 cm in diam.; mesocarp sweet-tasting; stone acute at both ends. Fr. Aug–Oct.

• Widely cultivated, mainly in S and SW China; below 1600 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Yunnan, Zhejiang.

**1c. *Ziziphus jujuba* var. *spinosa* (Bunge) Hu ex H. F. Chow, Familiar Trees Hopei, 307. 1934.**

酸枣 suan zao

*Ziziphus vulgaris* var. *spinosa* Bunge, Enum. Pl. China Bor. 14. 1833 [“*spinosus*”]; *Z. sativa* var. *spinosa* (Bunge) C. K. Schneider; *Z. spinosa* (Bunge) Hu ex F. H. Chen (1937), not Saint-Lager (1880).

Plants often shrubs. Branches erect, not tortuous, with spines. Leaves small. Drupe subglobose or broadly oblong, small, 0.7–1.2 cm in diam.; mesocarp sour-tasting, thin; stone obtuse at both ends. Fl. Jun–Jul, fr. Aug–Sep.  $2n = 24^*$ .

• Hills, sunny dry slopes, plains. Anhui, Gansu, Hebei, Henan, Jiangsu, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shanxi, Xinjiang.

The seeds are used medicinally for relieving muscle spasms, as a tranquilizer, or to treat insomnia. The fruit is thin, but rich in vitamins, and is eaten fresh or used for making jam. The flowers are fragrant and rich in nectar, so the variety is considered an important honey plant in N China. Because of the spiny branches, it is often planted to form hedges.

**2. *Ziziphus xiangchengensis* Y. L. Chen & P. K. Chou, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 88. 1979.**

蜀枣 shu zao

Small trees or shrubs, 2–3 m tall, spinose. Young branches red-brown, densely pilose; old branches gray-brown, flexuose, glabrous. Leaves alternate, or 2 or 3 in fascicles; stipular spines 2, both erect or one recurved, 1–1.6 cm, slender; petiole 5–8

mm, sparsely pilose; leaf blade abaxially pale green, adaxially dark green, ovate or ovate-oblong, 2–4 × 1.5–3 cm, papery, abaxially glabrous to clustered hairy in vein axils, adaxially glabrous, 3-veined from base, veins prominent on both surfaces, midvein without conspicuous secondary veins, base asymmetric, subrounded, margin crenate-serrate, apex obtuse or rounded. Flowers yellow-green, few- to 10-fascicled in axils of leaves, without peduncles. Pedicel 4–5 mm, ferruginous pilose. Sepals ovate-triangular, densely ferruginous pubescent, apex acute. Petals spatulate. Stamens shorter than petals. Ovary globose, glabrous; style 2-fid. Drupe yellow-green, globose, 1.2–1.5 cm in diam., apex mucronulate, with persistent calyx tube at base; fruiting pedicel 5–7 mm, sparsely pilose; mesocarp thin, corky; endocarp cartilaginous; stone ca. 4 mm, 2-loculed, with 2 seeds. Seeds compressed, convex on one face, obovoid, ca. 8 × 8–9 mm. Fl. unknown, fr. Jul–Aug.

- Riverbanks; ca. 2800 m. W Sichuan (Xiangcheng).

**3. *Ziziphus mairei*** Dode, Bull. Soc. Bot. France 55: 649. 1909.

大果枣 da guo zao

Trees, to 15 m tall, spinose. Young branches yellow-green, glabrous; branchlets purple-red, longitudinally striate. Stipular spines 2, both erect, or one erect and one recurved, yellow or turning purple-red, 8–25 mm; petiole 6–9 mm, glabrous; leaf blade abaxially pale green, adaxially dark green, ovate-lanceolate, 7.5–15 × 3.5–7 cm, papery, both surfaces glabrous, 3- or 5-veined from base, veins prominent abaxially, impressed adaxially, base oblique, asymmetric, subrounded, margin crenate-serrate, apex acuminate. Flowers yellow-green, small, usually few or 10 crowded in axillary dichasia; peduncles short, not longer than 2 mm, ferruginous tomentose. Pedicel 3–4 mm. Sepals ovate-triangular, sparsely hairy, apex acute or acuminate. Petals obovoid-orbicular, shortly clawed, apex emarginate. Stamens ca. as long as petals. Disk 5-lobed, centrally concave. Ovary slightly immersed in disk; style deeply 2-branched. Drupe yellow-brown, often spotted, globose or sub-obovoid-globose, large, 2.4–3.5 cm, 1.8–3 cm in diam., ± rugose when dry, base concave, apex with persistent style; fruiting pedicel 5–7 mm, glabrous; fleshy mesocarp soon becoming corky; endocarp thick, cartilaginous; stone ca. 6 mm in diam., 2-loculed, with 1 or 2 seeds. Seeds compressed, ca. 1.2 × 1 cm. Fl. Apr–Jun, fr. Jun–Aug.

- Thickets and forest margins along riverbanks; 1900–2000 m. Yunnan.

**4. *Ziziphus montana*** W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 10: 78. 1917.

山枣 shan zao

Trees or shrubs, to 14 m tall, spinose. Young and annual branches red-brown tomentose; branchlets brown or purple black, with conspicuous lenticels. Stipular spines 2, both erect, red-purple, 1–1.8 cm; petiole 7–15 mm, ± pilose at first, glabrescent; leaf blade abaxially pale green, adaxially green, elliptic, ovate-elliptic, or ovate, 5–8 × 3–4.5 cm, papery, abaxially ferruginous pubescent on major veins, adaxially glabrous, 3(or 5)-veined from base, veins prominent on both surfaces, midvein

without conspicuous secondary veins, base asymmetric, subrounded, margin crenulate, apex obtuse or subrounded, rarely shortly acute. Flowers greenish, few to 10 crowded in axillary dichotomous cymes; peduncles 1–2 mm, densely pilose. Sepals triangular, ca. 2 mm, abaxially brownish pilose, apex acute. Petals obovate, subequal to sepals, clawed. Disk thick, fleshy, 5-lobed. Ovary globose, deeply immersed in disk; styles long, 2-branched. Drupe yellow-brown, globose or subglobose, 2.5–3 cm, 2–2.5 cm in diam., glabrous, concave at base; fruiting pedicel often curved, 6–12 mm, sparsely pilose; mesocarp 6–7 mm, thick, spongy; endocarp woody, wall 3–4 mm, 2-loculed, with 2 seeds. Seeds compressed, obovoid, 9–10 mm. Fl. Apr–Jun, fr. May–Aug.

- Sparse forests in valleys, dry stony places; 1400–2600 m. SW and W Sichuan, E Xizang, NW Yunnan.

This species differs from *Ziziphus mairei* in having tomentose annual branches, leaf blade elliptic or ovate-elliptic, with an obtuse or subrounded apex, and mesocarp spongy and thicker than endocarp, not thickening at basal margin.

**5. *Ziziphus pubinervis*** Rehder, J. Arnold Arbor. 18: 218. 1937.

毛脉枣 mao mai zao

*Strychnos esquirolii* H. Léveillé.

Trees or shrubs, unarmed. Branchlets slender, glabrous. Petiole 4–6 mm, sparsely pilose or glabrous; leaf blade abaxially pale green, adaxially green, oblong-lanceolate or ovate-elliptic, 5–11 × 3–5 cm, papery, abaxially glabrous or pilose on major veins, adaxially glabrous, 3-veined from base, veins prominent abaxially, impressed adaxially, base subrounded or broadly cuneate, asymmetric, margin serrulate, apex caudate-acuminate or long acuminate. Flowers green, solitary or 2–4 in shortly pedunculate or sessile cymes. Pedicel 3–4 mm, sparsely pilose. Drupe solitary in axils of leaves, subovoid-globose, 1–1.5 cm, 9–12 mm in diam., base with persistent calyx tube, apex mucronulate; exocarp rugose when dry; fruiting pedicel 4–5 mm, sparsely pilose, 2-loculed, with 1 or 2 seeds. Fl. unknown, fr. Aug–Sep.

- Forests on mountain slopes. W Guangxi, Guizhou.

**6. *Ziziphus oenopolia*** (Linnaeus) Miller, Gard. Dict., ed. 8, *Ziziphus* no. 3. 1768 [*“oenoplia”*].

小果枣 xiao guo zao

*Rhamnus oenopolia* Linnaeus, Sp. Pl. 1: 194. 1753.

Shrubs erect or scandent, spinose. Young branches densely ferruginous or yellow-brown pubescent; bark gray or gray-brown. Stipular spines 1, sometimes 2, one recurved and one erect, 3–4 mm; petiole 5–7 mm, densely yellow-brown pubescent; leaf blade ovate-oblong or ovate-lanceolate, 3–8 × 2–4 cm, papery, abaxially appressed pubescent to nearly villous, adaxially veins sparsely pubescent or glabrescent, 3-veined at base, veins prominent abaxially, conspicuously impressed adaxially, base usually ± asymmetric, subrounded, margin inconspicuously crenate, apex acute or acuminate. Flowers greenish yellow, few to 10 in axillary shortly pedunculate cymes. Pedicel ca. 2 mm, pilose. Sepals ovate-triangular, abaxially sparsely pi-

lose to pubescent, adaxially glabrous, apex acute. Petals spatulate, clawed, enfolding stamens. Stamens slightly shorter than petals. Disk pentagonal, thick, fleshy, often 5-lobed. Ovary globose, glabrous, immersed in disk; style 2-branched. Drupe black, shiny, globose or obovoid-globose, small, 5–7 × 5–6 mm, base with persistent calyx tube, apex mucronulate; fruiting pedicel 3–4 mm, pilose; endocarp cartilaginous, ca. 2 mm; stone 1- or 2-seeded. Seeds shiny, globose. Fl. Aug–Sep, fr. Oct.  $2n = 24$ .

Forests, thickets; 500–1100 m. Guangxi, S Yunnan [India, Indonesia, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand; Australia].

**7. *Ziziphus mauritiana*** Lamarck, Encycl. 3: 319. 1789.

滇刺枣 dian ci zao

*Paliurus mairei* H. Léveillé; *Rhamnus jujuba* Linnaeus; *Ziziphus jujuba* (Linnaeus) Lamarck (1789), not Miller (1768); *Z. mairei* (H. Léveillé) Browicz & Lauener (1967), not Dode (1909).

Trees or shrubs, evergreen, to 15 m tall. Young branches densely yellow-gray tomentose; branchlets pilose; old branches purple-red. Stipular spines 2, one oblique and hooklike recurved; petiole 5–13 mm, densely gray-yellow tomentose; leaf blade adaxially dark green, shiny, ovate or oblong-elliptic, rarely subrounded, 2.5–6 × 1.5–4.5 cm, papery to thickly papery, abaxially yellow or gray-white tomentose, adaxially glabrous, 3-veined from base, veins conspicuously reticulate abaxially, impressed or ± prominent adaxially, base subrounded, slightly oblique, margin serrulate, apex rounded, rarely acute. Flowers green-yellow, few to 10 in subsessile or shortly pedunculate, axillary dichotomous cymes. Pedicel 2–4 mm, gray-yellow tomentose. Sepals ovate-triangular, abaxially hairy, apex acute. Petals oblong-spatulate, clawed at base. Stamens subequaling petals. Disk thick, fleshy, 10-lobed, concave at middle. Ovary globose, glabrous; style 2-fid or branched to half. Drupe orange or red, turning black at maturity, oblong or globose, 1–1.2 cm, ca. 1 cm in diam., with persistent tube at base; fruiting pedicel 5–8 mm, pilose, 2-loculed, 1- or 2-seeded; mesocarp corky; endocarp thick, thickly leathery. Seeds red-brown, broad and compressed, 6–7 × 5–6 mm, shiny. Fl. Aug–Nov, fr. Sep–Dec.  $2n = 24$ .

Humid forests, thickets along riverbanks, hills, slopes; below 1800 m. Native in Guangdong, Guangxi, Sichuan, and Yunnan; cultivated in Fujian and Taiwan [Afghanistan, Bhutan, India, Indonesia, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam; Africa, Australia].

The hard, fine wood is used in making furniture; the bark is used medicinally. The leaves contain tannin used for producing tannin extract. This is an important host tree for the parasitic scale insect, *Laccifer lacca* (lac insect).

**8. *Ziziphus laui*** Merrill, Lingnan Sci. J. 14: 32. 1935.

球枣 qiu zao

Shrubs scandent or erect, rarely trees. Young branches purple-red, ferruginous or yellow-brown pubescent; mature branches blackish purple. Stipular spines either 1, recurved, 3–4 mm, or 2, one erect and one recurved; petiole 4–7 mm, densely ferruginous pilose; leaf blade ovate, rarely ovate-elliptic or ovate-oblong, 3–5 × 2–4 cm, thinly papery or submembranous,

both surfaces glabrous, or abaxially sparsely pilose on veins in juvenile leaves, 3(or 5)-veined from base, veins abaxially prominent, base oblique, subrounded, margin sparsely serrulate or entire, apex obtuse or subrounded. Flowers small, several to 10 in axillary dichotomous cymes; peduncles 2–5 mm, pilose. Sepals ovate-triangular, ca. 1.3 mm, abaxially sparsely hairy, apex acute or acuminate. Petals oblong-obovate, shorter than sepals, clawed, apex rounded or emarginate. Stamens ca. as long as petals. Disk thick, fleshy, 5-lobed, centrally concave. Ovary subglobose, glabrous, 1-loculed; style 2-cleft to half, glabrous. Drupe subglobose, small, 4–5 mm in diam., with persistent styles at apex, glabrous; fruiting pedicel 2–3 mm, pilose, 1-seeded. Fl. Jun–Aug, fr. Aug–Nov.

Sparse forests, thickets, sandy beaches; sea level. Hainan [Vietnam].

**9. *Ziziphus incurva*** Roxburgh, Fl. Ind. 2: 364. 1824.

印度枣 yin du zao

*Ziziphus yunnanensis* C. K. Schneider.

Trees to 15 m tall or large shrubs, spinose. Young branches brownish pilose; old branches black-brown or purple-black, stiff, stout. Stipular spines 1 or 2, erect, 4–6 mm, caducous; petiole 5–11 mm, brownish pilose; leaf blade abaxially pale green, adaxially dark green, ovate to elliptic, rarely ovate-oblong, 5–14 × 3–6 cm, papery, abaxially with pubescent or sparsely hairy veins, glabrescent, adaxially glabrous or sparsely pubescent on primary vein, 3(or 5)-veined from base, base rounded to slightly cordate, often slightly asymmetric, margin crenate-serrate, apex acuminate or shortly acuminate, obtusely mucronulate, rarely subrounded. Flowers greenish, several to 10 in axillary dichotomous cymes; peduncles 7–16 mm, brownish pilose. Sepals ovate-triangular, abaxially pilose, adaxially glabrous, distinctly keeled up to middle, apex acute. Petals spatulate, subequal to stamens, clawed. Disk thick, fleshy, 5-lobed, distinctly emarginate in front of stamens, outer margin prominent. Ovary globose, apex puberulent; styles 2-branched, divided to half. Drupe red-brown at maturity, subglobose or globose-ellipsoid, 1–1.2 × 0.8–1.1 cm, glabrous, with persistent calyx tube and disk at base; fruiting pedicel 4–11 mm, pilose; mesocarp thin; endocarp ca. 3 mm, thickly cartilaginous, (1 or)2-loculed, with 1 or 2 seeds. Seeds black-brown, shiny, smooth. Fl. Apr–May, fr. Jun–Oct.  $2n = 24$ .

Mixed forests; 1000–2500 m. Guangxi, S Guizhou, SW Xizang, Yunnan [Bhutan, India, Myanmar, Nepal, Thailand].

**10. *Ziziphus fungii*** Merrill, Lingnan Sci. J. 13: 61. 1934.

褐果枣 he guo zao

Shrubs scandent, to 5 m tall. Young branches ferruginous pilose; older branches black-purple or purple-red, sparsely pilose, with conspicuous lenticels. Stipular spine 1, hooklike recurved, 3–5 mm, ferruginous pilose, base broad and compressed; petiole 5–7 mm, sparsely or densely ferruginous pubescent; leaf blade adaxially green, turning brown when dry, ovate-elliptic, ovate, or ovate-oblong, 6–13 × 3–5.5 cm, papery, abaxially densely ferruginous pubescent or sparsely pubescent on major veins, adaxially with pilose midvein at first, glabrescent, 3-veined from base, midvein with 2 or 3 conspicuous pairs

of secondary veins, prominent abaxially, impressed adaxially, base subrounded, asymmetric, margin inconspicuously serrulate, apex acuminate or shortly acuminate. Flowers yellow-green, in axillary dichotomous cymes or terminal cymose panicles; rachis, pedicels, and calyx densely ferruginous pubescent; peduncles 6–10 mm. Sepals triangular, abaxially densely pubescent. Petals absent. Disk thick, fleshy, 5-lobed. Drupe globose, to 1.5 cm, ferruginous pubescent, gradually glabrescent, with persistent calyx tube at base; endocarp ca. 1 mm thick; stone 1- or 2-loculed, with 1 or 2 seeds; fruiting pedicel 4–5 mm, pilose. Seeds reddish brown, reniform, 8–9 mm. Fl. Feb–Apr, fr. Apr–May.

• Sparse forests; below 1600 m. Hainan, S Yunnan.

**11. *Ziziphus attopensis*** Pierre, Fl. Forest. Cochinch. t. 316a. 1894.

毛果枣 mao guo zao

*Ziziphus trichocarpa* Hung T. Chang.

Shrubs scandent. Young branches purple-black, subcylindric, glabrous; old branches red-brown, with conspicuous lenticels. Stipular spine 1, recurved, ca. 1 mm, 3–5 mm wide basally; petiole 5–9 mm, subglabrous or sparsely pilose; leaf blade adaxially dark green, oblong or ovate-elliptic, 7–13 × 3.5–7 cm, papery or subleathery, adaxially glabrous, veins distinctly prominent abaxially, impressed adaxially, base asymmetric, subrounded, rarely cordate, margin crenulate or inconspicuously denticulate, apex long acuminate, with slightly curved obtuse mucro 5–10 mm. Inflorescences to 25 cm; branches 2–11 cm, densely yellow-brown pubescent, with numerous flowers. Flowers yellow, in terminal cymose racemes or large cymose panicles. Sepals ovate-triangular, ca. 1.5 mm, abaxially densely yellow-brown pilose. Petals obovate, shorter than sepals, clawed at base. Stamens slightly shorter than petals. Disk pentagonal, thick, fleshy, 5-lobed. Ovary globose, densely pubescent; styles 2-cleft to half. Drupe compressed-ellipsoid or compressed-globose, 1.9–2.2 × 1.3–1.8 cm, yellow-brown or orange pilose, base with persistent tube, apex mucronulate; fruiting pedicel 4–7 mm, yellow-brown pilose; mesocarp thin, fleshy; endocarp weak, ca. 1 mm thick, fragile-crustaceous; stone 1-loculed, 1-seeded; fruiting rachis to 30 cm, stout; branches 5–15 cm, densely yellow-brown pilose. Seeds red-brown, compressed, oblong-ellipsoid, ca. 1.3 × 1.1 mm; cotyledon large. Fl. Feb–May, fr. Apr–Jun.

Sparse forests, thickets; below 1500 m. W Guangxi, S Yunnan [Laos, Thailand].

This species is closely related to *Ziziphus funगी* but differs in having slightly thinner leaves, with barbate vein axils and without secondary lateral veins, and fruit larger, yellow-brown pilose.

**12. *Ziziphus rugosa*** Lamarck, Encycl. 3: 319. 1789.

皱枣 zhou zao

Shrubs or small trees, evergreen, to 9 m tall, spinose. Young branches densely ferruginous or yellow-brown tomentose; old branches red-brown, scabrous, striate, with conspicuous lenticels. Stipular spines 1(or 2), recurved, purple-red, 3–6 mm; petiole short, 5–9 mm, stout, densely yellow-brown to-

mentose; leaf blade broadly ovate or broadly elliptic, 8–11 × 4.5–9.5 cm, papery or subleathery, abaxially densely ferruginous or yellow-brown tomentose, adaxially at first villous, gradually glabrescent or later sparsely pubescent in vein axils, 3–5-veined from base, midvein with 2–5 pairs of secondary veins, veins prominent abaxially, impressed adaxially, base subcordate or rounded, oblique, margin serrulate, apex rounded. Inflorescences to 20 cm. Flowers green, densely pubescent, few to 10 in terminal or axillary large cymose panicles or cymose racemes; peduncles 5–12 mm. Pedicel ca. 2 mm, densely ferruginous tomentose. Sepals triangular, subequal to calyx tube, abaxially ferruginous tomentose, adaxially slightly keeled, apex acute. Petals absent. Disk orbicular, rather thick, 5-lobed, outer rim inconspicuous. Ovary globose, densely tomentose, to ca. 1/3 immersed in disk; styles deeply 2-cleft or 2-cleft to half. Drupe orange, turning black at maturity, obovoid-globose or subglobose, 9–12 mm, 8–10 mm in diam., hairy, gradually glabrescent, with persistent tube at base; fruiting pedicel 7–10 mm, tomentose; endocarp fragile-crustaceous; stone 1-loculed, 1-seeded. Seeds red-brown, globose, 6–7 × 6–7 mm. Fl. Mar–May, fr. Apr–Jun.  $2n = 24$ .

Sparse forests and thickets on hills, sunny places on mountains; below 1400 m. Hainan, S and SW Yunnan [India, Laos, Myanmar, Sri Lanka, Thailand, Vietnam].

This species is an important host for the parasitic scale insect, *Laccifer lacca* (lac insect).

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