

57. TRIGONOSTEMON Blume, Bijdr. 600. 1826 [*“Trigostemon”*], nom. cons.

三宝木属 san bao mu shu

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Enchidium Jack; *Poilaniella* Gagnepain; *Prosartema* Gagnepain.

Trees or shrubs, monoecious. Leaves simple, alternate, rarely opposite to nearly whorled; stipules small, persistent or deciduous; leaf blade unlobed, pinnately veined, sometimes stipulate at base, paired glands at apex of petiole. Flowers androgynous or anisogynous; inflorescences terminal or axillary, racemose or thyrsoid. Male flowers: sepals 5, free, imbricate; petals 5, exceeding calyx; disk cupular or annular, or shortly divided, or dissected, sometimes divided into 5 glands; stamens 3–5; filaments connate or only free at upper part; anther connective enlarged, often elongated, thecae adnate to thickened connectives; pistillode absent. Female flowers: pedicels usually prominently stronger than axil of inflorescence; sepals and petals as in male; disk annular or cupular, usually unlobed; ovary 3-locular; ovules 1 per locule; styles 3, free, connate at near base, bifid or unlobed at apex. Capsules 3-valved. Seeds not carunculate; testa dry; endosperm present; endosperm fleshy; cotyledon broad and flat.

About 50(–80) species: tropical Asia, extending from India and Sri Lanka to New Guinea; eight species (one endemic) in China.

See P. T. Li et al. (Harvard Pap. Bot. 11: 117–120. 2006) for a review of *Trigonostemon* in China.

- 1a. Leaves usually in dense pseudowhorls at tips of branches; petiole less than 1 cm; inflorescences unbranched, racemelike.
 - 2a. Leaf blade abaxially glabrous; sepals uniform in size; petals yellow; ovary and fruits glabrous 1. *T. xyphophylloides*
 - 2b. Leaf blade abaxially villous or hirsute; sepals unequal in size; petals purple-red; ovary and fruits densely hirsute.
 - 3a. Bracts leaflike, 10–25 mm; inflorescence less than 6 cm 2. *T. flavidus*
 - 3b. Bracts linear or linear-lanceolate, 3–6 mm; inflorescence 15–25 cm 3. *T. howii*
- 1b. Leaves evenly spaced; petiole 1–11 cm; inflorescences branched.
 - 4a. Leaf blade glabrous, apex shortly acuminate to acuminate.
 - 5a. Leaf blade broadly elliptic, margins entire or obscurely serrulate; basal veins 3; petals white or yellowish white; stamens 3 4. *T. albiflorus*
 - 5b. Leaf blade obovate, margins sparsely serrate; venation pinnate; petals yellow; stamens 5 5. *T. thyrsoides*
 - 4b. Leaf blade pilose or pubescent, apex obtuse to caudate.
 - 6a. Pedicels filamentous; petals elliptic 6. *T. bonianus*
 - 6b. Pedicels more robust; petals obovate.
 - 7a. Sepals unequal in size; leaf blade adaxially densely tuberculate 7. *T. chinensis*
 - 7b. Sepals uniform in size; leaf blade adaxially not tuberculate 8. *T. fragilis*

1. **Trigonostemon xyphophylloides** (Croizat) L. K. Dai & T. L. Wu, Acta Phytotax. Sin. 8: 277. 1963.

剑叶三宝木 jian ye san bao mu

Cleidion xyphophylloides Croizat, J. Arnold Arbor. 21: 503. 1940.

Shrubs ca. 3 m tall; branchlets dark brown, scabrous. Leaves densely clustered in apparent whorls; stipules small; petiole 3–6 mm, with paired glands at apex; leaf blade oblanceolate to subspatulate, 25–50 × 7–11 cm, both surfaces glabrous, base cuneate, obtuse, margins sparsely glandular-serrulate, apex acute to acuminate; lateral veins 14–22, arcuate anastomosing before margins. Racemes axillary, less than 3 cm, bisexual; bracts 2–3 mm, abaxially hirsute. Male flowers: pedicel 4–8 mm; sepals elliptic, ca. 1.2 mm, hirsute; petals oblanceolate, ca. 4 mm, yellow, glabrous; disk glands 5; stamens 3; filaments connate. Female flowers: pedicel ca. 6 mm; sepals narrowly ovate, ca. 3 mm, abaxially hirsute; petals as in male; disk glands 5; ovary glabrous; styles short; stigmas capitate and retuse. Capsules slightly depressed globose, 1–1.5 × ca. 1.5 cm, shallowly 3-grooved. Seeds depressed globose, ca. 8 mm in diam., brown, with stripes of

yellow spots. Fl. Jun–Sep, fr. Aug–Nov.

- Dense forests; 400–500 m. Hainan.

2. **Trigonostemon flavidus** Gagnepain, Bull. Soc. Bot. France 69: 749. 1923.

异叶三宝木 yi ye san bao mu

Trigonostemon heterophyllus Merrill.

Shrubs 1–2 m tall; branchlets densely yellow-brown hirsute; older branches scabrous, glabrescent. Leaves densely clustered in apparent whorls; petiole 3–6 mm, densely yellow-brown hirsute; leaf blade oblanceolate to oblong-oblanceolate, 12–35 × 4–10 cm, membranous to papery, densely hairy, basally attenuate into auriculate or subcordate base, margin entire or obscurely serrulate beyond middle, ciliate, apex shortly acuminate, acumen caudate. Male flowers: inflorescences axillary, racemelike, ca. 2.5 cm, few flowered; bracts 4 or 5, linear-lanceolate, slightly falcate, 1–2 cm; sepals 5, hirsute, 3 larger, 2.5–3 mm, 2 smaller, ca. 1.5 mm; petals obovate-elliptic, ca. 4.5 mm, purple-red; disk glands 5, ca. 0.8 mm; stamens 3; filaments connate. Female flowers axillary, solitary; pedicels

short, or sometimes inserted in upper part of to 6 cm inflorescences; sepals lanceolate, ca. 5 mm, hirsute, apex long ciliate, acuminate; petals elliptic or obovate, 4.5–5 × ca. 4 mm; disk glands 5, oblong; ovary densely hairy; styles bifid. Fruiting peduncles 1–8 cm; persistent sepals and bracts lanceolate, ca. 2 cm. Capsules subglobose, ca. 6 mm in diam., chestnut brown, with stripes of yellow spots. Fl. May–Oct, fr. Aug–Dec.

Dense forests; ca. 300 m. Hainan [Laos, Myanmar, Thailand].

3. *Trigonostemon howii* Merrill & Chun, *Sunyatsenia* 2: 262. 1935.

长序三宝木 chang xu san bao mu

Prosartema gaudichaudii Gagnepain (1925), not *Trigonostemon gaudichaudii* (Baillon) Müller Argoviensis (1865); *T. gagnepainianus* Airy Shaw.

Shrubs 2–4 m tall; branchlets densely yellow-hirsute, sparsely so at maturity. Leaves densely clustered in apparent whorls; stipules linear, hirsute, caducous; petiole 5–15 mm, hirsute; leaf blade oblanceolate to oblong-oblanceolate, 9–28 × 3.5–8 cm, papery to thinly leathery, abaxially purple-red and sparsely yellow hirsute, adaxially glaucous-green when dry and hirsute along midvein, base attenuate, obtuse to slightly cordate, margin entire or sparsely serrulate, ciliate, apex acute to shortly acuminate, sometimes acumen slightly inflected; lateral veins 10–12. Racemes or narrow panicles axillary, 15–25 cm, many flowered; peduncles densely hirsute; bracts linear, hirsute. Male flowers: sepals membranous, elliptic, ca. 1.5 mm, hirsute outside; petals obovate, ca. 3 mm, purple-red; stamens 3; connectives thickened, conspicuously produced. Female flowers: sepals unequal, ca. 2 mm; petals obovate, purple-red; disk crenellated; ovary densely hirsute; styles bifid at apex. Capsules subglobose, ca. 1 cm in diam., densely yellow hirsute. Seeds depressed globose, smooth. Fl. Jun–Jul, fr. Aug–Sep.

Dense montane forests; 400–500 m. Hainan [Vietnam].

4. *Trigonostemon albiflorus* Airy Shaw, *Kew Bull.* 25: 547. 1971.

白花三宝木 bai hua san bao mu

Trigonostemon leucanthus Airy Shaw; *T. leucanthus* var. *siamensis* H. S. Kiu.

Shrubs ca. 1 m tall; branchlets sparsely appressed pubescent to glabrescent. Leaves uniformly spaced; stipules small; petiole 2–5.5 cm, sparsely pilose to glabrous, apex with 2 subulate glands; leaf blade broadly elliptic, 9–16 × 3.5–6 cm, thinly leathery or papery, both surfaces glabrous, adaxially verruculose, base cuneate, margin entire or obscurely undulate-crenulate, apex acute to acuminate, rarely obtuse; basal veins 3, lateral veins ca. 6, delicate. Inflorescences axillary or terminal, panicles, to 21 cm, bisexual, bracts subulate, ca. 2.5 mm, villous. Male flowers: pedicel delicate, 3–7 mm, glabrous; sepals obovate, 1–2 mm, apex rounded, glabrous; petals broadly spatulate, ca. 3.5 × 2 mm, white, membranous, clawed, apex rounded; disk cupular, ca. 0.5 mm high; stamens 3; filaments connate for ca. 2 mm, free part to 0.5 mm. Female flowers: pedicels clavate, 1–1.5 cm, glabrous; sepals 5, ovate, ca. 3 mm, exterior sparsely villous; petals as in male, ca. 7 mm; disk

cupular, ca. 0.5 mm high, margins undulate or entire; ovary glabrous; styles free, ca. 1 mm; stigmas bifid, divaricate. Fruiting pedicels clavate, to 2.8 cm; capsules ca. 1 cm in diam., glabrous. Seeds elliptic, ca. 6 mm in diam., brown with stripes of gray-white spots. Fl. Apr–May, fr. Jun–Aug.

Montane thickets; 500–600 m. S Guangxi [N Thailand].

5. *Trigonostemon thyrsoides* Stapf, *Bull. Misc. Inform. Kew* 1909: 264. 1909.

长梗三宝木 chang geng san bao mu

Shrubs or treelets, 1–6 m tall; branches puberulent to glabrous. Leaves uniformly spaced; petiole 4–12 cm, glabrous, with 2 conical glands at apex; leaf blade obovate-elliptic or oblong-elliptic to lanceolate, [10.5–]16–32 × 3.5–12 cm, papery, both surfaces glabrous, brownish when dry, base broadly cuneate to rounded, margins obscurely sparsely glandular-serrate, apex acute to shortly acuminate; lateral veins 8–13. Inflorescences terminal, pyramidal thyrses, to 20 cm, brown pubescent. Male flowers: sepals 5, ovate, ca. 1.5 mm, exterior pilose; petals 5, oblong, yellow, glabrous, 3–4 × 1.8–2 mm; disk glands 5; stamens 5; filaments connate; connectives conspicuously produced, erect, emarginate. Female flowers: sepals and petals as in male, but larger; disk cupular, 5-lobed; ovary glabrous; styles 3, short, shallowly bifid. Fruiting pedicels ca. 3 cm; capsules ca. 1.5 cm in diam., deeply longitudinally 3-grooved, sparsely and very shortly aculeolate. Seeds ellipsoidal, with stripes of gray spots. Fl. Apr–Jul, fr. Jun–Sep.

Dense forests; 600–1000 m. Guangxi, Guizhou, S Yunnan [Laos, Myanmar, N Thailand, Vietnam].

6. *Trigonostemon bonianus* Gagnepain, *Bull. Soc. Bot. France* 69: 747. 1923.

勐仑三宝木 meng lun san bao mu

Trigonostemon filipes Y. T. Chang & X. L. Mo; *T. kwangsiensis* Handel-Mazzetti; *T. kwangsiensis* var. *viridulus* H. S. Kiu; *T. lii* Y. T. Chang; *T. petelotii* Merrill.

Shrubs or treelets, 2–4 m tall; young branches puberulent, glabrous at maturity; leaf blade narrowly elliptic to oblong-lanceolate, 10–17 × 2.5–5 cm, papery, glabrous on both surfaces, base cuneate, margin entire or sparsely serrulate, apex acuminate to caudate-acuminate, acumen obtuse; veins from base 3, lateral veins 3–5. Racemes terminal, spreading, to 15 cm, puberulent; bracts linear, 3–10 cm. Male flowers ca. 6 mm in diam.; sepals 5, lanceolate; petals yellow. Female flowers: sepals lanceolate, 5–6 mm; petals elliptic, ca. 1.2 cm, yellow; ovary glabrous; styles 3, short; stigmas capitate. Fruits not seen. Fl. May.

Fl. China 11: 272–274. 2008.

Open forests; 500–700 m. S Yunnan [Vietnam].

7. **Trigonostemon chinensis** Merrill, Philipp. J. Sci. 21: 498. 1922.

三宝木 san bao mu

Trigonostemon chinensis f. *fungii* (Merrill) Y. T. Chang; *T. fungii* Merrill; *T. harmandii* Gagnepain; *T. huangmosu* Y. T. Chang; *T. leucanthus* Airy Shaw var. *hainanensis* H. S. Kiu; *T. wui* H. S. Kiu.

Shrubs 2–4 m tall; young branches with densely yellow-brown pubescence, glabrescent at maturity. Petiole 1–2 cm, hispidulous to glabrescent, with 2 conical glands; leaf blade obovate-elliptic to oblong, 8–18 × 3–5.5 cm, thinly papery, hirsute or villous on both surfaces when young, glabrous or glabrescent at maturity, usually densely tuberculate adaxially, base cuneate to rounded, margins entire or obscurely serrulate at upper part, apex acute, usually attenuate into cauda; lateral veins 6–8. Racemes terminal, 9–18 cm, branching, spreading, pilose or hispidulous to glabrescent. Male flowers: pedicel delicate, 2–5 mm; sepals 5, oblong, ca. 1.2 mm, pilose; petals obovate, 5–6.5 mm, yellow; disk annular; stamens 3; filaments connate at and below middle, free at upper part. Female flowers: pedicel clavate, 1–15 cm; sepals 5, lanceolate, unequal, 5–6 mm, exterior pilose; petals obovate, ca. 12 mm, yellow; ovary glabrous; styles 3, short; stigmas subcapitate. Capsules subglobose, ca. 1.2 cm in diam., glabrous, with 3 longitudinal grooves. Fl. Jan–Sep, fr. May–Nov.

Dense forests, riverside thickets; 400–600 m. Guangdong, S Guangxi, Hainan [Vietnam].

8. **Trigonostemon fragilis** (Gagnepain) Airy Shaw, Kew Bull. 32: 415. 1978.

黄花三宝木 huang hua san bao mu

Poilaniella fragilis Gagnepain, Bull. Soc. Bot. France 72: 467. 1925; *Trigonostemon lutescens* Y. T. Chang & J. Y. Liang.

Shrubs ca. 1 m tall; young branches, petiole, and inflorescences uniformly densely spreading tawny pubescent, glabrescent. Leaves uniformly spaced; petiole 1–3 cm; leaf blade elliptic to oblong, 15–23 × 6–8.5 cm, papery, pubescent to glabrous on both surfaces, base broadly cuneate to rotund, margin entire or sparsely serrulate, apex acuminate, sometimes long acuminate; lateral veins 8–10. Panicles terminal, to 25 cm; bracts lanceolate, 3–5 mm. Male flowers: sepals 5, ovate, ca. 2 mm, exterior sparsely hairy; petals yellow, orange when dry, obovate, 3–5 mm, hooked; stamens 3. Female flowers: sepals lanceolate, 5–7, exterior pubescent; petals yellow, orange when dry, obovate-elliptic, ca. 8 × 4–5 mm, hooked; disk annular; ovary glabrous; styles 3; stigmas capitate. Capsules subglobose, ca. 1 cm, glabrous. Fl. Apr–May, fr. Jun–Aug.

Thickets on limestone; 500–600 m. S Guangxi, Hainan [Vietnam].

Fl. China 11: 272–274. 2008.