

## 45. CROTON Linnaeus, Sp. Pl. 2: 1004. 1753.

巴豆属 ba dou shu

Li Bingtao (李秉滔 Li Ping-tao); Hans-Joachim Esser

*Tridesmis* Loureiro.

Trees or shrubs, rarely subshrubs, monoecious or more rarely dioecious; latex clear or reddish, often scanty or apparently absent; indumentum of stellate hairs and/or peltate scales. Leaves alternate, rarely opposite or nearly verticillate; stipules present or absent; petiole with or without apical paired glands; leaf blade simple, margin entire or denticulate, often with glands; venation pinnate or palmate. Inflorescences terminal or axillary, racemelike thyrses, often with proximal solitary female flowers and distal male flowers, often in clusters. Male flowers: sepals mostly 5, imbricate to valvate, free; petals 5, smaller or nearly equal to sepals; disk glandular, usually 5, and opposite sepals; stamens 10–20; filaments free, inflexed in bud; anthers muticous; pistillode absent. Female flowers: sepals 5, often narrower than in male, imbricate to reduplicate-valvate, persistent, sometimes accrescent; petals 5, smaller than in male, mostly reduced or obsolete; disk annular or dissected, receptacle often villous; ovary 3-locular; ovules 1 per locule; styles 3, longer and slender, free or nearly so, once to several times bifid. Fruit a capsule dehiscing into 3 2-valved cocci, more rarely ± indehiscent and fleshy, drupelike or berrylike. Seeds usually smooth, carunculate; testa crustaceous; endosperm copious, fleshy; cotyledon broad and flattened.

Nearly 1300 species: tropics and subtropics of the world, most numerous in the neotropics; 23 species (15 endemic) in China.

Many species are used medicinally. Several are extremely toxic. *Croton moonii* Thwaites (瘤果巴豆 liu guo ba dou), native to Sri Lanka, is cultivated for medicine in S Guangdong.

- 1a. Young branches, inflorescences, and fruits with appressed membranous peltate scales.
  - 2a. Leaf blade leathery; capsule ovoid-ellipsoid or oblong, 2.5–3.5 cm ..... 1. *C. joufra*
  - 2b. Leaf blade papery or thinly papery; capsule subglobose, 0.4–1 cm.
    - 3a. Leaf margins serrate, both surfaces olivaceous when dry, abaxially sparsely scaly ..... 2. *C. mangelong*
    - 3b. Leaf margins entire, glaucous-gray to gray-brown when dry, abaxially densely scaly.
      - 4a. Leaf blade 3-veined from base, adaxially sparsely hairy; styles bifid ..... 3. *C. kongensis*
      - 4b. Leaf blade pinnately veined, adaxially glabrous; styles 4–8-fid ..... 4. *C. cascarilloides*
- 1b. Young branches stellate-hairy, stellate-scaled, or subglabrous.
  - 5a. Leaf blade palmately 3–5(–7)-veined.
    - 6a. Leaf blade palmately (3–)5(–7)-veined.
      - 7a. Leaf blade papery, abaxially glabrescent, glands at apex of petioles stalked ..... 5. *C. euryphyllus*
      - 7b. Leaf blade thinly leathery, abaxially persistently densely stellate-hairy, glands sessile or stalked.
        - 8a. Leaf blade rotund to broadly ovate, glabrescent adaxially, basal glands sessile; fruits sparsely stellate-pubescent ..... 6. *C. yunnanensis*
        - 8b. Leaf blade ovate, rarely ovate-elliptic, sparsely stellate-pubescent adaxially, glands at apex of petioles stalked; fruits with densely waxy-yellow scurfy hairs ..... 7. *C. yanhuii*
    - 6b. Leaf blade palmately 3(–5)-veined.
      - 9a. Bract margins with linear-lanceolate teeth, apex of teeth with capitulate glands; styles 4-lobed ..... 8. *C. crassifolius*
      - 9b. Bract margins entire; styles 2-lobed.
        - 10a. Glands of leaf base or petiole apex cupular, stalked.
          - 11a. Young branches, leaves, and inflorescences with purple-brown or purplish waxy stellate pubescence, older leaves glabrous ..... 9. *C. purpurascens*
          - 11b. Young branches, leaves, and inflorescences with yellow-gray stellate hairs, older leaves persistently so.
            - 12a. Leaf margins denticulate, leaf blade petiolar glands short and broad ..... 10. *C. lachnocarpus*
            - 12b. Leaf margins double-serrate, leaf blade basal glands longer and slender ..... 11. *C. cnidophyllus*
        - 10b. Glands of leaf base or petiole apex discoid, sessile.
          - 13a. Shrubs scandent; young branches and older leaves hispid; petiole to 1.5 cm, apex with glands; fruits globose ..... 12. *C. caudatus*
          - 13b. Shrubs or treelets; young branches sparsely stellate-hairy, older leaves glabrous; petiole 2.5–10(–14) cm; fruits ellipsoidal.
            - 14a. Leaves papery, 2–7 cm wide, glands on base; male sepals glabrous at apex ..... 13. *C. tigilium*
            - 14b. Leaves thinly leathery, 7–14 cm wide; glands on petiole apex; male sepals woolly ..... 14. *C. damayeshu*
      - 5b. Leaf blade pinnately veined.
        - 15a. Ovary and fruits glabrous; leaf blade papery, basal glands sessile and cupular ..... 15. *C. chunianus*

- 15b. Ovary and fruits with stellate hairs or stellate scale-hairs; leaf blade basal glands sessile or cupular.
- 16a. Leaf blade base or petiole apex with sessile, flat, or cupular glands.
- 17a. Inflorescences glabrous; female petals filamentous or absent.
- 18a. Leaves thinly leathery, abaxially with scurfy stellate hairs; petioles with cupular glands at apex ..... 20. *C. laniflorus*
- 18b. Leaves papery, glabrous on both surfaces, base with flat glands ..... 21. *C. dinghuensis*
- 17b. Inflorescences hairy; female petals present, oblong.
- 19a. Young branches and inflorescences with densely scurfy stellate scale-hairs; leaves glaucous-gray, base with semiorbicular glands ..... 22. *C. laevigatus*
- 19b. Young branches and inflorescences densely stellate-pubescent; leaves yellow-brown when dry, base with cupular glands ..... 23. *C. laui*
- 16b. Leaf blade base or petiole apex with stalked and cupular glands.
- 20a. Leaf blade not olivaceous-green when dry, abaxially glabrous or tomentose.
- 21a. Young branches and inflorescences with stellate scale-hairs; leaves papery, oblong-lanceolate, glabrous on both surfaces; petiole short, less than 1 cm ..... 18. *C. hancei*
- 21b. Young branches and inflorescences stellate-tomentose; leaves thickly papery, long elliptic to oblong-elliptic, tomentose abaxially; petiole 1–6 cm ..... 19. *C. merrillianus*
- 20b. Leaf blade olivaceous-green when dry, abaxially glabrous.
- 22a. Young branches sparsely stellate-hairy; leaves smaller, 3–7 cm, margin entire, base with glands; petiole less than 1 cm ..... 16. *C. howii*
- 22b. Young branches with appressed stellate hairs; leaves 7–14 cm, margin denticulate; petiole more than 1 cm, with glands at apex.
- 23a. Leaf blade base cuneate, equilateral ..... 17. *C. lauioides*
- 23b. Leaf blade base rounded or unequally cordate ..... *C. moonii* (see note above)

**1. *Croton joufra*** Roxburgh, Fl. Ind., ed. 1832, 3: 685. 1832.

长果巴豆 chang guo ba dou

*Croton caryocarpus* Croizat.

Trees up to 18 m tall; indumentum with stellate scales; branches rather stout. Petioles 1.5–6 cm, apex with 2 cupular glands; leaf blade oblong, elliptic, or ovate-lanceolate, 10–25 × 2.5–8 cm, leathery, quite glabrous when old, base obtuse, margin entire or remotely repand-serrate, apex acuminate; lateral veins ca. 10. Inflorescence terminal, 10–25 cm, stellate-scaly. Male flowers: sepals 5, ovate-triangular, ca. 2 mm, stellate-scaly; petals 5, ovate-triangular, ca. 2 mm, puberulent; stamens 11 or 12; filaments villous. Female flowers: pedicels shorter; sepals 5, triangular, ca. 2.5 mm; petals reduced; disk annular; ovary ovoid; styles 3, 2-partite, slender. Capsules ovoid-ellipsoid or oblong, 2.5–3.5 cm, obscurely lobed. Seeds ca. 1.2 cm. Fl. and fr. almost throughout year.

Evergreen or mixed forests; below 1000 m. SE Yunnan (Jinping) [Bangladesh, Bhutan, India, Myanmar, Vietnam].

**2. *Croton mangelong*** Y. T. Chang, Guihaia 3: 172. 1983.

曼哥龙巴豆 man ge long ba dou

?*Croton oblongifolius* Roxburgh (1832), not Delile (1812); ?*C. roxburghii* N. P. Balakrishnan (1962), not Wallich (1840).

Trees up to 10 m tall; indumentum of appressed peltate scales; branches with dense scale-glands, these gradually deciduous. Petiole 1–3.5 cm; leaf blade elliptic, 10–14 × 4–6 cm, papery, both surfaces olivaceous, only abaxial surface with sparse scales, base broadly cuneate to rounded, base of midrib with 2 abaxial discoid glands, margins glandular-serrate, apex mucronate, mucro obtuse; lateral veins 10–13. Inflorescence terminal

or axillary, 15–30 cm, many flowered. Male flowers to 5 mm in diam.; sepals 5, ovate, or ovate-oblong ca. 5 mm, with dense scale-glands; petals oblong, slightly larger than sepals, densely woolly; stamens 10–15, 2–3 × as long as sepals. Female flowers: sepals 5, long triangular, ca. 2 mm; petals 5, linear-oblong, ca. 2 mm; ovary ovoid, puberulent; styles 3, bifid almost to base and spreading. Capsules subglobose, ca. 1 × 0.9 cm. Fl. Jan–Mar, fr. Jul–Oct.

• Dense forests; 500–600 m. S Yunnan (Gengma) [see comment below].

*Croton mangelong* is very closely related to, possibly conspecific with, the widespread species currently known as *C. roxburghii* N. P. Balakrishnan, which otherwise lacks a legitimate name. If this is true it would extend the distribution of *C. mangelong* to Bangladesh, Cambodia, India, Laos, Myanmar, Thailand, and Vietnam.

There has been confusion with *Croton persimilis* Müller Argoviensis, a much smaller-leaved species restricted to S India and Sri Lanka, and both with species 22 of this account, *C. laevigatus*, and with *C. delpyi* Gagnepain, from Indochina, Malaysia, and Thailand, which have stellate hairs rather than the membranous scales characteristic of *C. mangelong*.

**3. *Croton kongensis*** Gagnepain, Bull. Soc. Bot. France 68: 555. 1922.

越南巴豆 yue nan ba dou

*Croton tonkinensis* Gagnepain.

Shrubs 1–5 m tall; indumentum of densely glaucous gray to grayish brown and appressed deeply fimbriate peltate scales/stellate hairs; older branches glaucous-gray, scales gradually deciduous. Petioles 1–3(–5) cm, apex with 2 cupular glands; leaf blade ovate to elliptic-lanceolate, 5–14 × 2–7 cm, papery, abaxially glaucous-gray to gray-brown, adaxially

usually dark brown when dry, with smaller scale-glands, base rounded to broadly cuneate, margins entire, apex acuminate, rarely shortly acuminate; basal veins 3, lateral veins 3–5, arcuately ascending, anastomosing before margins. Inflorescence terminal, 5–15 cm; bracts ovate-lanceolate, 2–3 mm. Male flowers: sepals ovate, ca. 1.5 mm, with scale-glands; petals long elliptic to linear, ca. 2 mm, margins woolly; stamens 12; filaments with woolly lower parts. Female flowers: sepals lanceolate, ca. 2.5 mm, with scales; ovary subglobose, with scale-glands; styles 2-lobed. Capsules subglobose, 4–6 mm, ovoid, ca. 3.5 mm, dark red. Fl. and fr. almost throughout year.

Open forests; near sea level to 2000 m. Hainan (near sea level to 100 m), Yunnan (700–2000 m) [Laos, Myanmar, Thailand, Vietnam].

**4. *Croton cascarilloides*** Raechel, Nomencl. Bot. 280. 1797.

银叶巴豆 yin ye ba dou

*Croton punctatus* Loureiro, Fl. Cochinch. 2: 581. 1790, not Jacquin (1787); *C. cascarilloides* f. *pilosus* Y. T. Chang; *C. cochinchinensis* Smith; *C. cumingii* Müller Argoviensis; *C. pierrei* Gagnepain.

Shrubs 1–2 m tall; indumentum of appressed, rounded, subhyaline, and membranous peltate scales; branches with stouter wrinkles. Leaves usually densely clustered at apex of branchlets; stipules subulate, caducous; petiole 1.5–3 cm; leaf blade lanceolate, oblanceolate, or elliptic to obovate-elliptic, 8–14(–23) × 2–5(–10) cm, thinly papery, glaucous-gray or brownish scale-glands persistent abaxially, adaxial scales deciduous, base attenuate, obtuse, or slightly cordate, with 2 discoid glands, apex acuminate, acute, rotund, or retuse; venation pinnate, lateral veins 8–12, arcuately ascending, anastomosing before margins. Inflorescence terminal, 1–4 cm, spikelike; bracts caducous. Male flowers: sepals ovate, white ciliate; petals obovate, ca. 2 mm, white-ciliate; stamens 15–20; filaments white pubescent. Female flowers: sepals and petals as in male; ovary and styles with dense scales; styles 4–8-fid, lobes filamentous. Capsules subglobose, ca. 7 mm in diam. Seeds ellipsoidal, ca. 4 mm. Fl. and fr. almost throughout year.

Seashores, stream bank thickets, sparse forests; below 500 m. Fujian (Xiamen), Guangdong, Guangxi, Hainan, Taiwan, Yunnan [Indonesia, Japan, Laos, Malaysia, Myanmar, Philippines, Thailand, Vietnam].

**5. *Croton euryphyllus*** W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 13: 159. 1921.

石山巴豆 shi shan ba dou

*Croton caudatiformis* Handel-Mazzetti; *C. cavaleriei* Gagnepain.

Shrubs or treelets 3–6 m tall; indumentum stellate-pubescent, mostly very quickly deciduous; branches yellowish brown. Stipules linear, 7–8 mm, caducous; petiole 1.5–7 cm, apex with 2 stalked glands; leaf blade rotund to broadly ovate, 6.5–8.5 × 6–8 cm, papery, base cordate, rarely broadly cuneate, margins with scabrous, obtuse serration, sometimes interserratures with stalked glands, apex shortly acuminate or

obtuse, sometimes caudate; basal veins (3–)5(–7), lateral veins 3–5 pairs, arcuately ascending, anastomosing near margins. Inflorescences to 15 cm, sometimes branching at base; bracts linear-triangular, 2–3 mm, glabrescent, caducous; pedicels 1–3 mm; buds pubescent at apex. Male flowers: sepals lanceolate, ca. 2.5 mm; petals smaller than sepals, margins woolly; stamens ca. 15, glabrous. Female flowers: sepals lanceolate, ca. 3 mm; petals small, subulate; ovary densely stellate-pubescent; styles bifid, glabrescent. Capsules subglobose, 1.2–1.5 × ca. 1.2 cm, densely stellate-pubescent. Seeds ellipsoidal, dark gray-brown. Fl. Apr–May, fr. Jun–Sep.

• Open forests; 200–2400 m. Guangxi, S Guizhou, S Sichuan, Yunnan.

**6. *Croton yunnanensis*** W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 13: 159. 1921.

云南巴豆 yun nan ba dou

*Croton duclouxii* Gagnepain; *C. yunnanensis* var. *megadontus* W. T. Wang.

Shrubs 1–3 m tall; indumentum grayish yellow stellate-tomentose; branches subglabrous, gray-brown. Petiole 1–4 cm, densely stellate-hairy; leaf blade rotund, 5–9 × 4–7 cm, thinly leathery, abaxially densely stellate-tomentose, adaxially glabrescent, margins irregularly serrulate, base of midrib with 2 sessile cupular glands; basal veins 5. Inflorescence terminal, 10–15 cm. Male flowers: sepals elliptic, pubescent outside; petals oblong, apex woolly; stamens 12; filament bases pubescent. Female flowers: sepals ovate-lanceolate, ca. 5 × 2 mm, stellate-hairy outside, glabrous inside; petals oblong, smaller than sepals, woolly; ovary subglobose, densely stellate-hairy. Capsules ovoid-globose, 7–8 × 6–7 mm, stellate-puberulent. Seeds ellipsoidal, 5–6 × ca. 4 mm, smooth, with brown spot-stripes. Fl. Aug–Sep, fr. Sep–Oct.

• Montane scrub or sparse forests; 1000–2200 m. SW Sichuan, W Yunnan.

**7. *Croton yanhuai*** Y. T. Chang, Acta Phytotax. Sin. 24: 146. 1986.

延辉巴豆 yan hui ba dou

Shrubs or treelets to 5 m tall; indumentum of dense waxy-yellow scurfy hairs; older branches glabrous. Petiole 1–2.5 cm, apex with 2 stalked glands; leaf blade ovate, rarely ovate-elliptic, 8–12 × 4.5–6.5 cm, thinly leathery, both surfaces densely stellate-tomentose when young, abaxially persistent, adaxially later sparsely so, base rounded, rarely broadly cuneate, margin subentire, apex acuminate; basal veins (3–)5, lateral veins 2–4, arcuately ascending, anastomosing near margins. Flowers not seen. Infructescence 3–6-fruited; persistent sepals triangular, both surfaces stellate-hairy. Fruiting pedicel 1–2 mm; capsule ellipsoidal, 1.2–1.4 × 1–1.2 cm. Seeds ellipsoidal, ca. 8 × 6 mm, smooth, with brown spot-stripes. Fr. Sep.

• Densely forested slopes; ca. 1000 m. S Yunnan (Xishuangbanna).

**8. *Croton crassifolius*** Geiseler, *Croton*. Monogr. 19. 1807.

鸡骨香 *ji gu xiang*

*Croton chinensis* Benth (1861), not Geiseler (1807); *C. kroneanus* Miquel; *C. tomentosus* (Loureiro) Müller Argovien-sis (1865), not Link (1822); *Tridesmis hispida* Loureiro (1790), not *Croton hispida* Kunth (1817); *T. tomentosa* Loureiro.

Shrubs 20–50 cm tall; indumentum stellate-tomentose; older branches subglabrous. Stipules subulate, 2–3 mm, caducous. Petiole 2–4 cm, apex or base of midrib with 2 stalked and cupular glands; leaf blade ovate, ovate-elliptic, or oblong, 4–10 × 2–6 cm, adaxial hairs gradually deciduous, but persistent hairs rugged, base rotund to slightly cordate, margins obscurely serrulate, sometimes glandular between teeth, apex obtuse to shortly acuminate; basal veins 3(–5), lateral veins (3 or)4 or 5. Inflorescence terminal, 5–10 cm; bracts linear, 2–4 mm, margins linear-lacerate, glandular-serrate. Male flowers: sepals ca. 2.5 × 1.5 mm, stellate-tomentose outside; petals oblong, about as long as sepals, margins woolly; stamens 14–20. Female flowers: sepals as in male; ovary densely yellow-tomentose; styles 4-parted, lobes linear. Capsule subglobose, ca. 1 cm in diam. Seeds ellipsoidal, brown, ca. 5 mm. Fl. Nov–Jun, fr. Feb–Sep.

Scrubby slopes, wastelands, hillside thickets; 100–800 m. Fujian, Guangdong, Guangxi, Hainan [Laos, Myanmar, Thailand, Vietnam].

The roots are used medicinally.

**9. *Croton purpurascens*** Y. T. Chang, *Acta Phytotax. Sin.* 24: 144. 1986.

淡紫毛巴豆 *dan zi mao ba dou*

*Croton yangchunensis* H. G. Ye & N. H. Xia.

Shrubs or treelets 1–6 m tall; indumentum purple-brown or purplish waxy stellate-pubescent; branches glabrous. Petiole 1.5–5 cm, apex with 2 stalked and cupular glands; leaf blade thinly leathery, oblong-elliptic or elliptic-ovate, 5–13 × 2.5–5 cm, black when dried young, major veins sparsely stellate-pubescent when young, glabrescent, base rounded, margin entire, apex acute to acuminate; basal veins 3, lateral veins 3–5 pairs, arcuately ascending, anastomosing near margins. Inflorescence terminal, 7–20 cm, proximal 4–6 flowers female, others male. Male flowers: bud ovoid, ca. 1.5 mm in diam., apex hairy. Female flowers: sepals 5, oblong-elliptic, ca. 2.5 mm; ovary densely yellow-tomentose; styles 3, bipartite, lobes linear. Capsule subglobose, ca. 8 mm in diam., stellate-hairy. Fl. May–Jun, fr. Jul–Sep.

• Open forest margins, limestone brushwood, rocks on hills and in valleys; 300–800 m. Guangdong (Ruyuan, Yangchun, Yangshan, Yingde).

**10. *Croton lachnocarpus*** Benth, *Hooker's J. Bot. Kew Gard. Misc.* 6: 5. 1854.

毛果巴豆 *mao guo ba dou*

*Croton kwangsiensis* Croizat; *C. lachnocarpus* var.

*kwangsiensis* (Croizat) H. S. Kiu; *Mallotus yifungensis* Hu & Chen.

Shrubs 1–3 m tall; indumentum densely stellate-pubescent, older branches subglabrous. Petiole (1–)2–4(–6) cm, densely stellate-pubescent, apex or base of leaf blade with 2 stalked and cupular glands; leaf blade oblong-elliptic to elliptic-ovate, rarely oblong-lanceolate, 4–10(–13) × 1.5–4(–5) cm, papery, glabrescent or only along nerves with stellate pubescence, slightly rugged adaxially, densely stellate-pubescent abaxially, base rounded to shallowly cordate, margin obscurely serrulate, usually with stalked and cupular glands, apex obtuse or acute to acuminate; basal veins 3, lateral veins 4–6. Inflorescences 1–3, terminal, 6–15 cm; bracts subulate, ca. 1 mm. Male flowers: sepals ovate-triangular, stellate-pubescent; petals oblong; stamens 10–12. Female flowers: sepals lanceolate, 2–4 mm, stellate-pubescent; ovary yellow tomentose; styles linear, 4–6 mm, bifid. Capsules slightly oblate, 6–12 mm in diam., hairy. Seeds ellipsoidal, dark brown, smooth. Fl. Apr–May, fr. Jun–Sep.

Sparsely forested slopes, thickets; 100–900 m. Guangdong, Guangxi, Guizhou, S Hunan, Jiangxi [Laos, Myanmar, Thailand, Vietnam].

**11. *Croton cnidophyllus*** Radcliffe-Smith & Govaerts, *Kew Bull.* 52: 186. 1997.

荨麻叶巴豆 *qian ma ye ba dou*

*Croton urticifolius* Y. T. Chang & Q. H. Chen, *Guihaia* 3: 172. 1983, not Lamarck (1786); *C. cnidophyllus* var. *dui* (Y. T. Chang) Radcliffe-Smith & Govaerts; *C. guizhouensis* H. S. Kiu; *C. urticifolius* var. *dui* Y. T. Chang.

Shrubs 1–2 m tall; indumentum of dense, flat stellate hairs; older branches glabrous. Stipules linear, caducous; petiole 1–1.5 cm; leaf blade ovate or elliptic-ovate, rarely ovate-oblong, 3–7.5 × 1.5–3.5 cm, papery, base rounded to subcordate or caudate, base of midrib with 2 abaxial long-stalked cupular glands, margins sparsely, sometimes coarsely, double-serrate, usually with stalked glands, apex caudate-acuminate or acute; basal veins 3(–5), lateral veins 2 or 3 pairs. Inflorescence terminal, 8–14 cm; bracts subulate, ca. 1.5 mm, deciduous. Male flowers: sepals oblong, stellate-hairy; petals oblong-elliptic, margins woolly; stamens 10–12. Female flowers: sepals oblong-lanceolate, stellate-tomentose, ca. 2.5 mm; ovary densely stellate-hirsute; styles 3, bifid, lobes linear. Capsules subglobose, ca. 1 cm in diam., stellate-tomentose. Fl. Jul–Sep, fr. Sep–Nov.

• Open forests on limestone; 400–700 m. Guangxi, S Guizhou, S Yunnan (Menglian).

**12. *Croton caudatus*** Geiseler, *Croton*. Monogr. 73. 1807.

卵叶巴豆 *luan ye ba dou*

*Croton caudatus* var. *harmandii* Gagnepain; *C. caudatus* var. *malaccanus* J. D. Hooker.

Scandent shrubs 2–3 m tall; indumentum densely stellate-hirsute; branches subglabrous. Petiole 0.5–1.5 cm, apex with 2 discoid glands; leaf blade ovate, 4–6 × 3.5–4.5 cm,

papery, abaxially densely stellate hairy, adaxially sparsely ruggedly stellate hairy, base broadly cuneate to rounded, often with pair of stalked glands, margins obscurely serrulate, sometimes with glands, apex acute, sometimes caudate-acuminate; basal veins 3(–5), lateral veins 3(or 4) pairs. Inflorescence terminal, 8–16 cm; bracts linear, ca. 2 mm, densely stellate-hairy. Male flowers: sepals ovate, ca. 2.5 mm, densely stellate-hairy; petals oblong, as long as sepals, margins white woolly; stamens ca. 20; filament bases densely white woolly. Female flowers: sepals ovate, ca. 3 mm, densely stellate-hairy outside; petals oblong, smaller than sepals; ovary densely hispid; styles bifid, linear. Fruits globose, ca. 1 cm in diam., densely yellow-brown stellate-hispid. Fl. May–Aug, fr. Jul–Oct.

Montane sparse forests; 500–600 m. SW Yunnan [Bangladesh, Bhutan, Brunei, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Thailand, Singapore, Sri Lanka, Vietnam; N Australia].

**13. *Croton tigilium*** Linnaeus, Sp. Pl. 2: 1004. 1753.

巴豆 ba dou

*Alchornea vaniotii* H. Léveillé; *Croton birmanicus* Müller Argovensis; *C. himalaicus* D. G. Long; *C. xiaopadou* H. S. Kiu.

Treelets up to 7 m tall; indumentum of stellate hairs; young branches green, sparsely stellate-hairy, glabrous at maturity. Stipules subulate, 1.5–4 mm, caducous; petiole 2.5–6 cm, subglabrous; leaf blade ovate, ovate-elliptic, or ovate-lanceolate, 5–15 × 2–7 cm, papery, glabrous or glabrescent, yellowish to brownish when dry, base cuneate or broadly so, rounded, rarely slightly cordate, with discoid glands, margins serrulate or sub-entire, apex acute or acuminate, sometimes long acuminate or caudate-acuminate; basal veins 3(–5), lateral veins 3 or 4. Racemes terminal, 8–20 cm; bracts subulate, ca. 2 mm. Male flowers: bud subglobose, sparsely stellate-hairy or glabrescent. Female flowers: sepals oblong-lanceolate, ca. 2.5 mm, glabrescent; ovary densely stellate-hairy; styles bipartite. Capsules ellipsoidal, oblong-ovoid, or subglobose, 1–2 × 1–2 cm, sparsely stellate-hairy or glabrescent. Seeds elliptic or oblong-ovate, 8–12 × 6–7 mm, gray-brown. Fl. Jan–Jul, fr. May–Sep.

Montane sparse forests, limestone shrublands; 300–700 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Jiangsu, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [Bangladesh, Bhutan, Cambodia, India, Indonesia, Japan, Malaysia, Myanmar, Nepal, Philippines, Thailand, Sri Lanka, Vietnam].

The seed oil contains croton, tiglic and crotonic acid, and crotonoside, and is very poisonous, being a drastic purgative and often causing pustular eruptions on the skin. The seeds are used to stupefy fish. The root and leaves are used as an external medicine for rheumatism and also as an insecticide.

The name "*Croton tigilium* var. *xiaopadou*" (Y. T. Chang & S. Z. Huang, Wuyi Sci. J. 2: 23. 1982) was not validly published because two gatherings were indicated as types (*Vienna Code*, Art. 37.2). The name was later validated, at species rank, by H. S. Kiu (*J. Trop. Subtrop. Bot.* 6: 103. 1998).

**14. *Croton damayeshu*** Y. T. Chang, Acta Phytotax. Sin. 24: 143. 1986.

大麻叶巴豆 da ma ye ba dou

Treelets to 7(–10) m tall; young branches with sparse, very quickly deciduous stellate hairs. Petiole 4–10(–14) cm, apex with 2 discoid glands; leaf blade ovate-elliptic, (10–)14–20(–30) × 7–10(–14) cm, thinly leathery, both surfaces glabrous, base broadly cuneate or rotund, apex acute to acuminate or caudate-acuminate; basal veins 3, lateral veins 4 or 5. Inflorescence terminal, erect or slightly sloping, to 15 cm, sparsely stellate-pubescent, glabrescent; bracts narrowly ovate to linear, 1–3 mm, caducous; flowers usually 3–5(–9) per bract, proximal clusters bisexual with central female flower, distal clusters all male. Male flowers: pedicels slender, 2–4 mm, glabrous; sepals 5, 1.5–2 mm, woolly at apex; petals 5, as large as sepals, glabrous outside, woolly inside; stamens numerous. Female flowers: pedicels ca. 2 mm, stellate-tomentose; sepals and petals as in male; ovary densely yellow tomentose; styles 3, bifid, lobes linear, black when dry, glabrous. Capsules ellipsoidal, ca. 2 × 1.8 cm, with sparsely appressed stellate hairs. Seeds ellipsoidal, 1.4–1.6 × ca. 1 cm, smooth. Fl. Jun–Aug, fr. Aug–Oct.

• Montane sparse forests; 1000–1800 m. S Yunnan.

**15. *Croton chunianus*** Croizat, J. Arnold Arbor. 21: 497. 1940.

光果巴豆 guang guo ba dou

Shrubs ca. 2 m tall; indumentum of flattened stellate hairs; branches glabrous at maturity. Leaves clustered toward stem apex; petiole 5–10(–25) mm, with sparse stellate hairs; leaf blade elliptic-oblong to obovate-lanceolate, 8–14 × 2–4 cm, papery, glabrous except sometimes for sparsely stellate-hairy abaxial midrib when young, base attenuate to obtuse, base of midrib with sessile cupular glands, margin entire or with obscure serration, apex acuminate; venation pinnate. Inflorescence terminal, ca. 6 cm. Male flowers: sepals elliptic, 3–4 mm, stellate-hairy outside; petals obovate, ca. 3 mm, woolly; stamens ca. 14. Female flowers: sepals ovate-elliptic, ca. 3 mm, sparsely stellate-hairy or glabrescent; ovary subglobose, ca. 3 mm in diam., glabrous; styles bipartite. Capsules subglobose, ca. 8 mm in diam., glabrous. Seeds elliptic, ca. 6 mm. Fl. Jan–Jun, fr. May–Aug.

• Dense forests; 300–600 m. Hainan (Baoting, Ledong).

**16. *Croton howii*** Merrill & Chun ex Y. T. Chang, Acta Phytotax. Sin. 27: 147. 1987.

宽昭巴豆 kuan zhao ba dou

Shrubs 1–4 m tall; indumentum sparse, of spreading stellate hairs; branches glabrous. Petiole 2–10 mm, glabrescent; leaf blade ovate-lanceolate, lanceolate, or elliptic to obovate-elliptic, 3–7 × 1–2.5 cm, papery, usually olivaceous-green when young and dry, glabrous, base broadly cuneate, base of midrib usually with stalked glands, sometimes glands obscure, margin entire, apex acute to acuminate. Inflorescence terminal, 1–3 cm; bracts ovate-lanceolate. Male flowers: sepals ovate-oblong, ca. 2 mm, only woolly at apex; petals lanceolate, 2–2.5 mm, margins woolly; stamens 8–10; filaments woolly at base.

Female flowers: sepals oblong-elliptic, ca. 2 mm, sparsely stellate-hairy or glabrescent; ovary stellate-hairy; styles bifid at apex. Capsules subglobose, ca. 8 mm in diam. Seeds ca. 6 mm, with brownish spot-stripes. Fl. and fr. almost throughout year.

- Dense forests or shrublands; 500–700 m. Hainan.

**17. *Croton lauioides*** Radcliffe-Smith & Govaerts, Kew Bull. 52: 187. 1997.

榄绿巴豆 lan lü ba dou

*Croton olivaceus* Y. T. Chang & P. T. Li, Guihaia 8: 54. 1988, not Müller Argoviensis (1866); *C. sanyaensis* Z. L. Xu, nom. illeg. superfl.

Shrubs or treelets ca. 5 m tall; indumentum of purplish brown appressed stellate hairs; young branches glabrous. Stipules linear, caducous; petiole 1–3.5 cm, apex with 2 stalked glands; leaf blade obovate-elliptic to oblanceolate, 7–14 × 2.5–5.5 cm, papery, both surfaces stellate hairy, quickly glabrescent, olivaceous-green adaxially and glaucous abaxially when dried, base cuneate, margins serrulate, apex acute to acuminate; lateral veins 7–9, arcuately ascending, anastomosing before margins. Inflorescence terminal, 3–5 cm, stellate hairy; bracts ovate-triangular, ca. 3 mm, caducous. Male flowers: sepals sparsely stellate-hairy or glabrescent; petals small; filaments white-woolly. Female flowers 1–3 on lower part of inflorescence; sepals ovate-triangular, ca. 3 mm, sparsely and appressed stellate-hairy; ovary yellow tomentose; styles 3, bifid. Fruits not seen. Fl. Jun–Dec.

- Shrublands; 100–300 m. SW Guangdong (Yangchun), S Hainan (Sanya).

**18. *Croton hancei*** Benth, Fl. Hongk. 308. 1861.

香港巴豆 xiang gang ba dou

Shrubs or treelets, ca. 5 m tall; indumentum of appressed stellate hairs; branches glabrous. Leaves clustered at stem apex; petiole 2–5 mm, puberulent; leaf blade oblong-lanceolate, 8–18 × 2–5 cm, papery, both surfaces glabrous, base attenuate to obtuse, base of midrib usually with stalked gland, margins entire or serrulate, apex acuminate. Inflorescence terminal, ca. 3 cm; bracts small. Male flowers many per bract; bud globose, ca. 2 mm in diam.; pedicel short; sepals ovate; petals narrow and small; stamens 16; filaments woolly. Female flowers usually solitary at base of inflorescence; sepals oblong, 4–5 mm; ovary subglobose, densely pubescent; styles 3, connate to below middle, upper part bifid. Fruits not seen. Fl. Jun–Aug.

- Dense forests; 500–600 m. Guangdong, Guangxi.

**19. *Croton merrillianus*** Croizat, J. Arnold Arbor. 21: 498. 1940.

厚叶巴豆 hou ye ba dou

Shrubs 1.5–3 m tall; indumentum dense, stellate-tomentose; branches glabrescent. Leaves clustered at stem apex; stipules linear, 5–8 mm; petiole 1–6 cm; leaf blade narrowly elliptic or oblong-elliptic, 11–20(–32) × 3–6(–11) cm, thickly papery, adaxially glabrous, base rounded to slightly cordate, base of midrib with stalked glands, margin entire, revolute

when dry, apex acute to acuminate; lateral veins 8–12, arcuately ascending, anastomosing before margins. Inflorescence terminal, base with several female flowers. Male flowers: sepals ovate, ca. 2 mm, stellate-hairy outside, glabrous inside; petals oblong, glabrous outside, woolly inside; stamens ca. 16; filaments white pubescent. Female flowers: sepals elliptic, 6–7 × 2–3 mm, stellate-hairy outside, glabrous inside, accrescent to 1 cm; petals filamentous, ca. 1.2 mm; ovary subglobose, densely pubescent; styles 3, bipartite. Capsules subglobose, ca. 1 cm in diam., densely stellate-hairy. Seeds ellipsoidal, ca. 7 mm. Fl. Jan–Oct, fr. Apr–Dec.

- Dense forests; 200–700 m. W Guangxi, SW Hainan.

**20. *Croton laniflorus*** Geiseler, Croton. Monogr. 44. 1807.

疏齿巴豆 shu chi ba dou

*Croton lanatus* Loureiro, Fl. Cochinch. 2: 581. 1790, not Lamarck (1786); *C. lasianthus* Persoon, nom. illeg. superfl.; *C. limitincola* Croizat.

Shrubs ca. 1 m tall; indumentum of scurfy stellate hairs; branches glabrous, but with small convexity after hairs deciduous. Stipules subulate, 2–8 mm; petiole 0.5–4 cm, apex with 2 sessile and cupular glands; leaf blade oblong or elliptic, 10–20 × 3–10 cm, thinly leathery, adaxially glabrous, lower part attenuate to cuneate into obtuse or slightly cordate base, margins sparsely serrulate, usually with glands, apex acuminate or acute; lateral veins 9–11. Inflorescence terminal or axillary, to 7 cm. Male flowers: sepals ovate, ca. 3 × 2.5 mm, with appressed stellate hairs; petals obovate, ca. 2 mm, woolly; stamens 13–15, filaments woolly. Female flowers: sepals lanceolate, ca. 4 × 2 mm, with appressed stellate hairs; petals filamentous or absent; ovary with densely scurfy, appressed stellate hairs; styles entire or bifid. Capsules subglobose, ca. 9 mm in diam., with scurfy stellate hairs. Fl. Sep–Nov, fr. Oct–Dec.

- Dense forests; ca. 600 m. Hainan [N Vietnam].

**21. *Croton dinghuensis*** H. S. Kiu, J. Trop. Subtrop. Bot. 6: 101. 1998.

鼎湖巴豆 ding hu ba dou

Treelets 5–8 m tall; young branches sparsely white stellate-hairy. Stipules subulate, 3–5 mm, stellate-hairy; petiole 2–5 mm, glabrous; leaf blade elliptic, 9–15 × 3–6 cm, papery, both surfaces glabrous, dark brown when dry, base broadly cuneate, margins subentire or shallowly undulate, base of midvein/midrib with sessile disciform glands, apex acuminate or long acuminate; venation pinnate, lateral veins 5 or 6. Inflorescence terminal, 5 cm or more, glabrous; bracts lanceolate, ca. 1 mm, bracts with 1 female flower or 1 female and 1 male. Male flowers: pedicels ca. 2 mm; sepals oblong, ca. 1.5 mm, glabrous; petals oblong, ca. 1.3 mm, apex woolly, margins pubescent; stamens 10; filaments glabrous. Female flowers: pedicels 2–3

mm; sepals 5, lanceolate, ca. 2.5 mm, glabrous; petals absent; disk annular; ovary densely white stellate-hairy; styles 3, ca. 3 mm, bipartite, lobes linear. Capsules subglobose, ca. 1 cm in diam., brownish when dry, sparsely stellate-pubescent; sepals persistent, 3–6 mm. Seeds subellipsoid, ca. 6 mm, yellow-brown, with white spot-stripes. Fl. May–Jun, fr. Jul–Oct.

• Open or dense forests in limestone regions; below 100–250 m. Guangdong (Guangzhou, Panyu, Zhaoqing).

**22. *Croton laevigatus*** Vahl, Symb. Bot. 2: 97. 1791.

光叶巴豆 *guang ye ba dou*

Shrubs or trees, up to 15 m tall; indumentum with dense, appressed stellate hairs; branches glabrescent, older branches silvery gray. Leaves clustered at stem apex; stipules subulate, 2–3 mm, caducous; petiole 1–5 cm; leaf blade elliptic or oblong-elliptic to oblanceolate, 7–25 × 3–9 cm, papery, abaxially with sparse stellate hairs, glaucous-gray when dried, adaxially glabrescent, base attenuate, base of midrib with abaxial sessile semiorbicular glands, margins subentire, usually with glands, bilateral apex acuminate. Inflorescences terminally clustered, 10–30 cm, persistently hairy. Male flowers: sepals ca. 2 mm, densely and appressed stellate-hairy; petals oblong, ca. 2 mm, margins woolly; stamens 12–15. Female flowers: sepals as in male; petals small; ovary with densely appressed stellate hairs. Capsules obovoid or trigonous, ca. 10 × 8 mm, densely hairy. Fl. Oct–Dec, fr. Dec–Mar.

• Dense or open forests; below 100–600 m. Hainan.

**23. *Croton laui*** Merrill & F. P. Metcalf, Lingnan Sci. J. 16: 389. 1937.

海南巴豆 *hai nan ba dou*

Shrubs 1–5 m tall; young branches densely stellate-pubescent, glabrescent. Leaves clustered at stem apex; petiole 5–20 mm, stellate-pubescent to glabrous; leaf blade obovate or oblong-obovate to oblanceolate, rarely elliptic, 4–14 × 1.5–5 cm, papery, stellate-tomentose when young, glabrescent, yellow-brown when dry, base obtuse to slightly cordate, margin subentire or irregularly serrulate, apex obtuse to acute, base of midrib (or lateral veins) with abaxial sessile cupular glands. Inflorescence terminal, 2–13 cm, densely stellate-tomentose. Male flowers: sepals elliptic, ca. 2 mm; petals oblong, nearly as long as sepals, woolly; stamens 10; filaments woolly. Female flowers: sepals ca. 3 mm; ovary subglobose, densely stellate-tomentose; styles bifid to base. Capsules subglobose, ca. 9 mm in diam., sparsely stellate-pubescent. Seeds ellipsoidal, slightly flattened. Fl. Jan–May, fr. Apr–Aug.

• Open forests; 100–300 m. Hainan.

